HYDROGEN-HELIUM ADIABATS FOR LATE-TYPE STARS*

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ABSTRACT

For late-type main-sequence stars, the earlier models that consisted of convective cores and radiative envelopes have been superseded by models with radiative cores and convective envelopes, topped by an atmosphere in radiative equilibrium. But in the available models of the latter type, the representation of the convective zone has been rather schematic, in so far as the adiabats used would apply only if the gas were completely ionized.

Accordingly, an expression for the adiabatic gradient of hydrogen-helium mixtures has been derived from thermodynamics. This derivation takes account of the interlocking ionization of hydrogen and helium and of its coupling with the association of hydrogen into molecules. Adiabats have been computed with three values of hydrogen to helium ratio (by number), 8/1, 16/1, and ∞. Moreover, an expression for the adiabatic gradient, in which the effect of pressure ionization has been included in an approximate way, has been given for the special case of pure hydrogen.

1. INTRODUCTION

Stringent observational tests of the theory of red dwarfs (Osterbrock 1953; Limber 1958*a*, *b*) must await improvement of the stellar models in several respects. In the first place the boundary conditions at the stellar surface will have to be represented by better models of the upper photosphere, where radiative equilibrium prevails. Second, the transition zone between the radiative photosphere and the convective envelope will have to be dealt with along the lines of Mrs. Böhm-Vitense's work (Vitense 1953) on the corresponding transition zone in the sun. Third, the variability of Γ, defined by

$$\left(\frac{d \ln T}{d \ln P}\right)_{\text{ad}} = \frac{\Gamma - 1}{\Gamma}, \tag{1.1}$$

throughout the convective zone ought to be taken into account. This quantity Γ is sometimes called the effective ratio of the specific heats, which differs from the better known ratio $\gamma = C_P/C_V$, by including the effects of dissociation and ionization of the gas. A single example of the variability of Γ in the convective zone has already been given by Osterbrock (1953). In the main body of his work, however, he has used the adiabatic relation

$$P = KT^{5/2}, \tag{1.2}$$

which is a special integrated form of equation (1.1), representing the case of Γ = constant = $\frac{5}{3}$, with K being the constant of integration. The assumption Γ = constant = $\frac{5}{3}$ implies that the stellar gas is mono-atomic and either wholly neutral or completely ionized. Although Limber discussed to some extent the influence of a variable Γ, his completely convective models are likewise based on the assumption $\Gamma = \frac{5}{3}$ throughout the star.

The purpose of the present investigation is to provide a set of complete adiabats for pure hydrogen as well as hydrogen-helium mixtures. Here the term complete is used to cover the range of temperature and pressure from the dissociation of hydrogen molecules at one end through the ionization of atoms of hydrogen and helium at the other end.

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The essential feature of this study is the complete evaluation of the interlocking ionization of hydrogen and helium and of its coupling with the partial association of hydrogen into molecules. The importance of molecular association to the correct evaluation of the adiabatic gradient in late-type stars had been stressed by Wildt (1934, 1957). These adiabats with variable Γ (here evaluated) should permit a more realistic identification of a particular red dwarf with a member of the sequence of model stars, which are distinguished, and conveniently labeled, by the value of K in the convective zone. The identifications attempted by Osterbrock and by Limber are unrealistic in the sense that the neglected variability of Γ must lead to a wrong value of K (see equation [1.2]). The assignment of the appropriate value of K is accomplished by following a particular adiabat toward higher temperatures until complete ionization is attained: thereafter the asymptotic equation (1.2) holds, and this relation suffices to label the adiabat.

The main approximations adopted in this work for constructing the adiabats are as follows:

1. The contribution of the metals has been neglected. Metals play an essential role in the opacity computation, but their contribution to the internal energy and other thermodynamic functions is very small owing to their low abundances.
2. The population of the excited states of H, He, and He^+ has been deemed negligible.
3. Incipient degeneracy as well as pressure ionization have not been taken into account. However, a few exploratory cases of pressure ionization have been examined.
4. Extremely rare ions like H_2^+, H^-, HeH^+, and H_3^+ have been disregarded for the same reason as the metals.
5. The contribution of hydrogen molecules was discarded at temperatures exceeding 20000° K or so, because the extrapolated dissociation constants become rather unreliable. The precise cutoff point was selected as described in Section 6.

2. EQUATION OF STATE FOR HYDROGEN-HELIUM MIXTURES

We shall assume that the gas contains H_2, H, H^+, He, He^+, He^{++}, and electrons, the mixture as a whole being electrically neutral.

Let B denote the ratio of the number of hydrogen nuclei to helium nuclei, and let ν_1 and ν_2 be the fractions of the number of hydrogen and helium nuclei, respectively, such that

$$\nu_1 + \nu_2 = 1 \ . \tag{2.1}$$

Then,

$$B = \frac{\nu_1}{\nu_2} = \frac{2n\,(H_2) + n\,(H) + n\,(H^+)}{n\,(He) + n\,(He^+) + n\,(He^{++})} \ . \tag{2.2}$$

Here $n(H_2)$ denotes the number of hydrogen molecules per unit volume, $n(H)$ the number of hydrogen atoms per unit volume, and so on for $n(H^+)$, $n(He)$, $n(He^+)$, and $n(He^{++})$.

Let

$1 - y$ = fraction of hydrogen nuclei in molecular state,

$y - x$ = fraction of hydrogen nuclei in atomic state,

and

x = fraction of hydrogen nuclei in ionized state.

Let

$1 - x_1$ = fraction of helium nuclei in neutral state,

$x_1 - x_2$ = fraction of helium nuclei in singly ionized state,

and

x_2 = fraction of helium nuclei in doubly ionized state.

Further, let

$$\bar{x} = \nu_1 x + \nu_2 (x_1 + x_2) , \quad \text{and} \quad \overline{x^2} = \nu_1 x^2 + \nu_2 (x_1 + x_2)^2 . \tag{2.3}$$

Then the total pressure P and the mass density ρ are related by the expression

$$\rho = \frac{\bar{\mu} P}{[-\frac{1}{2}\nu_1 (1 - y) + (1 + \bar{x})] kT}, \tag{2.4}$$

where

$$\bar{\mu} = \nu_1 m_{\mathrm{H}} + \nu_2 m_{\mathrm{He}} . \tag{2.5}$$

Here m_{H} is the mass of a hydrogen atom, and m_{He} that of a helium atom, k is the Boltzmann constant, and T denotes the absolute temperature.

The following three expressions are derived from the above definitions:

$$PV = \left[-\frac{\nu_1}{2} (1 - y) + (1 + \bar{x}) \right] RT, \tag{2.6}$$

$$p_e = \frac{\bar{x} P}{[-\frac{1}{2}\nu_1 (1 - y) + (1 + \bar{x})]}, \tag{2.7}$$

and

$$p_{\mathrm{H}} = \frac{\nu_1 (y - x) P}{[-\frac{1}{2}\nu_1 (1 - y) + (1 + \bar{x})]} . \tag{2.8}$$

Here V denotes the volume per mole, R the molar gas constant, p_e the partial electron pressure, and p_{H} the partial pressure of atomic hydrogen.

3. ADIABATIC GRADIENT FOR HYDROGEN-HELIUM MIXTURES

It is generally assumed that in a stellar convective zone the average pressure-density relation, to a sufficient approximation, is given by what is commonly called the adiabatic $P - T$ relation. It would be preferable to call it explicitly the *reversible* adiabatic $P - T$ relation because the constancy of entropy along a stellar "adiabat" is tacitly assumed. After this qualifying statement, we shall refer to "reversible adiabat" simply as "adiabat" in what follows.

With entropy as a function of T and P, an isentropic (or reversible adiabatic) process is characterized by

$$\left(\frac{d \ln T}{d \ln P}\right)_S = -\frac{P}{T} \frac{[\partial S (T, P) / \partial P]_T}{[\partial S (T, P) / \partial T]_P} \equiv \left(\frac{d \ln T}{d \ln P}\right)_{\mathrm{ad}} . \tag{3.1}$$

Because

$$\left[\frac{\partial S (T, P)}{\partial T}\right]_P = \frac{C_P}{T} \quad \text{and} \quad \left[\frac{\partial S (T, P)}{\partial P}\right]_T = -\left(\frac{\partial V}{\partial T}\right)_P , \tag{3.2}$$

where C_P is the specific heat at constant pressure, it follows from equation (3.1) that

$$\left(\frac{d \ln T}{d \ln P}\right)_{\mathrm{ad}} = \frac{P}{C_P}\left(\frac{\partial V}{\partial T}\right)_P . \tag{3.3}$$

While some astrophysicists prefer to compute the adiabatic gradient by starting from the expression for the entropy and then using equation (3.1), in the present context it is preferable to use equation (3.3) because this expression makes explicit the dependence of adiabatic gradient on C_P, which for molecular hydrogen in the ideal gas state is available in tabulated form. However, equation (3.1) will be used in the next section, where we approximately include the effect of pressure ionization but neglect the presence of hydrogen molecules.

By partial differentiation of equation (2.6), we obtain:

$$\frac{P}{R}\left(\frac{\partial V}{\partial T}\right)_P = \left[-\frac{\nu_1}{2}(1-y)+(1+\bar{x})\right] + T\left\{\nu_1\left[\frac{1}{2}\left(\frac{\partial y}{\partial T}\right)_P+\left(\frac{\partial x}{\partial T}\right)_P\right]+\nu_2\left[\left(\frac{\partial x_1}{\partial T}\right)_P+\left(\frac{\partial x_2}{\partial T}\right)_P\right]\right\}. \tag{3.4}$$

The expression for the enthalpy of the hydrogen-helium gas mixture is

$$\begin{aligned} H^* = \nu_1\Big[\Big(\frac{1-y}{2}\Big)H^\circ(H_2) + (y-x)H^\circ(H) + xH^\circ(H^+) + xH^\circ(e)\Big] \\ +\nu_2\Big[(1-x_1)H^\circ(He) + (x_1-x_2)H^\circ(He^+) \\ + x_2H^\circ(He^{++}) + (x_1+x_2)H^\circ(e)\Big], \end{aligned} \tag{3.5}$$

where $H^\circ(H_2)$, $H^\circ(H)$, $H^\circ(H^+)$, $H^\circ(He)$, $H^\circ(He^+)$, $H^\circ(He^{++})$, and $H^\circ(e)$ denote the enthalpy per mole of molecular hydrogen, atomic hydrogen, ionized hydrogen, neutral helium, singly ionized helium, doubly ionized helium, and electron, respectively, the superscript circle (°) denoting the ideal gas state at one atmosphere pressure.

By partial differentiation of equation (3.5) and assuming that the population of the excited states is negligible, except in the case of molecular hydrogen, we obtain

$$\begin{aligned} \frac{C_P^*}{R} = \nu_1\Big[\Big(\frac{1-y}{2}\Big)\frac{C_P^\circ(H_2)}{R} - \tfrac{5}{2}(1-y)\Big] + \tfrac{5}{2}(1+\bar{x}) \\ +\nu_1\Big[\frac{\Delta H^\circ(H_2)}{2R}\Big(\frac{\partial y}{\partial T}\Big)_P + \frac{\Delta H^\circ(H)}{R}\Big(\frac{\partial x}{\partial T}\Big)_P\Big] \\ +\nu_2\Big[\frac{\Delta H^\circ(He)}{R}\Big(\frac{\partial x_1}{\partial T}\Big)_P + \frac{\Delta H^\circ(He^+)}{R}\Big(\frac{\partial x_2}{\partial T}\Big)_P\Big], \end{aligned} \tag{3.6}$$

where

$$\frac{\Delta H^\circ(H_2)}{RT} = \frac{\Delta E_0^\circ(H_2)}{RT} + 2.5 - \frac{E^\circ(H_2) - E_0^\circ(H_2)}{RT}, \tag{3.7}$$[1]

$$\frac{\Delta H^\circ(H)}{RT} = \frac{\Delta E_0^\circ(H)}{RT} + 2.5 - \frac{E^\circ(H) - E_0^\circ(H)}{RT}, \tag{3.8}$$

$$\frac{\Delta H^\circ(He)}{RT} = \frac{\Delta E_0^\circ(He)}{RT} + 2.5 - \frac{E^\circ(He) - E_0^\circ(He)}{RT}, \tag{3.9}$$

and

$$\frac{\Delta H^\circ(He^+)}{RT} = \frac{\Delta E_0^\circ(He^+)}{RT} + 2.5 - \frac{E^\circ(He^+) - E_0^\circ(He^+)}{RT}. \tag{3.10}$$

Here the subscript (0) is used to denote the value of the quantity at 0° K. In equations (3.7) to (3.10), $\Delta E_0^\circ(H_2)$ denotes the dissociation potential of hydrogen molecule at 0° K, and $\Delta E_0^\circ(H)$, $\Delta E_0^\circ(He)$, and $\Delta E_0^\circ(He^+)$ denote the ionization potentials of atomic hydrogen, helium, and singly ionized helium, respectively. The last terms in equations (3.7) to (3.10) represent the energy of the excited states. We shall assume that, in the case of H, He, and He^+, the population in the excited states is negligible so that the last terms in the equations (3.8) to (3.10) may be neglected. This assumption is equivalent to neglecting in equations (3.8) to (3.10) the dependence of the partition function on tem-

[1] It may be noted that in the paper by Wildt (1934), equation (7), there is a misprint of sign.

perature and pressure. In the next section we shall consider the deviations at high pressures from the assumption in the simple case of pure hydrogen.

The adiabatic gradient for a hydrogen-helium mixture can be written by substituting equations (3.4) and (3.6) in equation (3.3). Finally, we have to express $(\partial y/\partial T)_P$, $(\partial x/\partial T)_P$, $(\partial x_1/\partial T)_P$, and $(\partial x_2/\partial T)_P$ as functions of temperature and pressure. The required relations between y, x, x_1, and x_2 and the equilibrium constants are

$$K(\mathrm{H}_2) = \frac{n(\mathrm{H})}{n(\mathrm{H}_2)}\, p_{\mathrm{H}} = \frac{2\nu_1 (y-x)^2 P}{(1-y)\left[-\frac{1}{2}\nu_1 (1-y) + (1+\bar{x})\right]}, \tag{3.11}$$

$$K(\mathrm{H}) = \frac{n(\mathrm{H}^+)}{n(\mathrm{H})}\, p_e = \frac{x\bar{x}P}{(y-x)\left[-\frac{1}{2}\nu_1 (1-y) + (1+\bar{x})\right]}, \tag{3.12}$$

$$K(\mathrm{He}) = \frac{n(\mathrm{He}^+)}{n(\mathrm{He})}\, p_e = \frac{\bar{x}(x_1 - x_2)P}{(1-x_1)\left[-\frac{1}{2}\nu_1 (1-y) + (1+\bar{x})\right]}, \tag{3.13}$$

and

$$K(\mathrm{He}^+) = \frac{n(\mathrm{He}^{++})}{n(\mathrm{He}^+)}\, p_e = \frac{\bar{x}x_2 P}{(x_1 - x_2)\left[-\frac{1}{2}\nu_1 (1-y) + (1+\bar{x})\right]}. \tag{3.14}$$

According to van 't Hoff's equation, we can write

$$\left[\frac{\partial \ln K(\mathrm{H}_2)}{\partial T}\right]_P = \frac{\Delta \mathrm{H}^\circ(\mathrm{H}_2)}{RT^2}, \tag{3.15}$$

$$\left[\frac{\partial \ln K(\mathrm{H})}{\partial T}\right]_P = \frac{\Delta \mathrm{H}^\circ(\mathrm{H})}{RT^2}, \tag{3.16}$$

$$\left[\frac{\partial \ln K(\mathrm{He})}{\partial T}\right]_P = \frac{\Delta \mathrm{H}^\circ(\mathrm{He})}{RT^2}, \tag{3.17}$$

and

$$\left[\frac{\partial \ln K(\mathrm{He}^+)}{\partial T}\right]_P = \frac{\Delta \mathrm{H}^\circ(\mathrm{He}^+)}{RT^2}. \tag{3.18}$$

Differentiating logarithmically equations (3.11) to (3.14), using equations (3.15) to (3.18), and solving for $(\partial x/\partial T)_P$, we obtain

$$\frac{T}{x(1-x)}\left(\frac{\partial x}{\partial T}\right)_P = \frac{Z_1}{Z_2}, \tag{3.19}$$

where

$$\begin{aligned} Z_1 = \Bigg\{ & \frac{\Delta \mathrm{H}^\circ(\mathrm{H}_2)}{2RT}\left(\frac{1-y}{1-x}\right)\left[2Z_3 + \nu_1 (y-x)\right] \\ & + \frac{\Delta \mathrm{H}^\circ(\mathrm{H})}{RT}\left[2Z_3 - (1+\bar{x})\left(\frac{y-x}{1-x}\right)\right]\Bigg\} \\ & \times \Bigg\{ \bar{x}Z_3 + \nu_2 \left[(2x_2 + x_1)(1-x_1) + x_2(1-x_2)\right]\left[1 - \frac{\nu_1}{2}(1-y)\right]\Bigg\} \\ & - \nu_2 Z_3 \left[1 - \nu_1 (1-y) + (1-\bar{x})\left(\frac{1-y}{1-x}\right)\right] \\ & \times \left[\frac{\Delta \mathrm{H}^\circ(\mathrm{He})}{RT}(1-x_1)(x_1+x_2) + \frac{\Delta \mathrm{H}^\circ(\mathrm{He}^+)}{RT}\, x_2 (2 - x_1 - x_2)\right] \\ & - \frac{\nu_1 \nu_2}{2}(y-x)\left(\frac{1-y}{1-x}\right)\Bigg\{\frac{\Delta \mathrm{H}^\circ(\mathrm{H}_2)}{RT}\left[1 - \frac{\nu_1}{2}(1-y)\right] + \frac{\Delta \mathrm{H}^\circ(\mathrm{H})}{RT}\,\bar{x}\Bigg\} \\ & \times \left[x_2 (1-x_2) + (1-x_1)(x_1 + 2x_2)\right], \end{aligned} \tag{3.20}$$

$$Z_2 = 2Z_3^2(2\bar{x} - \overline{x^2} + 2\nu_2 x_2)$$
$$+Z_3\{-\nu_2(y+2\bar{x})[x_2(1-x_2)+(1-x_1)(x_1+2x_2)] \quad (3.21)$$
$$+\nu_1 x[(2\bar{x}-1)(y-x) - 4\bar{x}(1-x)] - y\bar{x}(1+\bar{x})\},$$

and

$$Z_3 = \left[-\frac{\nu_1}{2}(1-y) + (1+\bar{x})\right]. \quad (3.22)$$

Similarly, $(\partial y/\partial T)_P$, $(\partial x_1/\partial T)_P$, and $(\partial x_2/\partial T)_P$ can also be solved, but we have preferred to express them in terms of $(\partial x/\partial T)_P$ and then eliminate them from equations (3.4) and (3.6). This reduces equations (3.4) and (3.6) to

$$\frac{P}{R}\left(\frac{\partial V}{\partial T}\right)_P = Z_3\left(1+\frac{Z_4}{Z_5}\right), \quad (3.23)$$

and

$$\frac{C_P^*}{R} = Z_6 + \frac{Z_7 + Z_8(T/x)(\partial x/\partial T)_P}{Z_9}, \quad (3.24)$$

where

Z_3 is given by equation (3.22),

$$Z_4 = \frac{\Delta H^\circ(H_2)}{2RT}\left(\frac{1-y}{1-x}\right)[\nu_1(y-x)+2\bar{x}] + \frac{\Delta H^\circ(H)}{RT}\bar{x}\left(1+\frac{1-y}{1-x}\right) \quad (3.25)$$
$$+[\nu_1 x(1-y) + \bar{x}(y-2)]\frac{T}{x(1-x)}\left(\frac{\partial x}{\partial T}\right)_P,$$

$$Z_5 = 1 - \nu_1(1-y) + (1-\bar{x})\left(\frac{1-y}{1-x}\right), \quad (3.26)$$

$$Z_6 = \nu_1\left[\frac{1-y}{2}\frac{C_P^\circ(H_2)}{R} - \tfrac{5}{2}(1-y)\right] + \tfrac{5}{2}(1+\bar{x}), \quad (3.27)$$

$$Z_7 = \nu_1\frac{\Delta H^\circ(H_2)}{2RT}\left\{\frac{\Delta H^\circ(H)}{RT}\bar{x} + \frac{\Delta H^\circ(H_2)}{RT}\left[1-\frac{\nu_1}{2}(1-y)\right]\right\}$$
$$\times\{(y-x)(1-y)[x_2(1-x_2)+(1-x_1)(x_1+2x_2)]\}$$
$$+\bar{x}\left\{\frac{\Delta H^\circ(H_2)}{2RT}(1-y)[2Z_3+\nu_1(y-x)] + \frac{\Delta H^\circ(H)}{RT}[2(1-x)Z_3\right. \quad (3.28)$$
$$\left.-(1+\bar{x})(y-x)]\right\}\times\left[\frac{\Delta H^\circ(He)}{RT}(1-x_1)(x_1+x_2) + \frac{\Delta H^\circ(He^+)}{RT}\right.$$
$$\left.\times x_2(2-x_1-x_2)\right] + \nu_2\{(1-x)[1-\nu_1(1-y)] + (1-y)(1-\bar{x})\}$$
$$\times\left\{x_2(1-x_1)(x_1-x_2)\left[\frac{\Delta H^\circ(He^+)}{RT} - \frac{\Delta H^\circ(He)}{RT}\right]^2\right\},$$

$$Z_8 = \nu_1 \left\{ \frac{\Delta H^\circ (H_2)}{2RT} (1-y)\,[2xZ_3 - \bar{x}\,(y+2x)\,] + \frac{\Delta H^\circ (H)}{RT}\, x\langle (1-x)\,[1-\nu_1(1-y)\,] + (1-y)(1-\bar{x})\,\rangle \right\}$$
$$\times\,[x_2(1-x_2) + (1-x_1)(x_1+2x_2)\,] - \{\,2Z_3\,[\nu_1 x(1-x) + \bar{x}] + \langle \nu_1 x\,[\,(2\bar{x}-1)(y-x) - 4\bar{x}(1-x)\,] - 4\bar{x}(1+\bar{x})\,\rangle\}$$
$$\times \left[\frac{\Delta H^\circ (He)}{RT} (1-x_1)(x_1+x_2) + \frac{\Delta H^\circ (He^+)}{RT}\, x_2(2-x_1-x_2) \right], \tag{3.29}$$

and

$$Z_9 = [x_2(1-x_2) + (1-x_1)(x_1+2x_2)\,]\,\{\,(1-x)\,[1-\nu_1(1-y)\,] + (1-y)(1-\bar{x})\,\}. \tag{3.30}$$

Dividing equation (3.23) by equation (3.24), we obtain the special form of equation (3.3), defining the adiabatic gradient that is appropriate to an ideal hydrogen-helium mixture in any state of dissociation or ionization.

Now we shall consider a few special cases of this general formulation.

Case 1.—Pure hydrogen gas mixture with hydrogen in molecular, atomic, and ionized states. This implies that

$$\nu_1 = 1\,, \qquad \nu_2 = 0\,, \qquad \bar{x} = x\,, \qquad \overline{x^2} = x^2\,. \tag{3.31}$$

Equations (3.23) and (3.24) reduce to

$$\frac{P}{R}\left(\frac{\partial V}{\partial T}\right)_P = \left[-\frac{1-y}{2} + (1+x) \right] \left\{ 1 + \left(\frac{1-y}{2}\right)\left(y+\frac{x}{2}\right) \frac{\Delta H^\circ (H_2)}{RT} + x\,[\,(2-y) - \tfrac{1}{2}(1+x)\,] \frac{\Delta H^\circ (H)}{RT} \right\}, \tag{3.32}$$

and

$$\frac{C_P^*}{R} = \left(\frac{1-y}{2}\right) \frac{C_P^\circ (H_2)}{R} + \tfrac{5}{2}(y+x) + \frac{1-y}{8}\,[2y(1+y) - x(1-y)\,] \times \left[\frac{\Delta H^\circ (H_2)}{RT}\right]^2 + \frac{x}{2}\,[\,(1-x^2) + 2x(1-y)\,] \left[\frac{\Delta H^\circ (H)}{RT}\right]^2 + \frac{x}{2}(1-y)(1+x+2y) \left[\frac{\Delta H^\circ (H_2)}{RT}\right]\left[\frac{\Delta H^\circ (H)}{RT}\right]. \tag{3.33}$$

Dividing equation (3.32) by equation (3.33) yields the required adiabatic gradient, and this quotient is essentially a combination of dissociation of molecular hydrogen case given by Wildt (1934) and the case of hydrogen ionization given by Unsöld (1930).

Case 2.—Pure helium gas with helium in neutral, singly ionized, and doubly ionized states. This implies that

$$\nu_1 = 0\,, \qquad \nu_2 = 1\,, \qquad \bar{x} = (x_1 + x_2)\,, \qquad \overline{x^2} = (x_1 + x_2)^2\,. \tag{3.34}$$

Substituting equation (3.34) in equations (3.23) and (3.24), we obtain the expression for the adiabatic gradient for a pure helium gas in any state of ionization:

$$\left(\frac{d \ln T}{d \ln P}\right)_{ad} = \frac{Z_{10}(1+Z_{11}Z_{12})}{(5/2)Z_{10} + (Z_{13}+Z_{10}Z_{11}Z_{12}^2)/Z_{14}}, \tag{3.35}$$

where

$$Z_{10} = (1 + x_1 + x_2), \tag{3.36}$$

$$Z_{11} = \frac{x_1 + x_2}{2(x_1 + 2x_2)}, \tag{3.37}$$

$$Z_{12} = (1 - x_1)(x_1 + x_2)\frac{\Delta H^\circ(He)}{RT} + x_2(2 - x_1 - x_2)\frac{\Delta H^\circ(He^+)}{RT}, \tag{3.38}$$

$$Z_{13} = x_2(1 - x_1)(x_1 - x_2)\left[\frac{\Delta H^\circ(He^+)}{RT} - \frac{\Delta H^\circ(He)}{RT}\right]^2, \tag{3.39}$$

and

$$Z_{14} = x_2(1 - x_2) + (1 - x_1)(x_1 + 2x_2). \tag{3.40}$$

4. PRESSURE IONIZATION OF HYDROGEN AND ADIABATIC GRADIENT

In this section we shall derive an expression for the adiabatic gradient for pure hydrogen gas, taking into account the effect of pressure ionization. It is assumed that the dissociation of hydrogen molecules is complete.

The state of ionization of a gas at prescribed temperature and pressure is commonly computed by Saha's ionization equation. The usual expression for the Saha equation fails at very high pressures because the increased density causes the energy levels to be depressed relative to their position at infinite dilution; in extreme cases all the energy levels may, in effect, become obliterated. Under these circumstances use of the conventional Saha equation would lead to underestimation of the state of ionization. To compensate for this deficiency, we shall, following Limber (1958*b*), use a partition function which incorporates the effect of pressure ionization in an approximate way, and then we shall derive the corresponding adiabatic gradient.

Assuming that the population of the excited states is negligible, the entropy per unit volume of ith type particle can be written as

$$\frac{S_i}{k} = n_i\left(\tfrac{5}{2} + \tfrac{5}{2}\ln T - \ln p_i + \ln g_{0,\,i} + \ln m_i^{3/2} + C_1\right), \tag{4.1}$$

where

$$C_1 = \ln\left[(2\pi)^{3/2}\frac{k^{5/2}}{h^3}\right], \tag{4.2}$$

and p_i, n_i, m_i, and $g_{0,i}$ are, respectively, the partial pressure, number density, mass, and the statistical weight of the ground state of the ith type of particle.

Let x be the fraction of hydrogen nuclei in the ionized state and $(1 - x)$ in the neutral state; then the ionization equation gives

$$\ln\frac{x}{1-x}p_e = -\frac{\chi_H}{kT} + \tfrac{5}{2}\ln T + C_1 + \tfrac{3}{2}\ln\frac{m_{H^+}m_e}{m_H} + \ln\frac{g_{0,\,e}\,g_{0,\,H^+}}{g_{0,\,H}}, \tag{4.3}$$

where χ_H is the ionization potential of hydrogen.

The total entropy per unit volume of the gas is the sum of the contributions by neutral hydrogen, ionized hydrogen, and electrons and can be written, using equations (4.1) and (4.3), as

$$\frac{S}{Nk} = 2\ln\frac{x}{1-x} + (1+x)\left(\frac{5}{2} + \frac{\chi_H}{kT}\right) + \tfrac{3}{2}\ln\frac{m_H^2}{m_{H^+}m_e} + \ln\frac{g_{0,\,H}^2}{g_{0,\,H^+}g_{0\ e}}, \tag{4.4}$$

where N is the number of hydrogen nuclei per unit volume.

Following Limber (1958*b*), we shall assume that $g_{0,\,\mathrm{H}}$ is given by

$$g_{0,\,\mathrm{H}} = 2\,e^{-(ap_e/T^2)}\,, \tag{4.5}$$

where

$$a = \frac{4\pi a_0^2 e^2 \beta^2}{k^2} = 4.2597 \times 10^{-3}\beta^2\,, \tag{4.6}$$

a_0 being the radius of the Bohr orbit, e the charge of an electron, k the Boltzmann constant, and β is a constant. The value of β is so chosen that it best describes the effect of pressure ionization. Actually, it will be a function of temperature and pressure and will assume different values for each pair of arguments T and P in the interior of a star. There is no simple way to compute the value of this average β. Therefore the adiabat so derived cannot be accepted without reservation.

Substituting equation (4.5) in equation (4.4), we obtain

$$\frac{S}{Nk} = 2\,\ln\frac{x}{1-x} + (1+x)\left(\frac{5}{2}+\frac{\chi_{\mathrm{H}}}{kT}\right) - \frac{2aP}{T^2}\left(\frac{x}{1+x}\right) + C_2\,, \tag{4.7}$$

where

$$C_2 = \tfrac{3}{2}\,\ln\frac{m_{\mathrm{H}}}{m_e} + \ln 2\,, \tag{4.8}$$

in which we have taken $g_{0,\,e} = 2$, $g_{0,\,\mathrm{H}^+} = 1$, and have made the approximation $m_{\mathrm{H}} = m_{\mathrm{H}^+}$.

Substituting equation (4.5) in equation (4.3), we obtain

$$\ln\frac{x^2}{1-x^2}P = -\frac{\chi_{\mathrm{H}}}{kT} + \tfrac{5}{2}\ln T + \frac{x}{1+x}\frac{aP}{T^2} + C_2\,. \tag{4.9}$$

Since x is a function of T and P, we can write equation (3.2) as

$$\left(\frac{d\,\ln T}{d\,\ln P}\right)_{\mathrm{ad}} = -\frac{P}{T}\,\frac{(\partial S/\partial T)_{T,\,x} + (\partial S/\partial x)_{T,\,P}(\partial x/\partial P)_T}{(\partial S/\partial T)_{P,\,x} + (\partial S/\partial x)_{T,\,P}(\partial x/\partial T)_P}\,. \tag{4.10}$$

Differentiating equations (4.7) and (4.9) and substituting in equation (4.10) yields

$$\left(\frac{d\,\ln T}{d\,\ln P}\right)_{\mathrm{ad}} = \frac{f'}{f''}\,, \tag{4.11}$$

where

$$f' = 2 + x(1-x)\left(\frac{5}{2}+\frac{\chi_{\mathrm{H}}}{kT}\right) - x(1-x)\frac{ap_e}{T^2}\left(\frac{5}{2}+\frac{\chi_{\mathrm{H}}}{kT}\right), \tag{4.12}$$

and

$$f'' = 5 + x(1-x)\left(\frac{5}{2}+\frac{\chi_{\mathrm{H}}}{kT}\right)^2 - (1-x)\frac{ap_e}{T^2} \times\left[\frac{2(1+x+x^2)}{(1+x)}\left(\frac{5}{2}+\frac{\chi_{\mathrm{H}}}{kT}\right) - \frac{4}{(1+x)} - \frac{\chi_{\mathrm{H}}}{kT}\right]. \tag{4.13}$$

Putting $a = 0$, the above expression reduces to the case in which pressure ionization is disregarded.

5. SOME PROPERTIES OF MOLECULAR HYDROGEN

The total energy of a molecule comprises that of translation, of vibration, of rotation, and of electronic excitation. The first of these contributions to the energy per mole of an ideal gas is

$$E^{\circ}_{\text{trans}} = \tfrac{3}{2} N_0 kT\,, \tag{5.1}$$

where N_0 is the Avogadro number, and k the Bolzmann constant.

The contribution of the other degrees of freedom to the energy, above the zero point, can be expressed as

$$E^{\circ}_{\text{int}} - E^{\circ}_0 = \Sigma n_j \epsilon_j \qquad \text{for all} \qquad n_j \neq 0\,, \tag{5.2}$$

$$= N \Sigma g_j \epsilon_j e^{-\epsilon_j/kT} / \text{(p.f.)}_{\text{int}}\,. \tag{5.3}$$

Here

$$\text{(p.f.)}_{\text{int}} = \Sigma g_j e^{-\epsilon_j/kT}\,, \tag{5.4}$$

summed over all internal energy levels, denotes the partition function or the sum-over-states, n_j is the number of molecules having internal energy ϵ_j above the lowest energy, and g_j is the statistical weight of the jth state. Here, E°_0, the zero-point energy, is a constant and denotes the energy at 0° K at which translational energy ceases to exist and each molecule is in the lowest energy state.

In the case of atomic hydrogen the ground state is far below the others in energy and hence the contribution of the higher states to the partition function is almost negligible as compared to the ground state. This simplifies the matter considerably. But for molecular hydrogen this is not true, and a very large number of excited states must be included in the partition function. The precise values of these are taken from the analysis of molecular spectra. But, in practice, values for quantum numbers higher than available from direct spectroscopic determination are often required, and an extrapolation of the observed data becomes necessary. Such is the case for molecular hydrogen. Knowing the partition function, the several thermodynamic functions can be predicted.

Such computations were carried out at the National Bureau of Standards (NBS, 1955), and the values of C°_P/R, $(\text{H}^{\circ} - E^{\circ}_0)/RT$, S°/R, and $-(F^{\circ} - E^{\circ}_0)/RT$ for normal molecular hydrogen (that is, 75 per cent in ortho and 25 per cent in para state) from $T = 10°$ K to $T = 5000°$ K have been collated. Here S° and F° denote entropy and free energy per mole, respectively, R the molar gas constant, and $T_0 = 273.16°$ K. The superscript (°) is used to indicate the ideal gas state at one atmosphere pressure. Fickett and Cowan (1954, 1955) have recently published the values of $(H^{\circ} - H^{\circ}_0)/RT$ and S°/R for molecular hydrogen from 5000° K to 12000° K, and their work is in essence an extension of the NBS tables (1955) to higher temperatures. The values of C°_P/R for molecular hydrogen for temperatures from 5000° K to 12000° K have been computed by the author from the thermodynamic relation

$$\frac{C^{\circ}_P}{R} = 1 + \frac{(E^{\circ} - \text{H}^{\circ}_0)}{RT} + T \frac{\partial}{\partial T}\left(\frac{E^{\circ} - \text{H}^{\circ}_0}{RT}\right), \tag{5.5}$$

using the values of the thermodynamic functions tabulated by Fickett and Cowan (1955).

For atomic hydrogen, thermodynamic functions from 10° K to 5000° K are tabulated in the NBS circular (1955). For higher temperatures the values have been computed by the author using the following expressions:

$$\frac{S^{\circ}}{R} = \frac{S^{\circ}_{\text{trans}}}{R} = \tfrac{5}{2} \ln T + \ln \frac{(2\pi M)^{3/2} R^{5/2}}{h^3 N_0^4} + \tfrac{5}{2}$$
$$= \tfrac{5}{2} \ln T + 0.2330\,, \tag{5.6}$$

and

$$-\frac{F^{\circ} - E^{\circ}_0}{RT} = \ln g_1 - \tfrac{5}{2} + \frac{S^{\circ}_{\text{trans}}}{R} = \tfrac{5}{2} \ln T - 2.2670\,, \tag{5.7}$$

referred to one atmosphere pressure. Here M denotes the mass of one mole of atomic hydrogen, h the Planck constant, N_0 the Avogadro number, and S°_{trans} the translational entropy per mole.

The dissociation equilibrium constant for molecules has been computed using the thermodynamic relation:

$$\ln K(\mathrm{H_2}) = \left(\frac{F^\circ - E_0^\circ}{RT}\right)_{\mathrm{H_2}} - 2\left(\frac{F^\circ - E_0^\circ}{RT}\right)_{\mathrm{H}} - \frac{\Delta E_0^\circ(\mathrm{H_2})}{RT}, \tag{5.8}$$

and the values of $\Delta H^\circ(H_2)/\mathrm{RT}$ have been obtained as a function of temperature using the expression

$$\frac{\Delta \mathrm{H}^\circ(\mathrm{H_2})}{RT} = \frac{\Delta E_0^\circ(\mathrm{H_2})}{RT} + 2.5 - \left(\frac{\mathrm{H}^\circ - \mathrm{H}_0^\circ}{RT}\right)_{\mathrm{H_2}}. \tag{5.9}$$

TABLE 1

SOME THERMODYNAMIC FUNCTIONS OF MOLECULAR HYDROGEN

T	θ	$\log_{10}K(\mathrm{H_2})$	$C_P^\circ(\mathrm{H_2})/R$	$\Delta\mathrm{H}^\circ(\mathrm{H_2})/RT$
1000	5.040	−11.281	3.633	51.946
1500	3.360	− 3.504	3.885	34.545
2000	2.520	0.427	4.124	25.782
2500	2.016	2.805	4.310	20.482
3000	1.680	4.401	4.458	16.920
4000	1.260	6.408	4.701	12.419
5000	1.008	7.622	4.829	9.695
6000	0.840	8.438	4.855	7.885
7000	0.720	9.019	4.915	6.561
8000	0.630	9.456	4.983	5.557
9000	0.560	9.794	5.060	4.766
10000	0.504	10.065	5.162	4.127
12000	0.420	10.468	5.515	3.143

In these calculations the following values of the various constants have been used:

$$\Delta E_0^\circ = 4.4763 \text{ ev}$$
$$1 \text{ ev} = 23063.2 \text{ cal mol}$$
$$R = 1.98719 \text{ cal/deg/mol}$$
$$h = 6.6237 \times 10^{-27} \text{ ergs sec}$$
$$N_0 = 6.0235 \times 10^{23}$$
$$M = 1.008 \text{ gram in the case of atomic hydrogen}$$
$$T_0 = 273.16^\circ \text{ K}$$

Table 1 gives the values of $\log_{10}K(\mathrm{H_2})$, $C_P^\circ(\mathrm{H_2})/R$, and $\Delta\mathrm{H}^\circ(\mathrm{H_2})/RT$ from $T = 1000$ to 12000° K. The physical dimension of $K(\mathrm{H_2})$ is that of pressure, and the pressure unit used in Table 1 is 1 dyne/cm². Note that the dissociation constants tabulated by Wildt (1934) are in units of 1 atmosphere pressure.

Figure 1 gives a plot of $\log_{10}K(\mathrm{H_2})$ versus $\theta = 5040.39/T$. For comparison, the values of Wildt (1934), after correction for the modern dissociation constant, and the values of

de Jager and Neven (1957) ($\Delta E_0^\circ = 4.476$ ev) have also been plotted. Wildt's values fall pretty close to our curve, whereas the de Jager and Neven values agree with ours only at lower temperatures—exceeding ours at higher temperatures. The explanation is simply that Wildt's values and those quoted in this paper are derived from a realistic partition function, whereas de Jager and Neven have used the harmonic oscillator and rigid rotator approximations.

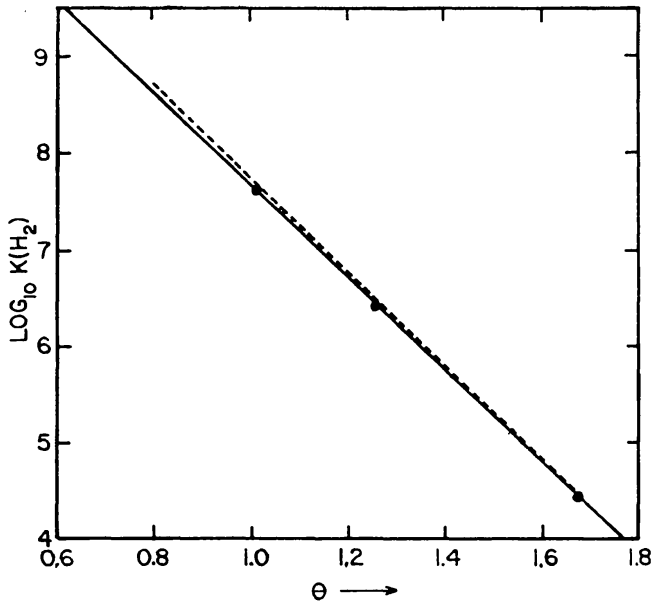

FIG. 1.—Plot of log $_{10}K(H_2)$ versus θ. The solid curve (——) is drawn from the values given in Table 1. The points (●) are those given by Wildt (1934) after correcting for the modern value of the dissociation constant, and the dotted curve (-----) shows de Jager and Neven (1957) values.

6. NUMERICAL COMPUTATION OF THE ADIABATS

Evaluation of the adiabatic gradient for a prescribed chemical composition, at any point (T, P), requires the knowledge of p_e and p_H at that point. The values of p_e and p_H were determined in the manner described below. Starting with

$$\frac{p_e}{p_H} = \frac{n_e}{n(H)} = \frac{n(H^+) + n(He^+) + 2n(He^{++})}{n(H)}, \tag{6.1}$$

and eliminating the several n from equation (6.1) with the help of equations (3.11) to (3.14) and (2.2), we obtain (after rearranging the terms)

$$f_1\left[\frac{p_H}{K(H_2)}\right]^2 + f_2\left[\frac{p_H}{K(H_2)}\right] - f_3 p_e^2 = 0, \tag{6.2}$$

where

$$f_1 = 2\nu_2 K(H_2)\, K(He)\, p_e\, [p_e + 2K(He^+)], \tag{6.3}$$

$$f_2 = K(H_2)\, \{ f_3 K(H) + \nu_2 K(He)\, [p_e + K(H)]\, [p_e + 2K(He^+)] \} \tag{6.4}$$

and

$$f_3 = \nu_1 [p_e^2 + K(He)\, p_e + K(He)\, K(He^+)]. \tag{6.5}$$

Furthermore,

$$\frac{P - 2p_e}{p_e} = \frac{n(H_2) + n(H) + n(He) - n(He^{++})}{n(H^+) + n(He^+) + 2n(He^{++})}. \tag{6.6}$$

Eliminating the several n as before, we obtain

$$\frac{p_{\rm H}}{K\,({\rm H}_2)} = \frac{f_4}{f_5}, \tag{6.7}$$

where

$$f_4 = \left(\frac{P-2p_e}{p_e}\right)\frac{f_2}{K\,({\rm H}_2)} - \{f_3 p_e + \nu_2\,[p_e^2 - K\,({\rm He})\,K\,({\rm He}^+)\,][p_e + K\,({\rm H})\,]\}, \tag{6.8}$$

and

$$f_5 = f_3 p_e + 2\nu_2\{p_e\,[p_e^2 - K\,({\rm He})\,K\,({\rm He}^+)\,] - K\,({\rm He})\,(P-2p_e)\,[p_e + 2K\,({\rm He}^+)\,]\}. \tag{6.9}$$

It may be noted that f_1, f_2, f_3, f_4, and f_5 are functions of T, P, p_e, and the chemical composition only. After eliminating $p_{\rm H}/K({\rm H}_2)$ from equation (6.2) by substituting equation (6.7), we obtain a polynomial equation in p_e, the coefficients of which are functions of T, P, and the chemical composition only. After solving this polynomial for p_e, $p_{\rm H}$ is found from equation (6.7).

At very low electron pressures ($p_e \ll p_{\rm H}$), it is preferable to determine $p_{\rm H}$ first and then from it p_e, for greater accuracy. This can be achieved by assuming that at low electron pressures, hydrogen atoms are the only donors of electrons. Then

$$p_{\rm H}\left\{\nu_1\left[1 + \frac{p_{\rm H}}{K\,({\rm H}_2)} + 2\sqrt{\frac{K\,({\rm H})}{p_{\rm H}}}\right] + \nu_2\left[1 + \frac{2p_{\rm H}}{K\,({\rm H}_2)} + \sqrt{\frac{K\,({\rm H})}{p_{\rm H}}}\right]\right\} - \nu_1 P = 0. \tag{6.10}$$

Solving this polynomial, we find $p_{\rm H}$, and then p_e from

$$p_e = \sqrt{[K\,({\rm H})\,p_{\rm H}]}. \tag{6.11}$$

Simplified expressions (6.10) and (6.11) were used only for $p_e \leq p_{\rm H}/10^4$.

The values of y, x, x_1, and x_2 were determined using the following expressions:

$$y = \frac{p_e + K\,({\rm H})}{p_e + K\,({\rm H}) + 2p_e\,[p_{\rm H}/K\,({\rm H}_2)\,]}, \tag{6.12}$$

$$x = \frac{K\,({\rm H})}{p_e + K\,({\rm H}) + 2p_e\,[p_{\rm H}/K\,({\rm H}_2)\,]}, \tag{6.13}$$

$$x_1 = \frac{p_e + K\,({\rm He}^+)}{p_e + K\,({\rm He}^+) + p_e\,[p_e/K\,({\rm He})\,]}, \tag{6.14}$$

and

$$x_2 = \frac{K\,({\rm He}^+)}{p_e + K\,({\rm He}^+) + p_e\,[p_e/K\,({\rm He})\,]}. \tag{6.15}$$

The values of $\log_{10}K({\rm H}_2)$ as a function of temperature are given in Table 1. For ease of computation, the following polynomial was used to determine its value at any temperature:

$$\log_{10} K\,({\rm H}_2) = 12.5335050 - 4.9251644\,\theta + 0.056191273\,\theta^2 - 0.0032687661\,\theta^3, \tag{6.16}$$

where $\theta = 5040.39/T$. The percentage root-mean-square error of this polynomial representation is 0.036 for $0.420 \leq \theta \leq 5.040$. The expressions used for the determination of $\log_{10}K({\rm H})$, $\log_{10}K({\rm He})$, and $\log_{10}K({\rm He}^+)$ were

$$\log_{10} K(\mathrm{H}) = -13.595\theta + 2.5 \log_{10} T - 0.4772 , \tag{6.17}$$

$$\log_{10} K(\mathrm{He}) = -24.580\theta + 2.5 \log_{10} T + 0.1249 , \tag{6.18}$$

and

$$\log_{10} K(\mathrm{He}^+) = -54.403\theta + 2.5 \log_{10} T - 0.4772 . \tag{6.19}$$

The polynomial, used for the evaluation of $\Delta H^\circ(H_2)/RT$ at different temperatures, based on the values of Table 1, was

$$\frac{\Delta H^\circ(H_2)}{RT} = -2.0199052 + 13.092816\theta - 2.2173815\theta^2 + 0.90719535\theta^3 - 0.13960228\theta^4 . \tag{6.20}$$

The percentage root-mean-square error of this polynomial is 0.06 for $0.420 \leq \theta \leq 2.520$.

The following expressions were used for the determination of $\Delta H^\circ(H)/RT$, $\Delta H^\circ(He)/RT$, and $\Delta H^\circ(He^+)/RT$:

$$\frac{\Delta H^\circ(H)}{RT} = \frac{1.5778270 \times 10^5}{T} + 2.5 , \tag{6.21}$$

$$\frac{\Delta H^\circ(He)}{RT} = \frac{2.8527391 \times 10^5}{T} + 2.5 , \tag{6.22}$$

and

$$\frac{\Delta H^\circ(He^+)}{RT} = \frac{6.3139774 \times 10^5}{T} + 2.5 . \tag{6.23}$$

In equations (6.17) to (6.19) and (6.21) to (6.23) it has been assumed that the population of the excited levels is negligible.

The values of $C_P^\circ(H_2)/R$ were fitted to the following polynomial:

$$\frac{C_P^\circ(H_2)}{R} = 12.623106 - 36.592610\theta + 69.724904\theta^2 - 67.984357\theta^3 + 35.547338\theta^4 - 9.5113792\theta^5 + 1.0228498\theta^6 , \tag{6.24}$$

the percentage root-mean-square error being 0.47 for $0.420 \leq \theta \leq 2.520$. The polynomials (6.16), (6.20), and (6.24) have been evaluated by least-square fitting over the ranges stated.

The polynomial equations were solved using the half-interval method. The integration of the adiabats was performed using Gill's version (1950) of the Runge-Kutta method of solving differential equations. In the calculations eight significant figures were always retained, by using floating point arithmetic. The final results, however, were punched with only five figures after the decimal. The computations were carried out on the IBM 650 electronic computer of the Yale University Computing Center and the IBM 704 electronic computer of the Massachusetts Institute of Technology Computing Center.

All adiabats were started at $\log T = 3.4$, and the integrations were continued up to $\log T = 6.7$. The choice of this range was motivated by the desire to cover even stars of very late type, which may be wholly convective.

In regard to the abundance ratio of hydrogen to helium, spectroscopic observations and the theory of model atmospheres suggest that this ratio, B, may lie somewhere between 6/1 (Unsöld 1944) and 20/1 (Underhill 1954). Adiabats were computed for two values of B, 8/1 and 16/1, which seemed adequate for representing the above extreme values. In addition, pure hydrogen adiabats ($B = \infty$) were also constructed.

It was realized from the beginning that the extrapolated equilibrium constants of H_2,

based upon the polynomial (6.16), are of dubious physical significance at temperatures exceeding 12000° K ($\theta = 0.420$) and that there was no hope of getting reliable information about the persistence of molecules at higher temperatures, unless the thermodynamic calculations for molecular hydrogen were extended beyond the range treated by Fickett and Cowan. At present this is not feasible, for reasons dealt with in Section 5. Consequently, it was necessary to drop, at some arbitrary temperature, the terms in the adiabatic gradient that represent the contribution from molecular hydrogen. Trial integrations *without* such a cutoff gave the unexpected result that the fraction of hydrogen molecules, $(1 - y)/(1 + y)$, did not go to zero with increase in temperature, but, after passing through a minimum, showed a marked rise. In all cases examined, this minimum happened to occur at log $T = 4.30$ ($\theta = 0.253$), or earlier. Whether this minimum has

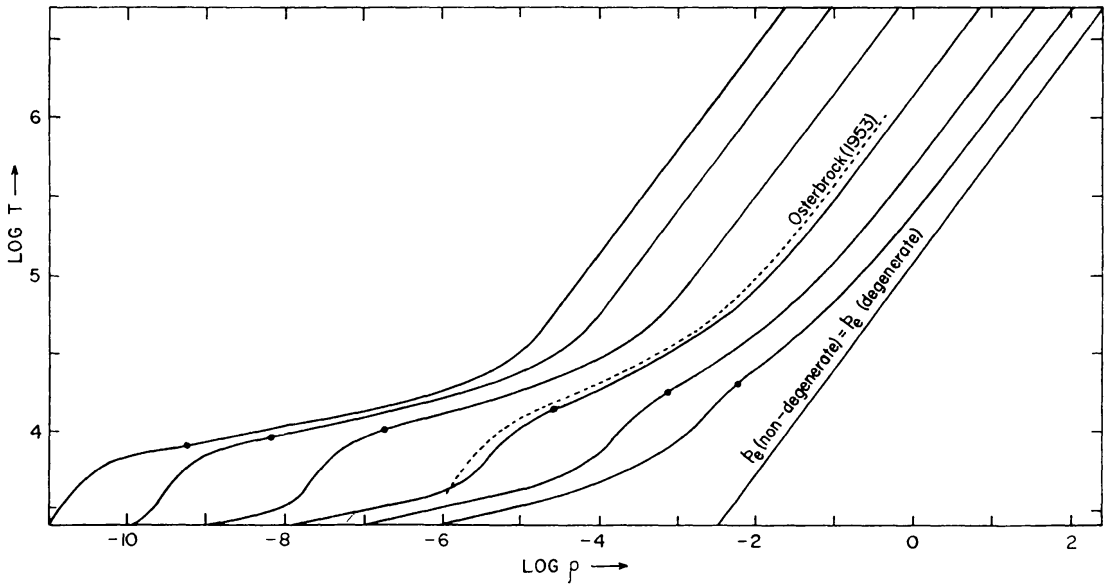

FIG. 2.—Pure hydrogen ($B = \infty$) adiabats

any physical significance cannot be decided before the thermodynamics of molecular hydrogen in this temperature range has been cleared up. The following rule for selecting the cutoff point was adopted for convenience in coding: If the fraction of hydrogen molecules reached a minimum at log T', then the actual cutoff was made at (log T' + 0.05).

It should be noted that this cutoff point of hydrogen molecules causes a discontinuity in the partial pressure of molecular hydrogen, and, if the integration is continued beyond this cutoff point, while keeping either the total density or the total pressure continuous, discontinuities in the partial pressures of all atoms and ions are engendered. Moreover, these discontinuities of the partial pressures differ according to whether the total pressure or the total density is kept continuous. For the sake of consistency, in all integrations, the total pressure has been kept continuous.

7. DISCUSSION AND CONCLUSION

Figures 2, 3, and 4 illustrate a few of the computed adiabats which are detailed in the appendix (Tables 1.01.0 to 3.11.0, for $B = \infty$, 16/1, and 8/1, respectively). The line "p_e (non-degenerate) = p_e (degenerate)" in these figures defines the boundary, where the non-degenerate and degenerate formulae give the same electron pressure (see, for example, Schwarzschild 1958). The point where molecular hydrogen has been cut off has

been indicated by a dot on these adiabats. These figures clearly show the increasing effect on these adiabats of the dissociation of molecular hydrogen, as we go from left to right (from lower to higher densities) in these diagrams. The pure hydrogen adiabat computed by Osterbrock (1953), neglecting the molecules, has been added to Figure 2, in order to show how it crosses the new adiabats. The effect of these new adiabats on the models of late-type main-sequence stars has been examined by Vardya and Wildt (1960).

Table 2 lists the values of $\log_{10}K$ for the various adiabats computed. In Table 2, T_1(° K) and ρ_1 (in gm/cm^3) are the lower terminal values of temperature and density, respectively. The value of K appropriate to each adiabat was determined by substituting in equation (1.2) the pressure at $\log_{10}T = 6.7$. Use of this equation assumes that the value of the gradient, $(d \ln T/d \ln P)_{ad}$, has attained its asymptotic value of $\frac{2}{5}$. The dif-

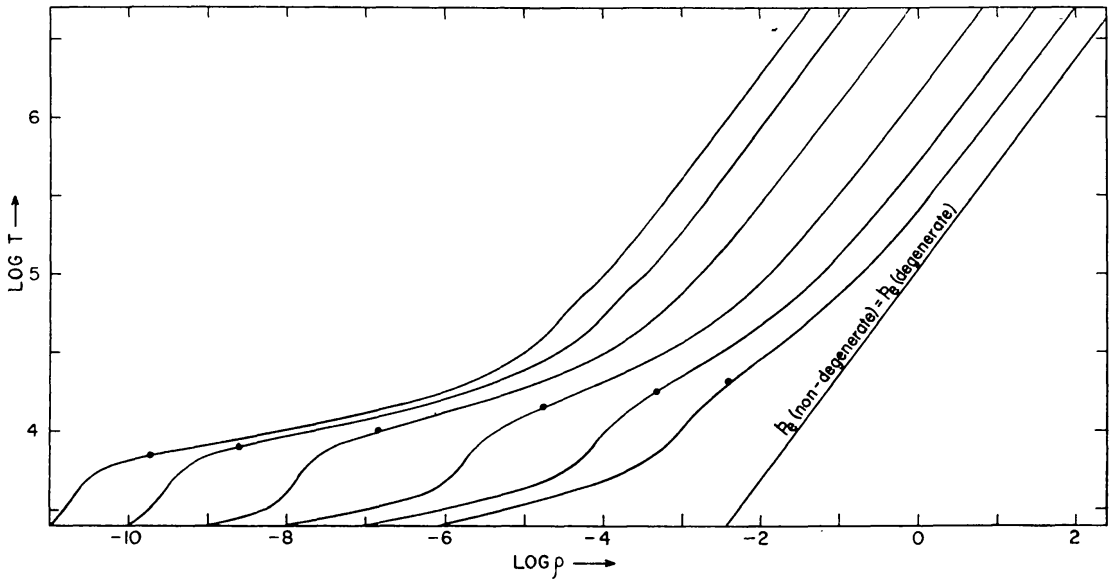

FIG. 3.—Hydrogen-helium adiabats with $B = 16/1$

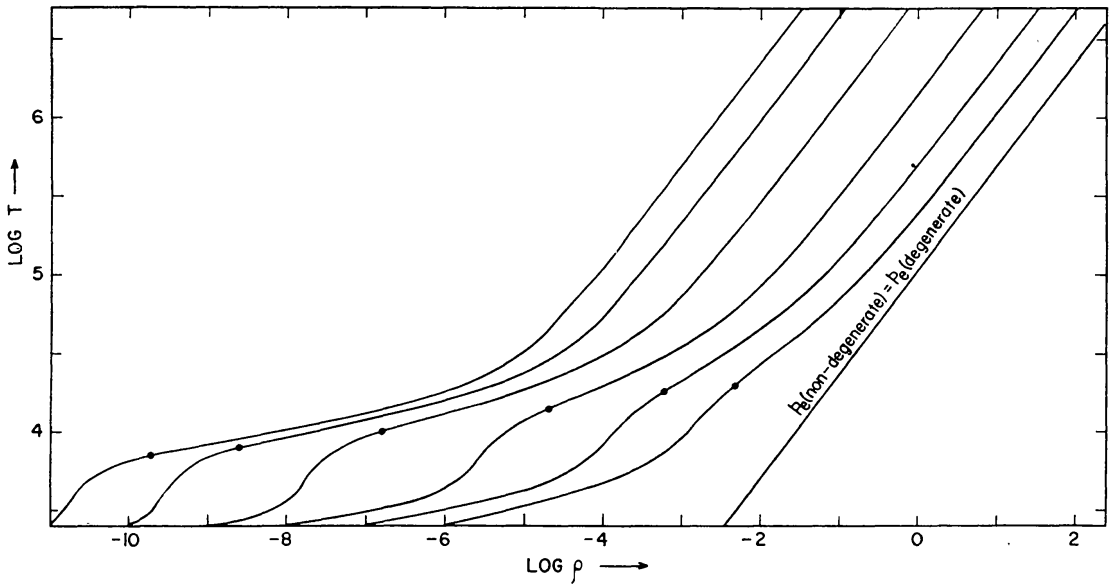

FIG. 4.—Hydrogen-helium adiabats with $B = 8/1$

ference between the gradient at $\log_{10}T = 6.7$, and its asymptotic value is in no case greater than 0.5 per cent.

For the same lower terminal value of T_1, ρ_1, the value of K is seen to increase on going from pure hydrogen adiabats to hydrogen-helium adiabats of increasing abundance of helium, in the case when ρ_1 is small (say, 10^{-10} gm/cm^3) (low-density adiabats). As we go to higher starting densities, the increment, owing to the addition of helium, decreases, and the trend reverses at higher values of ρ_1 (say, 10^{-8} gm/cm^3) (high-density adiabats). The reason for this reversal appears to be a difference in the rate of ionization of singly ionized helium; along a high-density adiabat the ionization of singly ionized helium does not proceed fast enough to reduce the value of the gradient significantly, whereas along the low-density adiabats it proceeds at a rate sufficient to produce a noticeable change in the gradient. In other words, along the high-density adiabats the helium component appears to act like a neutral or less active fraction, as compared with the hydrogen component, whereas along the low-density adiabats the helium component, owing to its

TABLE 2

VALUES OF $\log_{10}K$

B	$\log_{10}T_1$	$\log_{10}\rho_1$	$\log_{10}K$	β	See Table:
∞	3.4	− 6.0	0.053	0	1.01.0
∞	3.4	− 6.0	0.150	1	1.01.1
∞	3.4	− 6.0	0.152	2	1.01.2
∞	3.4	− 6.5	−0.155	0	1.02.0
∞	3.4	− 6.5	−0.056	2	1.02.2
∞	3.4	− 7.0	−0.391	0	1.03.0
∞	3.4	− 7.0	−0.304	2	1.03.2
∞	3.4	− 7.5	−0.680	0	1.04.0
∞	3.4	− 7.5	−0.617	2	1.04.2
∞	3.4	− 8.0	−1.046	0	1.05.0
∞	3.4	− 8.0	−1.017	2	1.05.2
∞	3.4	− 8.5	−1.502	0	1.06.0
∞	3.4	− 9.0	−2.016	0	1.07.0
∞	3.4	− 9.5	−2.502	0	1.08.0
∞	3.4	−10.0	−2.894	0	1.09.0
∞	3.4	−10.5	−3.204	0	1.10.0
∞	3.4	−11.0	−3.476	0	1.11.0
16/1	3.4	− 6.0	0.003	.....	2.01.0
16/1	3.4	− 6.5	−0.202	.....	2.02.0
16/1	3.4	− 7.0	−0.436	.....	2.03.0
16/1	3.4	− 7.5	−0.724	.....	2.04.0
16/1	3.4	− 8.0	−1.088	.....	2.05.0
16/1	3.4	− 8.5	−1.535	.....	2.06.0
16/1	3.4	− 9.0	−2.022	.....	2.07.0
16/1	3.4	− 9.5	−2.467	.....	2.08.0
16/1	3.4	−10.0	−2.823	.....	2.09.0
16/1	3.4	−10.5	−3.111	.....	2.10.0
16/1	3.4	−11.0	−3.370	.....	2.11.0
8/1	3.4	− 6.0	−0.037	.....	3.01.0
8/1	3.4	− 6.5	−0.239	.....	3.02.0
8/1	3.4	− 7.0	−0.472	.....	3.03.0
8/1	3.4	− 7.5	−0.759	.....	3.04.0
8/1	3.4	− 8.0	−1.119	.....	3.05.0
8/1	3.4	− 8.5	−1.553	.....	3.06.0
8/1	3.4	− 9.0	−2.015	.....	3.07.0
8/1	3.4	− 9.5	−2.427	.....	3.08.0
8/1	3.4	−10.0	−2.755	.....	3.09.0
8/1	3.4	−10.5	−3.028	.....	3.10.0
8/1	3.4	−11.0	−3.277	.....	3.11.0

double ionization, produces a greater deviation from the asymptotic gradient than would occur if it were replaced by the equivalent amount of hydrogen.

Tables 1.01.0, 2.01.0, 3.01.0, and other tables with high starting values of ρ_1, show that, even at temperatures of the order of five million degrees, matter is far from having attained complete ionization, while at the same time, the densities are approaching the domain of degeneracy (see Figs. 2, 3, and 4). As an illustration, the effect of pressure ionization on a single adiabat of pure hydrogen was explored in the following manner. Starting with $\log_{10}T = 3.4$, $\log_{10}\rho = -6.0$, the integration was carried forward, neglecting pressure ionization, to $\log_{10}T = 4.3$ (Table 1.01.0), at which point the hydrogen molecules were cut off. Beyond this cutoff point the integration was continued in three different ways, namely, with $\beta = 0.0$, i.e., no pressure ionization (Table 1.01.0), $\beta = 1.0$ (Table 1.01.1), and $\beta = 2.0$ (Table 1.01.2). It was found that for the single adiabat examined, pressure ionization raises K by about 25 per cent. The value of K for $\beta = 1.0$ and for $\beta = 2.0$, however, differ by less than 2 per cent, although β enters in equation (4.6) as β^2. It is reassuring that the preferred numerical value of β does not seem to be critical. Accordingly, for the pure-hydrogen adiabats, starting at $\log_{10}\rho = -6.5$, -7.0, -7.5, and -8.0, the integration beyond the cutoff point for molecular hydrogen was carried on with $\beta = 0$ (Tables 1.02.0, 1.03.0, 1.04.0, 1.05.0, respectively) as well as with $\beta = 2.0$ (Tables 1.02.2, 1.03.2, 1.04.2, and 1.05.2, respectively).

The surprising persistence of hydrogen molecules at high temperatures has already been mentioned. Until the equilibrium constants for molecular hydrogen at these high temperatures (beyond the range computed by Fickett and Cowan [1955]) are available, it is difficult to decide whether this persistence is a spurious result of the extrapolation adopted or whether it is genuine. In case future work confirms the persistence of hydrogen molecules at temperatures where hydrogen is being ionized, it may well be necessary to take account of the additional formation of the stable ion H_3^+, whose dissociation into H_2 and H^+ requires an energy of about 8 ev. Finally, it must be admitted that our computation of the dissociation equilibrium of hydrogen molecules is open to criticism because at the high-density end of the adiabats, molecular hydrogen is bound to fail to behave as an ideal gas. Unfortunately, there is no simple way of estimating the deviation from the ideal behavior of hydrogen molecules at the relevant temperatures and pressures.

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APPENDIX

In the following tabulation each adiabat is characterized by a number of the form *p.q.r.*, where $p = 1, 2, 3$ denotes hydrogen to helium abundance ratio $B = \infty, 16/1, 8/1$, respectively; q is the serial number of the adiabat for one particular composition; and r is the value of β (see equation 4.6) used in the integration after the cutoff of molecular hydrogen. Only in the pure hydrogen case ($B = \infty$) does r or β have meaning, becuuse pressure ionization has not been considered in the case of hydrogen-helium gas mixtures. The chemical composition for each adiabat is also given by the value of NU 1 which is $\nu_1 = B/(1 + B)$, and BETA gives the value of β in the case of pure hydrogen adiabats. The column headings have the following meanings:

LOG T = $\log_{10} T$

LOG RHO = $\log_{10} \rho$

LOG P = $\log_{10} P$

MOL. H = fraction of molecular hydrogen by number
= $(1 - y)/(1 + y)$

AT. H = fraction of atomic hydrogen by number
= $2(y - x)/(1 + y)$

HE ONE = fraction of neutral helium = $1 - x_1$

HE TWO = fraction of singly ionized helium = $x_1 - x_2$

GRAD. = $(d \ln T/d \ln P)_{ad}$

TABLE 1.01.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-6.00000	5.03257	0.92214	0.07786	0.11395
3.450	-5.60172	5.49627	0.85511	0.14489	0.10390
3.500	-5.18607	5.98196	0.77142	0.22858	0.10313
3.550	-4.78402	6.45746	0.67830	0.32170	0.10796
3.600	-4.41356	6.90360	0.58193	0.41807	0.11693
3.650	-4.08351	7.31048	0.48716	0.51284	0.12970
3.700	-3.79706	7.67386	0.39775	0.60225	0.14655
3.750	-3.55384	7.99304	0.31665	0.68335	0.16808
3.800	-3.35109	8.26971	0.24611	0.75389	0.19494
3.850	-3.18417	8.50756	0.18750	0.81248	0.22712
3.900	-3.04686	8.71216	0.14120	0.85872	0.26277
3.950	-2.93180	8.89072	0.10645	0.89331	0.29727
4.000	-2.83129	9.05127	0.08160	0.91779	0.32421
4.050	-2.73818	9.20163	0.06454	0.93404	0.33867
4.100	-2.64654	9.34856	0.05328	0.94371	0.33984
4.150	-2.55182	9.49740	0.04628	0.94791	0.33077
4.200	-2.45092	9.65185	0.04243	0.94724	0.31628
4.250	-2.34226	9.81396	0.04101	0.94198	0.30083
4.300	-2.22572	9.98413	0.04161	0.93224	0.28740
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.30				
4.350	-2.12336	10.15950	0.00000	0.96123	0.28056
4.400	-1.99911	10.33979	0.00000	0.94668	0.27475
4.450	-1.87308	10.52269	0.00000	0.92988	0.27253
4.500	-1.74721	10.70607	0.00000	0.91124	0.27323
4.550	-1.62302	10.88818	0.00000	0.89121	0.27622
4.600	-1.50159	11.06775	0.00000	0.87021	0.28091
4.675	-1.32601	11.33060	0.00000	0.83784	0.29014
4.750	-1.15904	11.58450	0.00000	0.80546	0.30085
4.825	-1.00056	11.82926	0.00000	0.77405	0.31209
4.900	-0.84985	12.06537	0.00000	0.74432	0.32317
4.975	-0.70594	12.29372	0.00000	0.71672	0.33364
5.050	-0.56781	12.51529	0.00000	0.69155	0.34322
5.125	-0.43448	12.73108	0.00000	0.66889	0.35176
5.200	-0.30509	12.94200	0.00000	0.64874	0.35925
5.275	-0.17889	13.14886	0.00000	0.63098	0.36571
5.350	-0.05528	13.35237	0.00000	0.61547	0.37122
5.425	0.06626	13.55311	0.00000	0.60200	0.37589
5.500	0.18612	13.75157	0.00000	0.59037	0.37982
5.575	0.30463	13.94815	0.00000	0.58038	0.38312
5.650	0.42206	14.14318	0.00000	0.57182	0.38588
5.725	0.53860	14.33695	0.00000	0.56451	0.38819
5.800	0.65443	14.52966	0.00000	0.55829	0.39011
5.875	0.76969	14.72150	0.00000	0.55300	0.39172
5.950	0.88446	14.91262	0.00000	0.54851	0.39307
6.025	0.99885	15.10315	0.00000	0.54471	0.39419
6.100	1.11292	15.29318	0.00000	0.54149	0.39513
6.175	1.22673	15.48279	0.00000	0.53877	0.39591
6.250	1.34032	15.67207	0.00000	0.53647	0.39657
6.325	1.45373	15.86105	0.00000	0.53453	0.39712
6.400	1.56699	16.04980	0.00000	0.53289	0.39758
6.475	1.68013	16.23834	0.00000	0.53151	0.39797
6.550	1.79316	16.42672	0.00000	0.53035	0.39829
6.625	1.90611	16.61496	0.00000	0.52937	0.39856
6.700	2.01898	16.80307	0.00000	0.52854	0.39879

TABLE 1.01.1

NU 1 = 1.0000000 BETA = 1.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.300	-2.24368	9.98413	0.00000	0.97323	0.29114
4.350	-2.12388	10.15903	0.00000	0.96112	0.28138
4.400	-2.00027	10.33875	0.00000	0.94641	0.27570
4.450	-1.87502	10.52098	0.00000	0.92933	0.27359
4.500	-1.75007	10.70361	0.00000	0.91021	0.27437
4.550	-1.62695	10.88495	0.00000	0.88940	0.27741
4.600	-1.50672	11.06375	0.00000	0.86727	0.28210
4.675	-1.33314	11.32555	0.00000	0.83227	0.29122

TABLE 1.01.1 (CONT.)

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.750	-1.16839	11.57862	0.00000	0.79589	0.30168
4.825	-1.01232	11.82285	0.00000	0.75883	0.31254
4.900	-0.86421	12.05881	0.00000	0.72158	0.32314
4.975	-0.72306	12.28737	0.00000	0.68450	0.33302
5.050	-0.58784	12.50956	0.00000	0.64775	0.34194
5.125	-0.45754	12.72637	0.00000	0.61141	0.34973
5.200	-0.33128	12.93875	0.00000	0.57541	0.35637
5.275	-0.20827	13.14755	0.00000	0.53958	0.36183
5.350	-0.08783	13.35355	0.00000	0.50363	0.36616
5.425	0.03060	13.55742	0.00000	0.46723	0.36939
5.500	0.14755	13.75981	0.00000	0.42993	0.37159
5.575	0.26345	13.96127	0.00000	0.39128	0.37279
5.650	0.37873	14.16233	0.00000	0.35086	0.37312
5.725	0.49377	14.36341	0.00000	0.30842	0.37275
5.800	0.60892	14.56479	0.00000	0.26408	0.37208
5.875	0.72442	14.76649	0.00000	0.21872	0.37172
5.950	0.84031	14.96812	0.00000	0.17417	0.37246
6.025	0.95643	15.16892	0.00000	0.13300	0.37482
6.100	1.07241	15.36806	0.00000	0.09758	0.37857
6.175	1.18795	15.56505	0.00000	0.06912	0.38293
6.250	1.30289	15.75982	0.00000	0.04749	0.38711
6.325	1.41722	15.95265	0.00000	0.03171	0.39067
6.400	1.53103	16.14391	0.00000	0.02059	0.39348
6.475	1.64443	16.33398	0.00000	0.01297	0.39559
6.550	1.75753	16.52319	0.00000	0.00790	0.39711
6.625	1.87041	16.71178	0.00000	0.00464	0.39817
6.700	1.98315	16.89996	0.00000	0.00261	0.39889

TABLE 1.01.2

NU 1 = 1.0000000 BETA = 2.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.300	-2.24373	9.98413	0.00000	0.97312	0.29325
4.350	-2.12542	10.15762	0.00000	0.96079	0.28390
4.400	-2.00374	10.33561	0.00000	0.94561	0.27859
4.450	-1.88085	10.51583	0.00000	0.92764	0.27679
4.500	-1.75869	10.69628	0.00000	0.90698	0.27777
4.550	-1.63873	10.87540	0.00000	0.88369	0.28080
4.600	-1.52197	11.05213	0.00000	0.85775	0.28520
4.675	-1.35399	11.31163	0.00000	0.81347	0.29297
4.750	-1.19486	11.56434	0.00000	0.76159	0.30040
4.825	-1.04369	11.81171	0.00000	0.69967	0.30539
4.900	-0.89834	12.05692	0.00000	0.62305	0.30512
4.975	-0.75483	12.30620	0.00000	0.52196	0.29419
5.050	-0.60367	12.57425	0.00000	0.37230	0.26123
5.125	-0.43113	12.87399	0.00000	0.16443	0.26616
5.200	-0.28561	13.11724	0.00000	0.06574	0.34468
5.275	-0.16155	13.32403	0.00000	0.03106	0.37614
5.350	-0.04427	13.51970	0.00000	0.01562	0.38879
5.425	0.07038	13.71102	0.00000	0.00797	0.39451
5.500	0.18389	13.90039	0.00000	0.00403	0.39728
5.575	0.29687	14.08881	0.00000	0.00199	0.39865
5.650	0.40959	14.27676	0.00000	0.00094	0.39935
5.725	0.52219	14.46447	0.00000	0.00043	0.39969
5.800	0.63473	14.65207	0.00000	0.00018	0.39986
5.875	0.74725	14.83961	0.00000	0.00007	0.39994
5.950	0.85976	15.02713	0.00000	0.00002	0.39997
6.025	0.97226	15.21464	0.00000	0.00000	0.39999
6.100	1.08476	15.40214	0.00000	0.00000	0.39999
6.175	1.19726	15.58964	0.00000	0.00000	0.39999
6.250	1.30976	15.77714	0.00000	0.00000	0.39999
6.325	1.42226	15.96464	0.00000	0.00000	0.39999
6.400	1.53476	16.15214	0.00000	0.00000	0.39999
6.475	1.64726	16.33964	0.00000	0.00000	0.40000
6.550	1.75976	16.52714	0.00000	0.00000	0.40000
6.625	1.87226	16.71464	0.00000	0.00000	0.40000
6.700	1.98476	16.90214	0.00000	0.00000	0.40000

TABLE 1.02.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-6.50000	4.54507	0.86761	0.13239	0.09408
3.450	-6.02725	5.08894	0.77896	0.22104	0.09119
3.500	-5.56196	5.62951	0.67837	0.32163	0.09462
3.550	-5.13011	6.13940	0.57341	0.42659	0.10221
3.600	-4.74418	6.60485	0.47002	0.52998	0.11345
3.650	-4.40910	7.01963	0.37287	0.62713	0.12870
3.700	-4.12554	7.38171	0.28560	0.71440	0.14891
3.750	-3.89144	7.69178	0.21097	0.78903	0.17549
3.800	-3.70240	7.95302	0.15064	0.84935	0.20959
3.850	-3.55162	8.17142	0.10492	0.89504	0.25029
3.900	-3.43004	8.35598	0.07251	0.92736	0.29212
3.950	-3.32758	8.51741	0.05083	0.94879	0.32581
4.000	-3.23493	8.66611	0.03692	0.96210	0.34394
4.050	-3.14456	8.81069	0.02823	0.96948	0.34510
4.100	-3.05078	8.95780	0.02295	0.97225	0.33301
4.150	-2.94944	9.11231	0.01994	0.97089	0.31371
4.200	-2.83812	9.27721	0.01849	0.96541	0.29317
4.250	-2.71636	9.45333	0.01823	0.95569	0.27551
4.300	-2.58547	9.63949	0.01895	0.94171	0.26262
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.30				
4.350	-2.45697	9.83321	0.00000	0.94361	0.25461
4.400	-2.31700	10.03115	0.00000	0.92404	0.25127
4.450	-2.17670	10.23024	0.00000	0.90205	0.25156
4.500	-2.03833	10.42795	0.00000	0.87818	0.25464
4.550	-1.90346	10.62245	0.00000	0.85301	0.25980
4.600	-1.77307	10.81256	0.00000	0.82706	0.26646
4.650	-1.64765	10.99759	0.00000	0.80080	0.27416
4.700	-1.52734	11.17726	0.00000	0.77466	0.28252
4.750	-1.41203	11.35157	0.00000	0.74898	0.29122
4.800	-1.30146	11.52072	0.00000	0.72405	0.30002
4.850	-1.19526	11.68500	0.00000	0.70010	0.30870
4.900	-1.09302	11.84478	0.00000	0.67730	0.31710
4.950	-0.99433	12.00048	0.00000	0.65577	0.32512
5.000	-0.89879	12.15250	0.00000	0.63558	0.33265
5.050	-0.80601	12.30122	0.00000	0.61678	0.33965
5.100	-0.71564	12.44703	0.00000	0.59937	0.34610
5.150	-0.62735	12.59026	0.00000	0.58332	0.35197
5.200	-0.54087	12.73124	0.00000	0.56859	0.35730
5.250	-0.45595	12.87023	0.00000	0.55513	0.36210
5.300	-0.37236	13.00748	0.00000	0.54287	0.36639
5.350	-0.28993	13.14322	0.00000	0.53173	0.37023
5.400	-0.20848	13.27764	0.00000	0.52164	0.37364
5.450	-0.12789	13.41091	0.00000	0.51251	0.37667
5.500	-0.04802	13.54317	0.00000	0.50428	0.37935
5.550	0.03121	13.67455	0.00000	0.49687	0.38173
5.600	0.10990	13.80517	0.00000	0.49020	0.38383
5.650	0.18813	13.93511	0.00000	0.48420	0.38568
5.700	0.26595	14.06447	0.00000	0.47883	0.38732
5.750	0.34342	14.19332	0.00000	0.47400	0.38876
5.800	0.42059	14.32171	0.00000	0.46968	0.39004
5.850	0.49749	14.44972	0.00000	0.46581	0.39117
5.900	0.57417	14.57737	0.00000	0.46235	0.39217
5.950	0.65064	14.70472	0.00000	0.45925	0.39305
6.000	0.72694	14.83180	0.00000	0.45649	0.39383
6.050	0.80309	14.95864	0.00000	0.45401	0.39452
6.100	0.87910	15.08527	0.00000	0.45180	0.39513
6.150	0.95500	15.21172	0.00000	0.44983	0.39568
6.200	1.03079	15.33801	0.00000	0.44806	0.39616
6.250	1.10649	15.46415	0.00000	0.44649	0.39658
6.300	1.18212	15.59016	0.00000	0.44509	0.39696
6.350	1.25767	15.71607	0.00000	0.44383	0.39730
6.400	1.33315	15.84187	0.00000	0.44272	0.39760
6.450	1.40859	15.96758	0.00000	0.44172	0.39786
6.500	1.48397	16.09321	0.00000	0.44083	0.39810
6.550	1.55931	16.21877	0.00000	0.44003	0.39830
6.600	1.63462	16.34427	0.00000	0.43933	0.39849
6.650	1.70989	16.46972	0.00000	0.43869	0.39866
6.700	1.78513	16.59511	0.00000	0.43813	0.39880

TABLE 1.02.2

NU 1 = 1.0000000 BETA = 2.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.300	-2.59384	9.63949	0.00000	0.96012	0.26369
4.350	-2.45811	9.83223	0.00000	0.94320	0.25598
4.400	-2.31947	10.02906	0.00000	0.92307	0.25273
4.450	-2.18072	10.22699	0.00000	0.90006	0.25302
4.500	-2.04409	10.42360	0.00000	0.87450	0.25595
4.550	-1.91107	10.61723	0.00000	0.84665	0.26077
4.600	-1.78260	10.80683	0.00000	0.81672	0.26682
4.675	-1.59920	11.08272	0.00000	0.76810	0.27708
4.750	-1.42687	11.34839	0.00000	0.71496	0.28750
4.825	-1.26453	11.60495	0.00000	0.65682	0.29696
4.900	-1.11055	11.85417	0.00000	0.59274	0.30456
4.975	-0.96298	12.09824	0.00000	0.52131	0.30954
5.050	-0.81969	12.33958	0.00000	0.44073	0.31150
5.125	-0.67854	12.58034	0.00000	0.34979	0.31143
5.200	-0.53845	12.82038	0.00000	0.25221	0.31487
5.275	-0.40169	13.05364	0.00000	0.16351	0.33058
5.350	-0.27206	13.27304	0.00000	0.10000	0.35329
5.425	-0.14928	13.47974	0.00000	0.06058	0.37135
5.500	-0.03091	13.67839	0.00000	0.03681	0.38281
5.575	0.08492	13.87242	0.00000	0.02231	0.38969
5.650	0.19933	14.06378	0.00000	0.01339	0.39382
5.725	0.31292	14.25357	0.00000	0.00789	0.39631
5.800	0.42604	14.44242	0.00000	0.00453	0.39783
5.875	0.53888	14.63071	0.00000	0.00252	0.39875
5.950	0.65157	14.81865	0.00000	0.00135	0.39930
6.025	0.76417	15.00640	0.00000	0.00069	0.39962
6.100	0.87672	15.19403	0.00000	0.00033	0.39980
6.175	0.98925	15.38159	0.00000	0.00015	0.39990
6.250	1.10176	15.56912	0.00000	0.00006	0.39995
6.325	1.21427	15.75664	0.00000	0.00002	0.39998
6.400	1.32677	15.94414	0.00000	0.00000	0.39999
6.475	1.43927	16.13165	0.00000	0.00000	0.39999
6.550	1.55177	16.31915	0.00000	0.00000	0.39999
6.625	1.66427	16.50665	0.00000	0.00000	0.39999
6.700	1.77677	16.69415	0.00000	0.00000	0.39999

TABLE 1.03.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-7.00000	4.06551	0.78173	0.21827	0.07980
3.450	-6.45680	4.68601	0.67322	0.32678	0.08221
3.500	-5.95010	5.27321	0.55970	0.44030	0.08876
3.550	-5.49687	5.80868	0.44813	0.55187	0.09875
3.600	-5.10385	6.28410	0.34404	0.65596	0.11262
3.650	-4.77284	6.69596	0.25185	0.74815	0.13170
3.700	-4.50281	7.04355	0.17489	0.82511	0.15830
3.750	-4.29006	7.32899	0.11509	0.88491	0.19523
3.800	-4.12703	7.55894	0.07249	0.92749	0.24286
3.850	-4.00167	7.74567	0.04483	0.95510	0.29368
3.900	-3.89980	7.90460	0.02815	0.97162	0.33348
3.950	-3.80911	8.04958	0.01849	0.98084	0.35277
4.000	-3.72054	8.19097	0.01296	0.98532	0.35136
4.050	-3.62740	8.33645	0.00979	0.98623	0.33409
4.100	-3.52440	8.49207	0.00801	0.98372	0.30805
4.150	-3.40784	8.66212	0.00712	0.97737	0.28078
4.200	-3.27652	8.84825	0.00683	0.96663	0.25782
4.250	-3.13203	9.04905	0.00701	0.95123	0.24153
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.25				
4.300	-2.98094	9.26127	0.00000	0.93866	0.23131
4.350	-2.82183	9.47977	0.00000	0.91547	0.22720
4.400	-2.66197	9.70003	0.00000	0.88916	0.22742
4.450	-2.50462	9.91846	0.00000	0.86045	0.23087
4.500	-2.35202	10.13250	0.00000	0.83005	0.23670
4.550	-2.20550	10.34053	0.00000	0.79862	0.24427
4.600	-2.06570	10.54169	0.00000	0.76677	0.25306
4.650	-1.93278	10.73566	0.00000	0.73501	0.26266

TABLE 1.03.0 (CONT.)

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.700	-1.80655	10.92248	0.00000	0.70379	0.27273
4.750	-1.68662	11.10245	0.00000	0.67347	0.28298
4.800	-1.57248	11.27602	0.00000	0.64436	0.29318
4.850	-1.46355	11.44372	0.00000	0.61668	0.30312
4.900	-1.35928	11.60612	0.00000	0.59058	0.31264
4.950	-1.25909	11.76376	0.00000	0.56617	0.32164
5.000	-1.16247	11.91720	0.00000	0.54350	0.33003
5.050	-1.06893	12.06693	0.00000	0.52258	0.33775
5.100	-0.97805	12.21341	0.00000	0.50337	0.34480
5.150	-0.88946	12.35708	0.00000	0.48581	0.35117
5.200	-0.80280	12.49829	0.00000	0.46983	0.35689
5.250	-0.71781	12.63738	0.00000	0.45534	0.36200
5.300	-0.63423	12.77462	0.00000	0.44224	0.36653
5.350	-0.55185	12.91028	0.00000	0.43042	0.37054
5.400	-0.47050	13.04457	0.00000	0.41979	0.37407
5.450	-0.39002	13.17767	0.00000	0.41023	0.37718
5.500	-0.31028	13.30974	0.00000	0.40166	0.37991
5.550	-0.23117	13.44093	0.00000	0.39398	0.38231
5.600	-0.15261	13.57135	0.00000	0.38711	0.38442
5.650	-0.07451	13.70110	0.00000	0.38096	0.38626
5.700	0.00318	13.83026	0.00000	0.37547	0.38788
5.750	0.08054	13.95893	0.00000	0.37056	0.38930
5.800	0.15760	14.08716	0.00000	0.36618	0.39055
5.850	0.23440	14.21500	0.00000	0.36227	0.39165
5.900	0.31098	14.34250	0.00000	0.35878	0.39261
5.950	0.38737	14.46971	0.00000	0.35566	0.39346
6.000	0.46359	14.59667	0.00000	0.35289	0.39421
6.050	0.53967	14.72340	0.00000	0.35041	0.39487
6.100	0.61562	14.84993	0.00000	0.34820	0.39545
6.150	0.69146	14.97628	0.00000	0.34623	0.39596
6.200	0.76719	15.10248	0.00000	0.34448	0.39642
6.250	0.84285	15.22855	0.00000	0.34291	0.39682
6.300	0.91843	15.35449	0.00000	0.34152	0.39718
6.350	0.99394	15.48033	0.00000	0.34028	0.39749
6.400	1.06939	15.60607	0.00000	0.33917	0.39777
6.450	1.14480	15.73173	0.00000	0.33818	0.39802
6.500	1.22015	15.85732	0.00000	0.33730	0.39824
6.550	1.29547	15.98284	0.00000	0.33651	0.39843
6.600	1.37075	16.10831	0.00000	0.33582	0.39861
6.650	1.44600	16.23372	0.00000	0.33519	0.39876
6.700	1.52122	16.35908	0.00000	0.33464	0.39890

TABLE 1.03.2

NU 1 = 1.0000000 BETA = 2.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.250	-3.13515	9.04905	0.00000	0.95804	0.24136
4.300	-2.98133	9.26094	0.00000	0.93849	0.23168
4.350	-2.82268	9.47907	0.00000	0.91506	0.22757
4.400	-2.66333	9.69901	0.00000	0.88828	0.22772
4.450	-2.50652	9.91721	0.00000	0.85874	0.23101
4.500	-2.35442	10.13123	0.00000	0.82697	0.23656
4.550	-2.20832	10.33957	0.00000	0.79345	0.24368
4.600	-2.06882	10.54145	0.00000	0.75856	0.25182
4.675	-1.87208	10.83178	0.00000	0.70429	0.26506
4.750	-1.68948	11.10772	0.00000	0.64836	0.27860
4.825	-1.51941	11.37075	0.00000	0.59133	0.29167
4.900	-1.35998	11.62260	0.00000	0.53366	0.30380
4.975	-1.20935	11.86505	0.00000	0.47575	0.31474
5.050	-1.06587	12.09967	0.00000	0.41805	0.32444
5.125	-0.92813	12.32776	0.00000	0.36113	0.33304
5.200	-0.79498	12.55033	0.00000	0.30578	0.34081
5.275	-0.66558	12.76804	0.00000	0.25307	0.34815
5.350	-0.53931	12.98126	0.00000	0.20434	0.35539
5.425	-0.41577	13.19017	0.00000	0.16095	0.36262
5.500	-0.29461	13.39499	0.00000	0.12386	0.36965
5.575	-0.17551	13.59611	0.00000	0.09335	0.37609
5.650	-0.05809	13.79402	0.00000	0.06906	0.38165
5.725	0.05799	13.98933	0.00000	0.05021	0.38621
5.800	0.17306	14.18258	0.00000	0.03586	0.38982
5.875	0.28738	14.37426	0.00000	0.02514	0.39260

TABLE 1.03.2 (CONT.)

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
5.950	0.40115	14.56476	0.00000	0.01725	0.39471
6.025	0.51452	14.75437	0.00000	0.01157	0.39629
6.100	0.62761	14.94334	0.00000	0.00755	0.39745
6.175	0.74050	15.13183	0.00000	0.00479	0.39829
6.250	0.85325	15.31998	0.00000	0.00293	0.39888
6.325	0.96590	15.50790	0.00000	0.00173	0.39929
6.400	1.07850	15.69566	0.00000	0.00097	0.39957
6.475	1.19106	15.88332	0.00000	0.00052	0.39975
6.550	1.30359	16.07090	0.00000	0.00027	0.39986
6.625	1.41610	16.25845	0.00000	0.00013	0.39992
6.700	1.52861	16.44598	0.00000	0.00005	0.39996

TABLE 1.04.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-7.50000	3.59706	0.65689	0.34311	0.07069
3.450	-6.90118	4.27914	0.53475	0.46525	0.07654
3.500	-6.36682	4.89853	0.41581	0.58419	0.08562
3.550	-5.90553	5.44478	0.30631	0.69369	0.09848
3.600	-5.52049	5.91259	0.21139	0.78861	0.11698
3.650	-5.21251	6.29886	0.13495	0.86505	0.14487
3.700	-4.97935	6.60391	0.07916	0.92084	0.18773
3.750	-4.81150	6.83645	0.04329	0.95671	0.24723
3.800	-4.68998	7.01648	0.02308	0.97689	0.30883
3.850	-4.59359	7.16736	0.01265	0.98721	0.35039
3.900	-4.50706	7.30629	0.00741	0.99213	0.36529
3.950	-4.42091	7.44399	0.00471	0.99394	0.35761
4.000	-4.32797	7.58846	0.00330	0.99324	0.33248
4.050	-4.22147	7.74718	0.00254	0.98959	0.29730
4.100	-4.09574	7.92652	0.00217	0.98195	0.26177
4.150	-3.94840	8.12936	0.00204	0.96926	0.23329
4.200	-3.78168	8.35370	0.00209	0.95095	0.21429
4.250	-3.60136	8.59362	0.00228	0.92713	0.20384
MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.25					
4.300	-3.41516	8.84221	0.00000	0.90092	0.19967
4.350	-3.22747	9.09247	0.00000	0.86864	0.20058
4.400	-3.04390	9.33935	0.00000	0.83342	0.20496
4.450	-2.86743	9.57949	0.00000	0.79616	0.21186
4.500	-2.69969	9.81088	0.00000	0.75769	0.22061
4.550	-2.54139	10.03258	0.00000	0.71875	0.23071
4.600	-2.39259	10.24433	0.00000	0.67999	0.24175
4.675	-2.18629	10.54386	0.00000	0.62340	0.25936
4.750	-1.99825	10.82344	0.00000	0.56996	0.27734
4.825	-1.82579	11.08560	0.00000	0.52076	0.29487
4.900	-1.66618	11.33303	0.00000	0.47642	0.31126
4.975	-1.51693	11.56832	0.00000	0.43719	0.32607
5.050	-1.37588	11.79377	0.00000	0.40301	0.33903
5.125	-1.24122	12.01135	0.00000	0.37359	0.35009
5.200	-1.11151	12.22271	0.00000	0.34850	0.35934
5.275	-0.98560	12.42917	0.00000	0.32727	0.36696
5.350	-0.86261	12.63178	0.00000	0.30938	0.37316
5.425	-0.74185	12.83138	0.00000	0.29436	0.37818
5.500	-0.62282	13.02860	0.00000	0.28178	0.38223
5.575	-0.50513	13.22395	0.00000	0.27126	0.38550
5.650	-0.38846	13.41782	0.00000	0.26245	0.38813
5.725	-0.27261	13.61050	0.00000	0.25509	0.39025
5.800	-0.15740	13.80225	0.00000	0.24894	0.39198
5.875	-0.04269	13.99323	0.00000	0.24379	0.39338
5.950	0.07161	14.18360	0.00000	0.23947	0.39452
6.025	0.18559	14.37347	0.00000	0.23586	0.39545
6.100	0.29931	14.56293	0.00000	0.23284	0.39622
6.175	0.41282	14.75206	0.00000	0.23030	0.39685
6.250	0.52615	14.94092	0.00000	0.22817	0.39738
6.325	0.63934	15.12955	0.00000	0.22639	0.39781
6.400	0.75242	15.31799	0.00000	0.22489	0.39817
6.475	0.86540	15.50628	0.00000	0.22363	0.39847

TABLE 1.04.0 (CONT.)

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
6.550	0.97830	15.69443	0.00000	0.22257	0.39872
6.625	1.09113	15.88249	0.00000	0.22168	0.39892
6.700	1.20391	16.07045	0.00000	0.22094	0.39910

TABLE 1.04.2

NU 1 = 1.0000000 BETA = 2.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.250	-3.60240	8.59362	0.00000	0.92927	0.20362
4.300	-3.41530	8.84213	0.00000	0.90078	0.19972
4.350	-3.22772	9.09235	0.00000	0.86830	0.20058
4.400	-3.04423	9.33929	0.00000	0.83272	0.20486
4.450	-2.86775	9.57964	0.00000	0.79484	0.21157
4.500	-2.69989	9.81149	0.00000	0.75537	0.22004
4.550	-2.54133	10.03394	0.00000	0.71493	0.22974
4.600	-2.39208	10.24678	0.00000	0.67407	0.24026
4.675	-2.18478	10.54866	0.00000	0.61295	0.25692
4.750	-1.99539	10.83136	0.00000	0.55322	0.27384
4.825	-1.82136	11.09724	0.00000	0.49596	0.29037
4.900	-1.66015	11.34874	0.00000	0.44207	0.30599
4.975	-1.50941	11.58817	0.00000	0.39217	0.32035
5.050	-1.36709	11.81762	0.00000	0.34665	0.33320
5.125	-1.23144	12.03892	0.00000	0.30562	0.34440
5.200	-1.10100	12.25364	0.00000	0.26898	0.35393
5.275	-0.97461	12.46313	0.00000	0.23642	0.36187
5.350	-0.85131	12.66848	0.00000	0.20754	0.36837
5.425	-0.73038	12.87059	0.00000	0.18188	0.37363
5.500	-0.61124	13.07015	0.00000	0.15900	0.37784
5.575	-0.49347	13.26774	0.00000	0.13849	0.38121
5.650	-0.37674	13.46376	0.00000	0.12003	0.38392
5.725	-0.26080	13.65853	0.00000	0.10334	0.38612
5.800	-0.14548	13.85230	0.00000	0.08824	0.38795
5.875	-0.03064	14.04522	0.00000	0.07460	0.38950
5.950	0.08381	14.23743	0.00000	0.06234	0.39086
6.025	0.19795	14.42901	0.00000	0.05139	0.39207
6.100	0.31182	14.62003	0.00000	0.04173	0.39318
6.175	0.42546	14.81053	0.00000	0.03333	0.39419
6.250	0.53890	15.00057	0.00000	0.02613	0.39513
6.325	0.65218	15.19017	0.00000	0.02009	0.39598
6.400	0.76530	15.37938	0.00000	0.01511	0.39675
6.475	0.87829	15.56825	0.00000	0.01110	0.39743
6.550	0.99117	15.75681	0.00000	0.00795	0.39802
6.625	1.10396	15.94513	0.00000	0.00553	0.39851
6.700	1.21667	16.13323	0.00000	0.00374	0.39891

TABLE 1.05.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-8.00000	3.14139	0.49613	0.50387	0.06576
3.450	-7.36956	3.85961	0.37146	0.62854	0.07416
3.500	-6.82969	4.48661	0.25907	0.74093	0.08642
3.550	-6.38616	5.01398	0.16471	0.83529	0.10529
3.600	-6.04389	5.43389	0.09289	0.90711	0.13728
3.650	-5.80310	5.74383	0.04575	0.95425	0.19343
3.700	-5.64625	5.96134	0.02041	0.97959	0.27264
3.750	-5.53857	6.12389	0.00901	0.99098	0.33978
3.800	-5.45116	6.26339	0.00424	0.99568	0.37206
3.850	-5.36930	6.39624	0.00219	0.99747	0.37689
3.900	-5.28506	6.53123	0.00126	0.99760	0.36063
3.950	-5.19085	6.67657	0.00081	0.99591	0.32516
4.000	-5.07721	6.84243	0.00059	0.99121	0.27818
4.050	-4.93492	7.03888	0.00049	0.98170	0.23365
4.100	-4.76008	7.27052	0.00046	0.96572	0.20117
4.150	-4.55702	7.53320	0.00048	0.94252	0.18182

MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.15

TABLE 1.05.0 (CONT.)

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.200	-4.33596	7.81663	0.00000	0.91297	0.17255
4.250	-4.10758	8.10909	0.00000	0.87715	0.17032
4.300	-3.88097	8.40105	0.00000	0.83675	0.17284
4.350	-3.66212	8.68593	0.00000	0.79299	0.17868
4.400	-3.45457	8.95973	0.00000	0.74697	0.18696
4.450	-3.26003	9.22035	0.00000	0.69971	0.19710
4.500	-3.07902	9.46698	0.00000	0.65211	0.20868
4.550	-2.91127	9.69965	0.00000	0.60499	0.22138
4.600	-2.75605	9.91893	0.00000	0.55907	0.23488
4.675	-2.54448	10.22476	0.00000	0.49376	0.25599
4.750	-2.35492	10.50618	0.00000	0.43412	0.27723
4.825	-2.18342	10.76713	0.00000	0.38114	0.29759
4.900	-2.02628	11.01143	0.00000	0.33520	0.31625
4.975	-1.88027	11.24250	0.00000	0.29617	0.33261
5.050	-1.74272	11.46329	0.00000	0.26354	0.34643
5.125	-1.61151	11.67620	0.00000	0.23656	0.35774
5.200	-1.48498	11.88314	0.00000	0.21443	0.36677
5.275	-1.36191	12.08559	0.00000	0.19635	0.37388
5.350	-1.24138	12.28465	0.00000	0.18162	0.37942
5.425	-1.12273	12.48116	0.00000	0.16960	0.38372
5.500	-1.00547	12.67574	0.00000	0.15978	0.38705
5.575	-0.88927	12.86884	0.00000	0.15175	0.38964
5.650	-0.77385	13.06080	0.00000	0.14516	0.39167
5.725	-0.65904	13.25188	0.00000	0.13974	0.39327
5.800	-0.54469	13.44227	0.00000	0.13527	0.39453
5.875	-0.43070	13.63212	0.00000	0.13157	0.39553
5.950	-0.31700	13.82153	0.00000	0.12851	0.39634
6.025	-0.20352	14.01061	0.00000	0.12597	0.39698
6.100	-0.09021	14.19940	0.00000	0.12385	0.39751
6.175	0.02295	14.38796	0.00000	0.12209	0.39794
6.250	0.13599	14.57635	0.00000	0.12062	0.39829
6.325	0.24894	14.76458	0.00000	0.11939	0.39858
6.400	0.36181	14.95269	0.00000	0.11836	0.39881
6.475	0.47462	15.14070	0.00000	0.11750	0.39901
6.550	0.58738	15.32862	0.00000	0.11678	0.39917
6.625	0.70009	15.51648	0.00000	0.11617	0.39931
6.700	0.81277	15.70427	0.00000	0.11567	0.39942

TABLE 1.05.2

NU 1 = 1.0000000 BETA = 2.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
4.150	-4.55723	7.53320	0.00000	0.94297	0.18176
4.200	-4.33598	7.81661	0.00000	0.91295	0.17255
4.250	-4.10761	8.10907	0.00000	0.87710	0.17032
4.300	-3.88099	8.40106	0.00000	0.83663	0.17280
4.350	-3.66211	8.68604	0.00000	0.79273	0.17859
4.400	-3.45445	8.96003	0.00000	0.74646	0.18678
4.450	-3.25972	9.22098	0.00000	0.69877	0.19678
4.500	-3.07840	9.46811	0.00000	0.65052	0.20816
4.550	-2.91021	9.70150	0.00000	0.60247	0.22058
4.600	-2.75443	9.92169	0.00000	0.55529	0.23377
4.675	-2.54184	10.22921	0.00000	0.48745	0.25440
4.750	-2.35119	10.51254	0.00000	0.42462	0.27524
4.825	-2.17866	10.77540	0.00000	0.36800	0.29544
4.900	-2.02069	11.02141	0.00000	0.31828	0.31418
4.975	-1.87411	11.25388	0.00000	0.27556	0.33082
5.050	-1.73626	11.47572	0.00000	0.23949	0.34500
5.125	-1.60495	11.68939	0.00000	0.20941	0.35666
5.200	-1.47848	11.89687	0.00000	0.18448	0.36596
5.275	-1.35554	12.09971	0.00000	0.16383	0.37323
5.350	-1.23520	12.29910	0.00000	0.14667	0.37883
5.425	-1.11674	12.49592	0.00000	0.13228	0.38310
5.500	-0.99965	12.69083	0.00000	0.12010	0.38635
5.575	-0.88359	12.88430	0.00000	0.10963	0.38882
5.650	-0.76828	13.07670	0.00000	0.10050	0.39070
5.725	-0.65353	13.26830	0.00000	0.09241	0.39213
5.800	-0.53921	13.45928	0.00000	0.08512	0.39323
5.875	-0.42520	13.64980	0.00000	0.07844	0.39406
5.950	-0.31144	13.83996	0.00000	0.07224	0.39471
6.025	-0.19787	14.02984	0.00000	0.06640	0.39520

TABLE 1.05.2 (CONT.)

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
6.100	-0.08443	14.21952	0.00000	0.06085	0.39559
6.175	0.02889	14.40903	0.00000	0.05552	0.39590
6.250	0.14212	14.59841	0.00000	0.05038	0.39615
6.325	0.25528	14.78768	0.00000	0.04542	0.39636
6.400	0.36839	14.97685	0.00000	0.04063	0.39656
6.475	0.48145	15.16593	0.00000	0.03602	0.39674
6.550	0.59447	15.35493	0.00000	0.03161	0.39692
6.625	0.70746	15.54384	0.00000	0.02742	0.39712
6.700	0.82040	15.73265	0.00000	0.02348	0.39732

TABLE 1.06.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-8.50000	2.69520	0.32176	0.67824	0.06447
3.450	-7.87255	3.41125	0.20934	0.79066	0.07643
3.500	-7.36960	3.99796	0.11892	0.88108	0.09689
3.550	-7.00532	4.43746	0.05580	0.94420	0.13829
3.600	-6.78004	4.72718	0.02125	0.97875	0.22087
3.650	-6.64991	4.91328	0.00731	0.99269	0.31872
3.700	-6.55859	5.05662	0.00263	0.99736	0.37192
3.750	-6.47832	5.18760	0.00106	0.99888	0.38755
3.800	-6.39941	5.31685	0.00049	0.99925	0.38328
3.850	-6.31579	5.45090	0.00025	0.99873	0.35912
3.900	-6.21820	5.59954	0.00016	0.99651	0.31109
3.950	-6.09194	5.77836	0.00011	0.99066	0.25009
4.000	-5.92161	6.00395	0.00009	0.97838	0.19811
4.050	-5.70216	6.28224	0.00009	0.95738	0.16539
4.100	-5.44383	6.60300	0.00009	0.92710	0.14884
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.10				
4.150	-5.16456	6.94764	0.00000	0.88862	0.14270
4.200	-4.88085	7.29869	0.00000	0.84337	0.14299
4.250	-4.60431	7.64372	0.00000	0.79306	0.14742
4.300	-4.34186	7.97515	0.00000	0.73917	0.15478
4.350	-4.09707	8.28885	0.00000	0.68301	0.16441
4.400	-3.87135	8.58304	0.00000	0.62578	0.17592
4.450	-3.66475	8.85735	0.00000	0.56862	0.18904
4.500	-3.47648	9.11229	0.00000	0.51259	0.20359
4.550	-3.30530	9.34895	0.00000	0.45864	0.21933
4.600	-3.14966	9.56872	0.00000	0.40765	0.23600
4.650	-3.00788	9.77322	0.00000	0.36030	0.25325
4.700	-2.87824	9.96416	0.00000	0.31712	0.27065
4.750	-2.75900	10.14327	0.00000	0.27840	0.28772
4.800	-2.64854	10.31227	0.00000	0.24423	0.30398
4.850	-2.54535	10.47276	0.00000	0.21449	0.31898
4.900	-2.44806	10.62623	0.00000	0.18892	0.33243
4.950	-2.35550	10.77398	0.00000	0.16713	0.34416
5.000	-2.26670	10.91713	0.00000	0.14868	0.35414
5.050	-2.18083	11.05663	0.00000	0.13314	0.36249
5.100	-2.09726	11.19323	0.00000	0.12008	0.36935
5.150	-2.01547	11.32755	0.00000	0.10910	0.37495
5.200	-1.93506	11.46007	0.00000	0.09987	0.37948
5.250	-1.85572	11.59118	0.00000	0.09209	0.38313
5.300	-1.77723	11.72116	0.00000	0.08552	0.38607
5.350	-1.69940	11.85026	0.00000	0.07995	0.38845
5.400	-1.62208	11.97865	0.00000	0.07522	0.39037
5.450	-1.54517	12.10647	0.00000	0.07118	0.39193
5.500	-1.46859	12.23382	0.00000	0.06772	0.39321
5.550	-1.39228	12.36081	0.00000	0.06475	0.39425
5.600	-1.31617	12.48748	0.00000	0.06219	0.39512
5.650	-1.24024	12.61391	0.00000	0.05997	0.39583
5.700	-1.16446	12.74013	0.00000	0.05805	0.39643
5.750	-1.08878	12.86617	0.00000	0.05639	0.39693
5.800	-1.01321	12.99207	0.00000	0.05493	0.39735
5.850	-0.93772	13.11784	0.00000	0.05366	0.39770
5.900	-0.86230	13.24351	0.00000	0.05255	0.39800
5.950	-0.78693	13.36910	0.00000	0.05158	0.39826
6.000	-0.71161	13.49461	0.00000	0.05072	0.39848
6.050	-0.63634	13.62005	0.00000	0.04997	0.39867
6.100	-0.56109	13.74544	0.00000	0.04931	0.39884
6.150	-0.48588	13.87078	0.00000	0.04872	0.39898
6.200	-0.41070	13.99608	0.00000	0.04821	0.39910
6.250	-0.33554	14.12134	0.00000	0.04775	0.39921
6.300	-0.26040	14.24657	0.00000	0.04735	0.39930
6.350	-0.18527	14.37178	0.00000	0.04699	0.39938
6.400	-0.11016	14.49696	0.00000	0.04668	0.39945
6.450	-0.03506	14.62212	0.00000	0.04640	0.39952
6.500	0.04002	14.74726	0.00000	0.04615	0.39957
6.550	0.11510	14.87238	0.00000	0.04593	0.39962
6.600	0.19017	14.99749	0.00000	0.04573	0.39966
6.650	0.26522	15.12259	0.00000	0.04556	0.39970
6.700	0.34028	15.24768	0.00000	0.04540	0.39973

TABLE 1.07.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-9.00000	2.24766	0.17137	0.82863	0.06785
3.450	-8.43480	2.89593	0.08549	0.91451	0.09042
3.500	-8.06002	3.34276	0.03177	0.96823	0.14694
3.550	-7.86463	3.59787	0.00890	0.99110	0.26412
3.600	-7.75875	3.75658	0.00236	0.99764	0.35848
3.650	-7.67687	3.88919	0.00070	0.99929	0.38911
3.700	-7.59981	4.01645	0.00024	0.99972	0.39434
3.750	-7.52227	4.14412	0.00010	0.99971	0.38651
3.800	-7.43894	4.27778	0.00004	0.99908	0.35728
3.850	-7.33772	4.43006	0.00002	0.99667	0.29631
3.900	-7.19575	4.62503	0.00002	0.98974	0.22109
3.950	-6.98799	4.88937	0.00001	0.97430	0.16466
4.000	-6.70960	5.22897	0.00001	0.94749	0.13458
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.0				
4.050	-6.38157	5.62246	0.00000	0.90937	0.12189
4.100	-6.03253	6.04006	0.00000	0.86176	0.11875
4.150	-5.68473	6.45832	0.00000	0.80684	0.12104
4.200	-5.35182	6.86263	0.00000	0.74656	0.12682
4.250	-5.04107	7.24501	0.00000	0.68258	0.13518
4.300	-4.75574	7.60162	0.00000	0.61642	0.14572
4.350	-4.49676	7.93110	0.00000	0.54953	0.15829
4.400	-4.26365	8.23359	0.00000	0.48336	0.17285
4.450	-4.05512	8.51007	0.00000	0.41936	0.18942
4.500	-3.86937	8.76212	0.00000	0.35890	0.20793
4.550	-3.70426	8.99172	0.00000	0.30322	0.22820
4.600	-3.55742	9.20115	0.00000	0.25332	0.24978
4.650	-3.42631	9.39295	0.00000	0.20979	0.27193
4.700	-3.30833	9.56980	0.00000	0.17284	0.29364
4.750	-3.20098	9.73437	0.00000	0.14220	0.31387
4.800	-3.10194	9.88919	0.00000	0.11730	0.33176
4.850	-3.00923	10.03648	0.00000	0.09734	0.34682
4.900	-2.92123	10.17808	0.00000	0.08150	0.35899
4.950	-2.83668	10.31547	0.00000	0.06897	0.36853
5.000	-2.75462	10.44975	0.00000	0.05906	0.37586
5.050	-2.67436	10.58176	0.00000	0.05120	0.38141
5.100	-2.59541	10.71211	0.00000	0.04493	0.38559
5.150	-2.51741	10.84122	0.00000	0.03989	0.38875
5.200	-2.44010	10.96943	0.00000	0.03582	0.39113
5.250	-2.36331	11.09696	0.00000	0.03250	0.39295
5.300	-2.28690	11.22396	0.00000	0.02977	0.39434
5.350	-2.21079	11.35058	0.00000	0.02752	0.39542
5.400	-2.13489	11.47689	0.00000	0.02564	0.39626
5.450	-2.05917	11.60296	0.00000	0.02406	0.39692
5.500	-1.98357	11.72884	0.00000	0.02274	0.39744
5.550	-1.90809	11.85458	0.00000	0.02161	0.39786
5.600	-1.83268	11.98019	0.00000	0.02065	0.39820
5.650	-1.75734	12.10571	0.00000	0.01983	0.39848
5.700	-1.68206	12.23115	0.00000	0.01912	0.39871
5.750	-1.60682	12.35653	0.00000	0.01851	0.39890
5.800	-1.53161	12.48185	0.00000	0.01798	0.39905
5.850	-1.45644	12.60712	0.00000	0.01752	0.39919
5.900	-1.38129	12.73236	0.00000	0.01712	0.39930
5.950	-1.30616	12.85756	0.00000	0.01677	0.39939
6.000	-1.23105	12.98274	0.00000	0.01647	0.39947
6.050	-1.15595	13.10790	0.00000	0.01620	0.39954
6.100	-1.08087	13.23303	0.00000	0.01596	0.39960
6.150	-1.00580	13.35815	0.00000	0.01576	0.39965
6.200	-0.93073	13.48326	0.00000	0.01557	0.39969
6.250	-0.85568	13.60835	0.00000	0.01541	0.39973
6.300	-0.78063	13.73343	0.00000	0.01527	0.39976
6.350	-0.70558	13.85850	0.00000	0.01515	0.39979
6.400	-0.63055	13.98356	0.00000	0.01504	0.39981
6.450	-0.55551	14.10861	0.00000	0.01494	0.39983
6.500	-0.48048	14.23366	0.00000	0.01485	0.39985
6.550	-0.40546	14.35871	0.00000	0.01477	0.39987
6.600	-0.33043	14.48374	0.00000	0.01471	0.39989
6.650	-0.25541	14.60878	0.00000	0.01464	0.39990
6.700	-0.18040	14.73381	0.00000	0.01459	0.39991

TABLE 1.08.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-9.50000	1.78541	0.07385	0.92615	0.08095
3.450	-9.09035	2.26617	0.02289	0.97711	0.14561
3.500	-8.90417	2.51005	0.00493	0.99507	0.28723
3.550	-8.80761	2.65829	0.00104	0.99896	0.37451
3.600	-8.72881	2.78743	0.00025	0.99974	0.39468
3.650	-8.65284	2.91349	0.00007	0.99991	0.39720
3.700	-8.57630	3.04009	0.00003	0.99987	0.39077
3.750	-8.49481	3.17180	0.00001	0.99940	0.36354
3.800	-8.39529	3.32221	0.00000	0.99736	0.29663
3.850	-8.24763	3.52278	0.00000	0.99060	0.20813
3.900	-8.01337	3.81415	0.00000	0.97395	0.14514
3.950	-7.68353	4.20662	0.00000	0.94368	0.11515
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.95				
4.000	-7.28991	4.66776	0.00000	0.90020	0.10401
4.050	-6.87301	5.15552	0.00000	0.84607	0.10207
4.100	-6.46148	5.63983	0.00000	0.78394	0.10505
4.150	-6.07150	6.10343	0.00000	0.71598	0.11116
4.200	-5.71109	6.53752	0.00000	0.64402	0.11969
4.250	-5.38361	6.93814	0.00000	0.56979	0.13044
4.300	-5.08984	7.30405	0.00000	0.49502	0.14345
4.350	-4.82908	7.63550	0.00000	0.42156	0.15895
4.400	-4.59980	7.93367	0.00000	0.35136	0.17725
4.450	-4.39988	8.20039	0.00000	0.28638	0.19861
4.500	-4.22663	8.43810	0.00000	0.22838	0.22303
4.550	-4.07684	8.64991	0.00000	0.17866	0.24991
4.600	-3.94681	8.83958	0.00000	0.13779	0.27781
4.650	-3.83257	9.01128	0.00000	0.10549	0.30464
4.700	-3.73030	9.16918	0.00000	0.08078	0.32833
4.750	-3.63665	9.31698	0.00000	0.06231	0.34764
4.800	-3.54898	9.45770	0.00000	0.04867	0.36239
4.850	-3.46536	9.59356	0.00000	0.03863	0.37315
4.900	-3.38443	9.72612	0.00000	0.03121	0.38078
4.950	-3.30531	9.85646	0.00000	0.02567	0.38614
5.000	-3.22740	9.98529	0.00000	0.02150	0.38988
5.050	-3.15031	10.11308	0.00000	0.01832	0.39251
5.100	-3.07378	10.24014	0.00000	0.01586	0.39437
5.150	-2.99765	10.36670	0.00000	0.01393	0.39572
5.200	-2.92179	10.49289	0.00000	0.01240	0.39669
5.250	-2.84614	10.61881	0.00000	0.01117	0.39741
5.300	-2.77063	10.74454	0.00000	0.01017	0.39795
5.350	-2.69523	10.87011	0.00000	0.00936	0.39836
5.400	-2.61991	10.99558	0.00000	0.00869	0.39867
5.450	-2.54466	11.12096	0.00000	0.00813	0.39891
5.500	-2.46945	11.24627	0.00000	0.00766	0.39910
5.550	-2.39428	11.37152	0.00000	0.00726	0.39925
5.600	-2.31914	11.49674	0.00000	0.00693	0.39938
5.650	-2.24402	11.62192	0.00000	0.00664	0.39947
5.700	-2.16892	11.74707	0.00000	0.00639	0.39955
5.750	-2.09384	11.87220	0.00000	0.00618	0.39962
5.800	-2.01877	11.99731	0.00000	0.00600	0.39967
5.850	-1.94371	12.12240	0.00000	0.00584	0.39972
5.900	-1.86866	12.24748	0.00000	0.00570	0.39976
5.950	-1.79362	12.37255	0.00000	0.00558	0.39979
6.000	-1.71858	12.49761	0.00000	0.00548	0.39982
6.050	-1.64355	12.62266	0.00000	0.00539	0.39984
6.100	-1.56852	12.74771	0.00000	0.00531	0.39986
6.150	-1.49349	12.87275	0.00000	0.00524	0.39988
6.200	-1.41847	12.99779	0.00000	0.00517	0.39989
6.250	-1.34345	13.12282	0.00000	0.00512	0.39991
6.300	-1.26844	13.24784	0.00000	0.00507	0.39992
6.350	-1.19342	13.37287	0.00000	0.00503	0.39993
6.400	-1.11841	13.49789	0.00000	0.00499	0.39994
6.450	-1.04340	13.62291	0.00000	0.00496	0.39994
6.500	-0.96839	13.74792	0.00000	0.00493	0.39995
6.550	-0.89338	13.87294	0.00000	0.00490	0.39996
6.600	-0.81837	13.99795	0.00000	0.00488	0.39996
6.650	-0.74336	14.12296	0.00000	0.00486	0.39997
6.700	-0.66836	14.24797	0.00000	0.00484	0.39997

TABLE 1.09.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-10.00000	1.30480	0.02695	0.97305	0.11693
3.450	-9.76959	1.59457	0.00506	0.99494	0.26361
3.500	-9.66768	1.74830	0.00086	0.99914	0.37253
3.550	-9.58883	1.87745	0.00017	0.99983	0.39541
3.600	-9.51312	2.00321	0.00004	0.99995	0.39855
3.650	-9.43743	2.12894	0.00001	0.99995	0.39571
3.700	-9.35904	2.25743	0.00000	0.99973	0.37867
3.750	-9.26837	2.39861	0.00000	0.99856	0.32245
3.800	-9.13667	2.58235	0.00000	0.99383	0.22502
3.850	-8.91288	2.86212	0.00000	0.97990	0.14551
3.900	-8.56784	3.26919	0.00000	0.95125	0.10773
3.950	-8.13290	3.77193	0.00000	0.90736	0.09408
MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.95					
4.000	-7.66142	4.31520	0.00000	0.85116	0.09119
4.050	-7.19226	4.85840	0.00000	0.78577	0.09356
4.100	-6.74692	5.37880	0.00000	0.71365	0.09910
4.150	-6.33588	5.86503	0.00000	0.63683	0.10704
4.200	-5.96358	6.31198	0.00000	0.55718	0.11722
4.250	-5.63130	6.71785	0.00000	0.47666	0.12980
4.300	-5.33861	7.08256	0.00000	0.39745	0.14519
4.350	-5.08414	7.40702	0.00000	0.32196	0.16402
4.400	-4.86579	7.69291	0.00000	0.25275	0.18700
4.450	-4.68068	7.94282	0.00000	0.19222	0.21454
4.500	-4.52488	8.16051	0.00000	0.14207	0.24608
4.550	-4.39338	8.35108	0.00000	0.10285	0.27938
4.600	-4.28059	8.52048	0.00000	0.07374	0.31089
4.650	-4.18113	8.67459	0.00000	0.05299	0.33734
4.700	-4.09058	8.81835	0.00000	0.03855	0.35736
4.750	-4.00571	8.95542	0.00000	0.02859	0.37140
4.800	-3.92439	9.08826	0.00000	0.02168	0.38081
4.850	-3.84528	9.21843	0.00000	0.01684	0.38700
4.900	-3.76756	9.34691	0.00000	0.01340	0.39105
4.950	-3.69071	9.47430	0.00000	0.01089	0.39373
5.000	-3.61443	9.60098	0.00000	0.00905	0.39552
5.050	-3.53852	9.72719	0.00000	0.00766	0.39674
5.100	-3.46287	9.85308	0.00000	0.00660	0.39758
5.150	-3.38739	9.97874	0.00000	0.00577	0.39817
5.200	-3.31202	10.10425	0.00000	0.00512	0.39860
5.250	-3.23675	10.22963	0.00000	0.00460	0.39891
5.300	-3.16154	10.35494	0.00000	0.00419	0.39914
5.350	-3.08637	10.48018	0.00000	0.00385	0.39931
5.400	-3.01124	10.60537	0.00000	0.00356	0.39945
5.450	-2.93613	10.73053	0.00000	0.00333	0.39955
5.500	-2.86105	10.85566	0.00000	0.00314	0.39963
5.550	-2.78597	10.98076	0.00000	0.00297	0.39969
5.600	-2.71092	11.10585	0.00000	0.00283	0.39974
5.650	-2.63587	11.23092	0.00000	0.00271	0.39978
5.700	-2.56083	11.35599	0.00000	0.00261	0.39982
5.750	-2.48579	11.48104	0.00000	0.00253	0.39984
5.800	-2.41077	11.60609	0.00000	0.00245	0.39987
5.850	-2.33574	11.73112	0.00000	0.00239	0.39988
5.900	-2.26072	11.85616	0.00000	0.00233	0.39990
5.950	-2.18570	11.98119	0.00000	0.00228	0.39991
6.000	-2.11069	12.10621	0.00000	0.00224	0.39993
6.050	-2.03567	12.23123	0.00000	0.00220	0.39994
6.100	-1.96066	12.35625	0.00000	0.00216	0.39994
6.150	-1.88565	12.48127	0.00000	0.00214	0.39995
6.200	-1.81064	12.60628	0.00000	0.00211	0.39996
6.250	-1.73563	12.73130	0.00000	0.00209	0.39996
6.300	-1.66063	12.85631	0.00000	0.00207	0.39997
6.350	-1.58562	12.98132	0.00000	0.00205	0.39997
6.400	-1.51062	13.10632	0.00000	0.00203	0.39997
6.450	-1.43561	13.23133	0.00000	0.00202	0.39998
6.500	-1.36061	13.35634	0.00000	0.00201	0.39998
6.550	-1.28560	13.48134	0.00000	0.00200	0.39998
6.600	-1.21060	13.60635	0.00000	0.00199	0.39998
6.650	-1.13560	13.73135	0.00000	0.00198	0.39999
6.700	-1.06060	13.85636	0.00000	0.00197	0.39999

TABLE 1.10.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-10.50000	0.81246	0.00900	0.99100	0.19139
3.450	-10.36839	0.99741	0.00129	0.99871	0.35027
3.500	-10.28639	1.12988	0.00021	0.99979	0.39292
3.550	-10.21044	1.25590	0.00004	0.99996	0.39877
3.600	-10.13513	1.38123	0.00002	0.99998	0.39857
3.650	-10.05893	1.50746	0.00000	0.99991	0.39165
3.700	-9.97709	1.63950	0.00000	0.99946	0.35908
3.750	-9.87091	1.79669	0.00000	0.99713	0.27208
3.800	-9.69107	2.03031	0.00000	0.98835	0.16900
3.850	-9.37816	2.40275	0.00000	0.96590	0.11161
3.900	-8.93715	2.91005	0.00000	0.92640	0.09014
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.90				
3.950	-8.42947	3.48912	0.00000	0.87220	0.08420
4.000	-7.91010	4.08289	0.00000	0.80702	0.08498
4.050	-7.41071	4.65816	0.00000	0.73377	0.08936
4.100	-6.94690	5.19827	0.00000	0.65472	0.09624
4.150	-6.52557	5.69556	0.00000	0.57185	0.10535
4.200	-6.14920	6.14692	0.00000	0.48724	0.11681
4.250	-5.81804	6.55155	0.00000	0.40321	0.13112
4.300	-5.53121	6.90980	0.00000	0.32248	0.14908
4.350	-5.28704	7.22281	0.00000	0.24812	0.17181
4.400	-5.08290	7.49276	0.00000	0.18318	0.20037
4.450	-4.91467	7.72350	0.00000	0.13006	0.23479
4.500	-4.77645	7.92102	0.00000	0.08963	0.27264
4.550	-4.66099	8.09296	0.00000	0.06085	0.30897
4.600	-4.56119	8.24710	0.00000	0.04138	0.33893
4.650	-4.47130	8.38982	0.00000	0.02858	0.36062
4.700	-4.38738	8.52558	0.00000	0.02021	0.37498
4.750	-4.30696	8.65721	0.00000	0.01469	0.38405
4.800	-4.22860	8.78638	0.00000	0.01099	0.38967
4.850	-4.15146	8.91408	0.00000	0.00846	0.39317
4.900	-4.07506	9.04086	0.00000	0.00668	0.39538
4.950	-3.99912	9.16708	0.00000	0.00541	0.39680
5.000	-3.92347	9.29293	0.00000	0.00448	0.39773
5.050	-3.84802	9.41853	0.00000	0.00378	0.39836
5.100	-3.77269	9.54398	0.00000	0.00325	0.39879
5.150	-3.69745	9.66931	0.00000	0.00284	0.39909
5.200	-3.62227	9.79455	0.00000	0.00252	0.39930
5.250	-3.54714	9.91975	0.00000	0.00226	0.39945
5.300	-3.47203	10.04490	0.00000	0.00205	0.39957
5.350	-3.39695	10.17002	0.00000	0.00188	0.39966
5.400	-3.32188	10.29511	0.00000	0.00174	0.39972
5.450	-3.24683	10.42019	0.00000	0.00163	0.39977
5.500	-3.17179	10.54525	0.00000	0.00153	0.39981
5.550	-3.09675	10.67030	0.00000	0.00145	0.39984
5.600	-3.02173	10.79535	0.00000	0.00138	0.39987
5.650	-2.94670	10.92038	0.00000	0.00133	0.39989
5.700	-2.87168	11.04542	0.00000	0.00128	0.39990
5.750	-2.79666	11.17044	0.00000	0.00123	0.39992
5.800	-2.72165	11.29546	0.00000	0.00120	0.39993
5.850	-2.64664	11.42048	0.00000	0.00116	0.39994
5.900	-2.57163	11.54550	0.00000	0.00114	0.39995
5.950	-2.49662	11.67051	0.00000	0.00111	0.39995
6.000	-2.42161	11.79553	0.00000	0.00109	0.39996
6.050	-2.34660	11.92054	0.00000	0.00107	0.39996
6.100	-2.27160	12.04555	0.00000	0.00106	0.39997
6.150	-2.19659	12.17055	0.00000	0.00104	0.39997
6.200	-2.12159	12.29556	0.00000	0.00103	0.39997
6.250	-2.04659	12.42057	0.00000	0.00102	0.39998
6.300	-1.97158	12.54557	0.00000	0.00101	0.39998
6.350	-1.89658	12.67058	0.00000	0.00100	0.39998
6.400	-1.82158	12.79558	0.00000	0.00099	0.39998
6.450	-1.74657	12.92059	0.00000	0.00098	0.39998
6.500	-1.67157	13.04559	0.00000	0.00098	0.39999
6.550	-1.59657	13.17059	0.00000	0.00097	0.39999
6.600	-1.52157	13.29559	0.00000	0.00097	0.39999
6.650	-1.44657	13.42060	0.00000	0.00096	0.39999
6.700	-1.37157	13.54560	0.00000	0.00096	0.39999

TABLE 1.11.0

NU 1 = 1.0000000 BETA = 0.0

LOG T	LOG RHO	LOG P	MOL. H	AT. H	GRAD
3.400	-11.00000	0.31510	0.00290	0.99710	0.28612
3.450	-10.90617	0.46002	0.00037	0.99963	0.38385
3.500	-10.82913	0.58720	0.00006	0.99994	0.39792
3.550	-10.75383	0.71253	0.00002	0.99998	0.39943
3.600	-10.67849	0.83787	0.00000	0.99997	0.39765
3.650	-10.60130	0.96512	0.00000	0.99985	0.38478
3.700	-10.51363	1.10315	0.00000	0.99900	0.33070
3.750	-10.38293	1.28567	0.00000	0.99483	0.22009
3.800	-10.13839	1.58631	0.00000	0.98059	0.13007
3.850	-9.73341	2.05449	0.00000	0.94913	0.09221
3.900	-9.21392	2.64374	0.00000	0.90022	0.08029
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.90				
3.950	-8.65386	3.27777	0.00000	0.83783	0.07848
4.000	-8.10188	3.90593	0.00000	0.76559	0.08128
4.050	-7.58270	4.50219	0.00000	0.68617	0.08688
4.100	-7.10762	5.05433	0.00000	0.60171	0.09470
4.150	-6.68122	5.55707	0.00000	0.51429	0.10477
4.200	-6.30484	6.00844	0.00000	0.42627	0.11751
4.250	-5.97828	6.40804	0.00000	0.34048	0.13376
4.300	-5.70054	6.75628	0.00000	0.26029	0.15485
4.350	-5.46968	7.05449	0.00000	0.18938	0.18245
4.400	-5.28209	7.30585	0.00000	0.13105	0.21768
4.450	-5.13160	7.51647	0.00000	0.08694	0.25894
4.500	-5.00960	7.69537	0.00000	0.05630	0.30047
4.550	-4.90697	7.85244	0.00000	0.03636	0.33528
4.600	-4.81620	7.99597	0.00000	0.02385	0.36004
4.650	-4.73222	8.13165	0.00000	0.01608	0.37581
4.700	-4.65204	8.26290	0.00000	0.01119	0.38529
4.750	-4.57397	8.39165	0.00000	0.00805	0.39089
4.800	-4.49709	8.51898	0.00000	0.00598	0.39421
4.850	-4.42091	8.64547	0.00000	0.00458	0.39622
4.900	-4.34515	8.77144	0.00000	0.00361	0.39746
4.950	-4.26964	8.89710	0.00000	0.00291	0.39825
5.000	-4.19429	9.02256	0.00000	0.00241	0.39877
5.050	-4.11904	9.14789	0.00000	0.00203	0.39911
5.100	-4.04386	9.27313	0.00000	0.00174	0.39934
5.150	-3.96873	9.39831	0.00000	0.00152	0.39950
5.200	-3.89364	9.52344	0.00000	0.00135	0.39962
5.250	-3.81856	9.64855	0.00000	0.00121	0.39970
5.300	-3.74351	9.77363	0.00000	0.00110	0.39977
5.350	-3.66846	9.89869	0.00000	0.00101	0.39981
5.400	-3.59343	10.02374	0.00000	0.00093	0.39985
5.450	-3.51840	10.14878	0.00000	0.00087	0.39988
5.500	-3.44338	10.27382	0.00000	0.00082	0.39990
5.550	-3.36836	10.39885	0.00000	0.00078	0.39991
5.600	-3.29334	10.52387	0.00000	0.00074	0.39993
5.650	-3.21833	10.64889	0.00000	0.00071	0.39994
5.700	-3.14332	10.77391	0.00000	0.00068	0.39995
5.750	-3.06831	10.89892	0.00000	0.00066	0.39995
5.800	-2.99330	11.02393	0.00000	0.00064	0.39996
5.850	-2.91830	11.14894	0.00000	0.00062	0.39996
5.900	-2.84329	11.27395	0.00000	0.00061	0.39997
5.950	-2.76829	11.39896	0.00000	0.00059	0.39997
6.000	-2.69328	11.52397	0.00000	0.00058	0.39998
6.050	-2.61828	11.64897	0.00000	0.00057	0.39998
6.100	-2.54328	11.77398	0.00000	0.00056	0.39998
6.150	-2.46827	11.89898	0.00000	0.00056	0.39998
6.200	-2.39327	12.02398	0.00000	0.00055	0.39998
6.250	-2.31827	12.14899	0.00000	0.00054	0.39998
6.300	-2.24327	12.27399	0.00000	0.00054	0.39999
6.350	-2.16826	12.39899	0.00000	0.00053	0.39999
6.400	-2.09326	12.52400	0.00000	0.00053	0.39999
6.450	-2.01826	12.64900	0.00000	0.00052	0.39999
6.500	-1.94326	12.77400	0.00000	0.00052	0.39999
6.550	-1.86826	12.89900	0.00000	0.00052	0.39999
6.600	-1.79326	13.02400	0.00000	0.00052	0.39999
6.650	-1.71826	13.14900	0.00000	0.00051	0.39999
6.700	-1.64326	13.27400	0.00000	0.00051	0.39999

TABLE 2.01.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-6.00000	4.98728	0.91360	0.08640	1.00000	0.00000	0.11629
3.450	-5.60984	5.44293	0.83887	0.16113	1.00000	0.00000	0.10551
3.500	-5.20126	5.92170	0.74623	0.25377	1.00000	0.00000	0.10457
3.550	-4.80601	6.39054	0.64436	0.35564	1.00000	0.00000	0.10956
3.600	-4.44268	6.82962	0.54059	0.45941	1.00000	0.00000	0.11900
3.650	-4.12045	7.22854	0.44049	0.55951	1.00000	0.00000	0.13263
3.700	-3.84267	7.58275	0.34828	0.65172	1.00000	0.00000	0.15091
3.750	-3.60902	7.89134	0.26707	0.73293	1.00000	0.00000	0.17472
3.800	-3.41654	8.15610	0.19898	0.80102	1.00000	0.00000	0.20486
3.850	-3.26002	8.38130	0.14491	0.85506	1.00000	0.00000	0.24098
3.900	-3.13228	8.57368	0.10442	0.89548	1.00000	0.00000	0.27975
3.950	-3.02494	8.74180	0.07573	0.92397	1.00000	0.00000	0.31439
4.000	-2.92967	8.89467	0.05633	0.94290	1.00000	0.00000	0.33768
4.050	-2.83930	9.04039	0.04364	0.95457	1.00000	0.00000	0.34614
4.100	-2.74818	9.18547	0.03560	0.96062	1.00000	0.00000	0.34120
4.150	-2.65214	9.33484	0.03077	0.96195	1.00000	0.00000	0.32736
4.200	-2.54852	9.49175	0.02821	0.95889	0.99999	0.00001	0.30990
4.250	-2.43619	9.65773	0.02737	0.95149	0.99994	0.00006	0.29313
4.300	-2.31558	9.83257	0.02792	0.93977	0.99977	0.00023	0.27958
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.30						
4.350	-2.20115	10.01410	0.00000	0.95286	0.99934	0.00066	0.27114
4.400	-2.07145	10.20050	0.00000	0.93568	0.99829	0.00171	0.26600
4.450	-1.94026	10.38922	0.00000	0.91611	0.99605	0.00395	0.26441
4.500	-1.80959	10.57804	0.00000	0.89468	0.99172	0.00828	0.26560
4.550	-1.68092	10.76524	0.00000	0.87198	0.98411	0.01589	0.26888
4.600	-1.55525	10.94963	0.00000	0.84857	0.97180	0.02820	0.27365
4.675	-1.37356	11.21941	0.00000	0.81328	0.94157	0.05843	0.28269
4.750	-1.20064	11.48002	0.00000	0.77903	0.89481	0.10519	0.29309
4.825	-1.03647	11.73120	0.00000	0.74677	0.83237	0.16759	0.30422
4.900	-0.88055	11.97324	0.00000	0.71699	0.75901	0.24075	0.31557
4.975	-0.73209	12.20680	0.00000	0.68985	0.68148	0.31758	0.32662
5.050	-0.59012	12.43282	0.00000	0.66537	0.60585	0.39127	0.33690
5.125	-0.45355	12.65240	0.00000	0.64353	0.53611	0.45664	0.34605
5.200	-0.32135	12.86663	0.00000	0.62430	0.47404	0.51049	0.35395
5.275	-0.19263	13.07648	0.00000	0.60758	0.41988	0.55131	0.36065
5.350	-0.06668	13.28277	0.00000	0.59322	0.37309	0.57904	0.36633
5.425	0.05703	13.48613	0.00000	0.58100	0.33292	0.59476	0.37118
5.500	0.17888	13.68702	0.00000	0.57067	0.29858	0.60041	0.37538
5.575	0.29919	13.88583	0.00000	0.56196	0.26939	0.59834	0.37903
5.650	0.41818	14.08285	0.00000	0.55463	0.24474	0.59092	0.38221
5.725	0.53607	14.27836	0.00000	0.54844	0.22400	0.58024	0.38496
5.800	0.65304	14.47257	0.00000	0.54322	0.20665	0.56792	0.38733
5.875	0.76923	14.66568	0.00000	0.53881	0.19220	0.55514	0.38935
5.950	0.88478	14.85787	0.00000	0.53508	0.18016	0.54269	0.39106
6.025	0.99981	15.04929	0.00000	0.53192	0.17016	0.53103	0.39251
6.100	1.11439	15.24006	0.00000	0.52925	0.16186	0.52040	0.39372
6.175	1.22862	15.43029	0.00000	0.52699	0.15496	0.51090	0.39474
6.250	1.34256	15.62008	0.00000	0.52508	0.14922	0.50253	0.39559
6.325	1.45625	15.80949	0.00000	0.52346	0.14445	0.49523	0.39631
6.400	1.56974	15.99859	0.00000	0.52209	0.14048	0.48890	0.39690
6.475	1.68307	16.18743	0.00000	0.52094	0.13717	0.48346	0.39740
6.550	1.79626	16.37605	0.00000	0.51996	0.13441	0.47880	0.39782
6.625	1.90933	16.56449	0.00000	0.51914	0.13209	0.47483	0.39817
6.700	2.02231	16.75278	0.00000	0.51845	0.13016	0.47144	0.39846

TABLE 2.02.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-6.50000	4.49961	0.85382	0.14618	1.00000	0.00000	0.09563
3.450	-6.03522	5.03554	0.75605	0.24395	1.00000	0.00000	0.09245
3.500	-5.57725	5.56881	0.64642	0.35358	1.00000	0.00000	0.09595
3.550	-5.15292	6.07112	0.53386	0.46614	1.00000	0.00000	0.10391
3.600	-4.77531	6.52793	0.42523	0.57477	1.00000	0.00000	0.11592
3.650	-4.44980	6.93240	0.32567	0.67433	1.00000	0.00000	0.13256
3.700	-4.17739	7.28199	0.23905	0.76095	1.00000	0.00000	0.15524
3.750	-3.95601	7.57724	0.16795	0.83205	1.00000	0.00000	0.18584
3.800	-3.78062	7.82199	0.11347	0.88651	1.00000	0.00000	0.22545
3.850	-3.64287	8.02412	0.07483	0.92512	1.00000	0.00000	0.27110
3.900	-3.53178	8.19503	0.04934	0.95049	1.00000	0.00000	0.31356
3.950	-3.43622	8.34695	0.03343	0.96609	1.00000	0.00000	0.34215
4.000	-3.34697	8.49034	0.02377	0.97498	1.00000	0.00000	0.35219
4.050	-3.25712	8.63318	0.01798	0.97911	1.00000	0.00000	0.34554
4.100	-3.16147	8.78149	0.01458	0.97934	1.00000	0.00000	0.32749
4.150	-3.05623	8.93971	0.01270	0.97571	0.99999	0.00001	0.30454
4.200	-2.93943	9.11031	0.01187	0.96796	0.99997	0.00003	0.28243
4.250	-2.81119	9.29345	0.01182	0.95579	0.99990	0.00010	0.26471
4.300	-2.67356	9.48714	0.01241	0.93918	0.99965	0.00035	0.25260
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.30					
4.350	-2.53501	9.68853	0.00000	0.93155	0.99901	0.00099	0.24532
4.400	-2.38867	9.89360	0.00000	0.90869	0.99749	0.00251	0.24298
4.450	-2.24266	10.09912	0.00000	0.88334	0.99430	0.00570	0.24408
4.500	-2.09917	10.30261	0.00000	0.85623	0.98822	0.01178	0.24770
4.550	-1.95964	10.50238	0.00000	0.82808	0.97766	0.02234	0.25313
4.600	-1.82488	10.69741	0.00000	0.79957	0.96082	0.03918	0.25980
4.650	-1.69522	10.88718	0.00000	0.77129	0.93604	0.06396	0.26730
4.700	-1.57075	11.07150	0.00000	0.74372	0.90228	0.09772	0.27537
4.750	-1.45134	11.25036	0.00000	0.71722	0.85953	0.14046	0.28380
4.800	-1.33680	11.42391	0.00000	0.69201	0.80899	0.19096	0.29247
4.850	-1.22685	11.59236	0.00000	0.66819	0.75285	0.24700	0.30123
4.900	-1.12118	11.75599	0.00000	0.64581	0.69379	0.30578	0.30992
4.950	-1.01943	11.91515	0.00000	0.62488	0.63447	0.36445	0.31836
5.000	-0.92118	12.07024	0.00000	0.60537	0.57706	0.42053	0.32638
5.050	-0.82601	12.22169	0.00000	0.58729	0.52308	0.47205	0.33384
5.100	-0.73351	12.36993	0.00000	0.57063	0.47337	0.51758	0.34064
5.150	-0.64328	12.51539	0.00000	0.55536	0.42823	0.55620	0.34673
5.200	-0.55498	12.65846	0.00000	0.54147	0.38758	0.58736	0.35215
5.250	-0.46830	12.79946	0.00000	0.52891	0.35117	0.61090	0.35695
5.300	-0.38301	12.93869	0.00000	0.51762	0.31862	0.62696	0.36122
5.350	-0.29891	13.07637	0.00000	0.50752	0.28958	0.63602	0.36503
5.400	-0.21584	13.21269	0.00000	0.49852	0.26370	0.63879	0.36848
5.450	-0.13370	13.34780	0.00000	0.49050	0.24068	0.63621	0.37162
5.500	-0.05237	13.48182	0.00000	0.48337	0.22027	0.62931	0.37450
5.550	0.02823	13.61486	0.00000	0.47702	0.20220	0.61914	0.37713
5.600	0.10816	13.74701	0.00000	0.47136	0.18627	0.60668	0.37955
5.650	0.18750	13.87836	0.00000	0.46632	0.17225	0.59278	0.38175
5.700	0.26632	14.00899	0.00000	0.46182	0.15995	0.57817	0.38374
5.750	0.34467	14.13898	0.00000	0.45779	0.14917	0.56340	0.38555
5.800	0.42261	14.26838	0.00000	0.45419	0.13974	0.54888	0.38717
5.850	0.50019	14.39728	0.00000	0.45097	0.13151	0.53492	0.38862
5.900	0.57744	14.52573	0.00000	0.44808	0.12431	0.52170	0.38991
5.950	0.65442	14.65377	0.00000	0.44549	0.11802	0.50934	0.39106
6.000	0.73116	14.78146	0.00000	0.44317	0.11253	0.49789	0.39208
6.050	0.80768	14.90883	0.00000	0.44109	0.10772	0.48738	0.39298
6.100	0.88402	15.03593	0.00000	0.43923	0.10352	0.47777	0.39378
6.150	0.96020	15.16279	0.00000	0.43757	0.09983	0.46903	0.39449
6.200	1.03623	15.28943	0.00000	0.43607	0.09660	0.46112	0.39512
6.250	1.11214	15.41589	0.00000	0.43474	0.09377	0.45398	0.39567
6.300	1.18795	15.54217	0.00000	0.43354	0.09127	0.44754	0.39616
6.350	1.26366	15.66831	0.00000	0.43247	0.08908	0.44175	0.39659
6.400	1.33929	15.79433	0.00000	0.43152	0.08715	0.43656	0.39697
6.450	1.41484	15.92022	0.00000	0.43066	0.08545	0.43190	0.39731
6.500	1.49033	16.04602	0.00000	0.42990	0.08395	0.42773	0.39761
6.550	1.56576	16.17173	0.00000	0.42922	0.08262	0.42400	0.39788
6.600	1.64115	16.29736	0.00000	0.42861	0.08145	0.42066	0.39812
6.650	1.71649	16.42291	0.00000	0.42806	0.08041	0.41768	0.39833
6.700	1.79179	16.54841	0.00000	0.42758	0.07949	0.41501	0.39851

TABLE 2.03.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-7.00000	4.01969	0.76084	0.23916	1.00000	0.00000	0.08093
3.450	-6.46511	4.63177	0.64302	0.35698	1.00000	0.00000	0.08334
3.500	-5.96668	5.21049	0.52180	0.47820	1.00000	0.00000	0.09018
3.550	-5.52261	5.73630	0.40514	0.59486	1.00000	0.00000	0.10087
3.600	-5.14050	6.19981	0.29916	0.70084	1.00000	0.00000	0.11612
3.650	-4.82295	6.59651	0.20847	0.79153	1.00000	0.00000	0.13791
3.700	-4.56937	6.92503	0.13621	0.86378	1.00000	0.00000	0.16954
3.750	-4.37531	7.18834	0.08361	0.91638	1.00000	0.00000	0.21425
3.800	-4.23035	7.39646	0.04918	0.95079	1.00000	0.00000	0.26918
3.850	-4.11887	7.56598	0.02879	0.97112	1.00000	0.00000	0.32001
3.900	-4.02534	7.71412	0.01744	0.98226	1.00000	0.00000	0.35169
3.950	-3.93837	7.85382	0.01124	0.98789	1.00000	0.00000	0.36058
4.000	-3.85017	7.99396	0.00781	0.98995	1.00000	0.00000	0.35023
4.050	-3.75462	8.14147	0.00590	0.98895	1.00000	0.00000	0.32630
4.100	-3.64658	8.30215	0.00487	0.98452	1.00000	0.00000	0.29620
4.150	-3.52266	8.47995	0.00438	0.97589	0.99999	0.00001	0.26748
4.200	-3.38240	8.67569	0.00426	0.96237	0.99996	0.00004	0.24497
4.250	-3.22846	8.88682	0.00444	0.94371	0.99983	0.00017	0.23006
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.25					
4.300	-3.06709	9.10899	0.00000	0.92489	0.99945	0.00055	0.22155
4.350	-2.89990	9.33644	0.00000	0.89773	0.99847	0.00153	0.21888
4.400	-2.73311	9.56446	0.00000	0.86737	0.99619	0.00381	0.22025
4.450	-2.56987	9.78951	0.00000	0.83472	0.99148	0.00852	0.22452
4.500	-2.41218	10.00926	0.00000	0.80068	0.98264	0.01736	0.23084
4.550	-2.26109	10.22240	0.00000	0.76610	0.96749	0.03251	0.23856
4.600	-2.11698	10.42834	0.00000	0.73173	0.94372	0.05628	0.24720
4.650	-1.97983	10.62695	0.00000	0.69821	0.90942	0.09058	0.25644
4.700	-1.84937	10.81837	0.00000	0.66603	0.86385	0.13615	0.26608
4.750	-1.72526	11.00288	0.00000	0.63547	0.80790	0.19208	0.27600
4.800	-1.60711	11.18081	0.00000	0.60670	0.74409	0.25582	0.28609
4.850	-1.49447	11.35257	0.00000	0.57974	0.67596	0.32375	0.29619
4.900	-1.38688	11.51859	0.00000	0.55457	0.60724	0.39195	0.30612
4.950	-1.28381	11.67942	0.00000	0.53117	0.54106	0.45695	0.31564
5.000	-1.18470	11.83561	0.00000	0.50952	0.47956	0.51608	0.32453
5.050	-1.08899	11.98775	0.00000	0.48961	0.42388	0.56744	0.33262
5.100	-0.99614	12.13643	0.00000	0.47143	0.37430	0.60982	0.33984
5.150	-0.90566	12.28218	0.00000	0.45495	0.33058	0.64249	0.34617
5.200	-0.81715	12.42545	0.00000	0.44014	0.29221	0.66517	0.35169
5.250	-0.73027	12.56663	0.00000	0.42691	0.25857	0.67798	0.35652
5.300	-0.64478	12.70602	0.00000	0.41515	0.22910	0.68149	0.36079
5.350	-0.56048	12.84386	0.00000	0.40475	0.20329	0.67672	0.36464
5.400	-0.47725	12.98031	0.00000	0.39555	0.18073	0.66505	0.36816
5.450	-0.39496	13.11552	0.00000	0.38741	0.16105	0.64805	0.37141
5.500	-0.31354	13.24959	0.00000	0.38020	0.14396	0.62733	0.37442
5.550	-0.23290	13.38263	0.00000	0.37379	0.12917	0.60435	0.37720
5.600	-0.15296	13.51474	0.00000	0.36809	0.11641	0.58038	0.37974
5.650	-0.07365	13.64600	0.00000	0.36300	0.10544	0.55639	0.38206
5.700	0.00511	13.77651	0.00000	0.35844	0.09602	0.53310	0.38414
5.750	0.08337	13.90635	0.00000	0.35436	0.08795	0.51100	0.38601
5.800	0.16121	14.03559	0.00000	0.35071	0.08104	0.49038	0.38767
5.850	0.23868	14.16432	0.00000	0.34742	0.07511	0.47137	0.38914
5.900	0.31583	14.29259	0.00000	0.34448	0.07003	0.45403	0.39044
5.950	0.39270	14.42046	0.00000	0.34184	0.06566	0.43832	0.39158
6.000	0.46933	14.54798	0.00000	0.33948	0.06190	0.42416	0.39258
6.050	0.54575	14.67519	0.00000	0.33736	0.05866	0.41145	0.39346
6.100	0.62199	14.80215	0.00000	0.33546	0.05586	0.40008	0.39423
6.150	0.69808	14.92886	0.00000	0.33375	0.05344	0.38992	0.39491
6.200	0.77404	15.05538	0.00000	0.33223	0.05134	0.38087	0.39550
6.250	0.84987	15.18171	0.00000	0.33087	0.04951	0.37282	0.39602
6.300	0.92561	15.30789	0.00000	0.32965	0.04791	0.36565	0.39648
6.350	1.00126	15.43394	0.00000	0.32856	0.04652	0.35927	0.39689
6.400	1.07683	15.55986	0.00000	0.32758	0.04530	0.35360	0.39724
6.450	1.15234	15.68568	0.00000	0.32671	0.04424	0.34856	0.39756
6.500	1.22778	15.81140	0.00000	0.32593	0.04330	0.34408	0.39783
6.550	1.30317	15.93704	0.00000	0.32524	0.04248	0.34010	0.39808
6.600	1.37852	16.06261	0.00000	0.32462	0.04175	0.33656	0.39829
6.650	1.45383	16.18812	0.00000	0.32406	0.04112	0.33341	0.39849
6.700	1.52910	16.31356	0.00000	0.32357	0.04055	0.33061	0.39865

TABLE 2.04.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-7.50000	3.55042	0.62833	0.37167	1.00000	0.00000	0.07169
3.450	-6.91073	4.22254	0.49857	0.50143	1.00000	0.00000	0.07778
3.500	-6.38694	4.83065	0.37494	0.62506	1.00000	0.00000	0.08749
3.550	-5.93866	5.36260	0.26427	0.73573	1.00000	0.00000	0.10178
3.600	-5.57071	5.81116	0.17193	0.82807	1.00000	0.00000	0.12344
3.650	-5.28519	6.17176	0.10162	0.89838	1.00000	0.00000	0.15807
3.700	-5.07846	6.44629	0.05447	0.94553	1.00000	0.00000	0.21239
3.750	-4.93481	6.65055	0.02740	0.97259	1.00000	0.00000	0.28099
3.800	-4.82930	6.81151	0.01380	0.98616	1.00000	0.00000	0.33790
3.850	-4.74089	6.95259	0.00734	0.99248	1.00000	0.00000	0.36655
3.900	-4.65723	7.08768	0.00425	0.99514	1.00000	0.00000	0.37005
3.950	-4.57072	7.22531	0.00270	0.99551	1.00000	0.00000	0.35364
4.000	-4.47444	7.37305	0.00189	0.99353	1.00000	0.00000	0.32168
4.050	-4.36125	7.53874	0.00148	0.98821	1.00000	0.00000	0.28238
4.100	-4.22548	7.72872	0.00128	0.97816	1.00000	0.00000	0.24605
4.150	-4.06582	7.94476	0.00124	0.96220	0.99999	0.00001	0.21910
4.200	-3.88625	8.18301	0.00129	0.93990	0.99992	0.00008	0.20244
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.20					
4.250	-3.69443	8.43615	0.00000	0.91298	0.99971	0.00029	0.19404
4.300	-3.49718	8.69577	0.00000	0.87980	0.99909	0.00091	0.19199
4.350	-3.30136	8.95504	0.00000	0.84269	0.99750	0.00250	0.19430
4.400	-3.11132	9.20914	0.00000	0.80279	0.99390	0.00610	0.19969
4.450	-2.92963	9.45508	0.00000	0.76121	0.98657	0.01343	0.20724
4.500	-2.75751	9.69134	0.00000	0.71899	0.97301	0.02699	0.21628
4.550	-2.59522	9.91739	0.00000	0.67709	0.95014	0.04986	0.22629
4.600	-2.44250	10.13334	0.00000	0.63634	0.91495	0.08505	0.23693
4.675	-2.23011	10.43931	0.00000	0.57873	0.83559	0.16441	0.25362
4.750	-2.03588	10.72540	0.00000	0.52630	0.72828	0.27167	0.27097
4.825	-1.85776	10.99353	0.00000	0.47924	0.60760	0.39205	0.28864
4.900	-1.69356	11.24584	0.00000	0.43734	0.49085	0.50747	0.30585
4.975	-1.54080	11.48487	0.00000	0.40043	0.38950	0.60451	0.32148
5.050	-1.39687	11.71334	0.00000	0.36846	0.30710	0.67590	0.33467
5.125	-1.25941	11.93386	0.00000	0.34135	0.24206	0.71820	0.34514
5.200	-1.12659	12.14854	0.00000	0.31882	0.19103	0.73037	0.35329
5.275	-0.99718	12.35881	0.00000	0.30038	0.15090	0.71446	0.35990
5.350	-0.87053	12.56552	0.00000	0.28534	0.11933	0.67642	0.36569
5.425	-0.74630	12.76911	0.00000	0.27302	0.09472	0.62476	0.37100
5.500	-0.62422	12.96993	0.00000	0.26281	0.07576	0.56796	0.37585
5.575	-0.50402	13.16832	0.00000	0.25426	0.06132	0.51243	0.38015
5.650	-0.38539	13.36463	0.00000	0.24704	0.05041	0.46194	0.38382
5.725	-0.26803	13.55924	0.00000	0.24092	0.04218	0.41806	0.38686
5.800	-0.15168	13.75246	0.00000	0.23573	0.03596	0.38097	0.38934
5.875	-0.03612	13.94458	0.00000	0.23132	0.03123	0.35012	0.39134
5.950	0.07882	14.13582	0.00000	0.22759	0.02761	0.32469	0.39295
6.025	0.19328	14.32636	0.00000	0.22443	0.02480	0.30382	0.39423
6.100	0.30736	14.51634	0.00000	0.22176	0.02261	0.28670	0.39527
6.175	0.42115	14.70588	0.00000	0.21950	0.02088	0.27266	0.39611
6.250	0.53470	14.89505	0.00000	0.21759	0.01951	0.26112	0.39679
6.325	0.64806	15.08393	0.00000	0.21599	0.01842	0.25161	0.39734
6.400	0.76127	15.27257	0.00000	0.21463	0.01753	0.24377	0.39779
6.475	0.87435	15.46102	0.00000	0.21349	0.01681	0.23728	0.39816
6.550	0.98733	15.64931	0.00000	0.21253	0.01623	0.23190	0.39847
6.625	1.10024	15.83746	0.00000	0.21172	0.01575	0.22743	0.39872
6.700	1.21307	16.02551	0.00000	0.21104	0.01536	0.22371	0.39893

TABLE 2.05.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-8.00000	3.09294	0.46256	0.53744	1.00000	0.00000	0.06686
3.450	-7.38226	3.79749	0.33383	0.66617	1.00000	0.00000	0.07588
3.500	-6.85864	4.40659	0.22119	0.77881	1.00000	0.00000	0.08970
3.550	-6.43805	4.90835	0.13066	0.86934	1.00000	0.00000	0.11257
3.600	-6.12795	5.29217	0.06654	0.93346	1.00000	0.00000	0.15458
3.650	-5.92394	5.56071	0.02919	0.97081	1.00000	0.00000	0.22776
3.700	-5.79485	5.74672	0.01192	0.98808	1.00000	0.00000	0.31190
3.750	-5.70082	5.89354	0.00503	0.99495	1.00000	0.00000	0.36376
3.800	-5.61853	6.02696	0.00232	0.99756	1.00000	0.00000	0.38146
3.850	-5.53788	6.15821	0.00120	0.99834	1.00000	0.00000	0.37726
3.900	-5.45227	6.29448	0.00069	0.99777	1.00000	0.00000	0.35349
3.950	-5.35343	6.44458	0.00046	0.99513	1.00000	0.00000	0.31101
4.000	-5.23060	6.62010	0.00034	0.98875	1.00000	0.00000	0.26024
4.050	-5.07429	6.83141	0.00029	0.97642	1.00000	0.00000	0.21647
4.100	-4.88251	7.08112	0.00028	0.95643	1.00000	0.00000	0.18717
4.150	-4.66263	7.36187	0.00029	0.92834	0.99997	0.00003	0.17114
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.15					
4.200	-4.42698	7.66100	0.00000	0.89321	0.99985	0.00015	0.16452
4.250	-4.18713	7.96598	0.00000	0.85179	0.99947	0.00053	0.16422
4.300	-3.95192	8.26739	0.00000	0.80583	0.99839	0.00161	0.16813
4.350	-3.72681	8.55921	0.00000	0.75673	0.99570	0.00430	0.17500
4.400	-3.51470	8.83804	0.00000	0.70583	0.98970	0.01030	0.18400
4.450	-3.31671	9.10242	0.00000	0.65438	0.97759	0.02241	0.19454
4.500	-3.13275	9.35216	0.00000	0.60359	0.95546	0.04454	0.20613
4.550	-2.96206	9.58784	0.00000	0.55456	0.91879	0.08121	0.21838
4.600	-2.80356	9.81041	0.00000	0.50817	0.86399	0.13601	0.23107
4.675	-2.58626	10.12195	0.00000	0.44466	0.74760	0.25239	0.25083
4.750	-2.39080	10.40931	0.00000	0.38873	0.60536	0.39451	0.27157
4.825	-2.21436	10.67525	0.00000	0.33993	0.46407	0.53507	0.29266
4.900	-2.05371	10.92306	0.00000	0.29780	0.34408	0.65197	0.31249
4.975	-1.90513	11.15662	0.00000	0.26215	0.25178	0.73453	0.32923
5.050	-1.76499	11.37993	0.00000	0.23280	0.18395	0.77839	0.34184
5.125	-1.63029	11.59639	0.00000	0.20931	0.13445	0.78095	0.35062
5.200	-1.49913	11.80827	0.00000	0.19086	0.09799	0.74329	0.35713
5.275	-1.37078	12.01655	0.00000	0.17641	0.07105	0.67426	0.36303
5.350	-1.24511	12.22147	0.00000	0.16491	0.05140	0.58901	0.36900
5.425	-1.12208	12.42311	0.00000	0.15554	0.03737	0.50254	0.37483
5.500	-1.00142	12.62178	0.00000	0.14776	0.02755	0.42467	0.38005
5.575	-0.88271	12.81796	0.00000	0.14123	0.02075	0.35943	0.38440
5.650	-0.76551	13.01216	0.00000	0.13574	0.01604	0.30698	0.38784
5.725	-0.64945	13.20485	0.00000	0.13111	0.01276	0.26570	0.39050
5.800	-0.53423	13.39639	0.00000	0.12723	0.01043	0.23348	0.39253
5.875	-0.41963	13.58706	0.00000	0.12396	0.00874	0.20835	0.39408
5.950	-0.30549	13.77707	0.00000	0.12123	0.00752	0.18866	0.39528
6.025	-0.19170	13.96658	0.00000	0.11894	0.00660	0.17316	0.39620
6.100	-0.07816	14.15570	0.00000	0.11701	0.00591	0.16086	0.39692
6.175	0.03516	14.34451	0.00000	0.11540	0.00537	0.15104	0.39749
6.250	0.14833	14.53308	0.00000	0.11405	0.00496	0.14314	0.39795
6.325	0.26138	14.72145	0.00000	0.11292	0.00463	0.13676	0.39831
6.400	0.37432	14.90967	0.00000	0.11197	0.00437	0.13156	0.39861
6.475	0.48719	15.09777	0.00000	0.11118	0.00416	0.12732	0.39885
6.550	0.59999	15.28576	0.00000	0.11051	0.00400	0.12383	0.39904
6.625	0.71274	15.47367	0.00000	0.10995	0.00386	0.12096	0.39920
6.700	0.82545	15.66151	0.00000	0.10948	0.00375	0.11859	0.39933

TABLE 2.06.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-8.50000	2.64324	0.28973	0.71027	1.00000	0.00000	0.06606
3.450	-7.89301	3.33687	0.17771	0.82229	1.00000	0.00000	0.07975
3.500	-7.42119	3.88931	0.09205	0.90795	1.00000	0.00000	0.10555
3.550	-7.10209	4.27916	0.03780	0.96220	1.00000	0.00000	0.16265
3.600	-6.92079	4.52048	0.01263	0.98737	1.00000	0.00000	0.26524
3.650	-6.81332	4.68143	0.00406	0.99594	1.00000	0.00000	0.35100
3.700	-6.72952	4.81630	0.00143	0.99856	1.00000	0.00000	0.38430
3.750	-6.65133	4.94487	0.00057	0.99935	1.00000	0.00000	0.39062
3.800	-6.57242	5.07402	0.00026	0.99938	1.00000	0.00000	0.38088
3.850	-6.48675	5.21016	0.00013	0.99848	1.00000	0.00000	0.34992
3.900	-6.38327	5.36493	0.00008	0.99542	1.00000	0.00000	0.29442
3.950	-6.24479	5.55658	0.00006	0.98766	1.00000	0.00000	0.23085
4.000	-6.05565	5.80202	0.00005	0.97197	1.00000	0.00000	0.18205
4.050	-5.81464	6.10318	0.00005	0.94618	1.00000	0.00000	0.15390
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.05						
4.100	-5.53671	6.44488	0.00000	0.91030	0.99998	0.00002	0.14091
4.150	-5.24204	6.80605	0.00000	0.86572	0.99993	0.00007	0.13716
4.200	-4.94726	7.16907	0.00000	0.81439	0.99971	0.00029	0.13905
4.250	-4.66323	7.52227	0.00000	0.75812	0.99902	0.00098	0.14463
4.300	-4.39603	7.85889	0.00000	0.69857	0.99711	0.00289	0.15290
4.350	-4.14847	8.17562	0.00000	0.63730	0.99240	0.00760	0.16325
4.400	-3.92125	8.47137	0.00000	0.57582	0.98192	0.01808	0.17527
4.450	-3.71370	8.74649	0.00000	0.51567	0.96083	0.03917	0.18855
4.500	-3.52434	9.00229	0.00000	0.45833	0.92260	0.07740	0.20268
4.550	-3.35126	9.24052	0.00000	0.40506	0.86085	0.13915	0.21733
4.600	-3.19264	9.46297	0.00000	0.35665	0.77314	0.22686	0.23247
4.650	-3.04701	9.67108	0.00000	0.31329	0.66439	0.33559	0.24837
4.700	-2.91331	9.86591	0.00000	0.27471	0.54645	0.45346	0.26523
4.750	-2.79052	10.04847	0.00000	0.24052	0.43297	0.56664	0.28277
4.800	-2.67736	10.22004	0.00000	0.21042	0.33398	0.66465	0.30014
4.850	-2.57230	10.38224	0.00000	0.18422	0.25368	0.74223	0.31620
4.900	-2.47361	10.53693	0.00000	0.16174	0.19156	0.79780	0.32986
4.950	-2.37955	10.68602	0.00000	0.14281	0.14465	0.83081	0.34036
5.000	-2.28855	10.83129	0.00000	0.12712	0.10942	0.83998	0.34753
5.050	-2.19938	10.97418	0.00000	0.11431	0.08277	0.82354	0.35195
5.100	-2.11127	11.11563	0.00000	0.10397	0.06238	0.78118	0.35489
5.150	-2.02401	11.25597	0.00000	0.09560	0.04667	0.71628	0.35776
5.200	-1.93776	11.39505	0.00000	0.08874	0.03462	0.63625	0.36143
5.250	-1.85285	11.53254	0.00000	0.08299	0.02551	0.55047	0.36599
5.300	-1.76945	11.66823	0.00000	0.07808	0.01875	0.46735	0.37104
5.350	-1.68760	11.80208	0.00000	0.07382	0.01382	0.39247	0.37601
5.400	-1.60713	11.93425	0.00000	0.07007	0.01028	0.32838	0.38050
5.450	-1.52783	12.06498	0.00000	0.06678	0.00774	0.27536	0.38431
5.500	-1.44947	12.19455	0.00000	0.06387	0.00593	0.23238	0.38741
5.550	-1.37183	12.32319	0.00000	0.06132	0.00463	0.19792	0.38988
5.600	-1.29475	12.45110	0.00000	0.05907	0.00368	0.17039	0.39182
5.650	-1.21810	12.57845	0.00000	0.05710	0.00299	0.14838	0.39334
5.700	-1.14178	12.70537	0.00000	0.05537	0.00247	0.13071	0.39453
5.750	-1.06571	12.83195	0.00000	0.05385	0.00208	0.11646	0.39548
5.800	-0.98983	12.95825	0.00000	0.05251	0.00178	0.10488	0.39623
5.850	-0.91411	13.08434	0.00000	0.05134	0.00155	0.09541	0.39683
5.900	-0.83850	13.21026	0.00000	0.05031	0.00136	0.08760	0.39732
5.950	-0.76300	13.33604	0.00000	0.04940	0.00122	0.08113	0.39772
6.000	-0.68757	13.46170	0.00000	0.04860	0.00110	0.07572	0.39805
6.050	-0.61221	13.58727	0.00000	0.04789	0.00100	0.07118	0.39833
6.100	-0.53690	13.71275	0.00000	0.04727	0.00092	0.06734	0.39856
6.150	-0.46163	13.83817	0.00000	0.04671	0.00086	0.06407	0.39875
6.200	-0.38640	13.96354	0.00000	0.04623	0.00080	0.06129	0.39891
6.250	-0.31120	14.08886	0.00000	0.04580	0.00076	0.05890	0.39905
6.300	-0.23603	14.21413	0.00000	0.04541	0.00072	0.05685	0.39917
6.350	-0.16088	14.33938	0.00000	0.04508	0.00069	0.05507	0.39928
6.400	-0.08575	14.46459	0.00000	0.04478	0.00066	0.05353	0.39937
6.450	-0.01064	14.58977	0.00000	0.04451	0.00064	0.05220	0.39944
6.500	0.06447	14.71494	0.00000	0.04427	0.00062	0.05103	0.39951
6.550	0.13955	14.84008	0.00000	0.04406	0.00060	0.05001	0.39957
6.600	0.21463	14.96521	0.00000	0.04388	0.00058	0.04912	0.39962
6.650	0.28970	15.09032	0.00000	0.04371	0.00057	0.04834	0.39966
6.700	0.36476	15.21542	0.00000	0.04356	0.00056	0.04765	0.39970

TABLE 2.07.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-9.00000	2.19020	0.14807	0.85193	1.00000	0.00000	0.07087
3.450	-8.47240	2.79769	0.06659	0.93341	1.00000	0.00000	0.09971
3.500	-8.15162	3.18618	0.02128	0.97872	1.00000	0.00000	0.17728
3.550	-7.99605	3.39818	0.00532	0.99468	1.00000	0.00000	0.30603
3.600	-7.90328	3.54256	0.00136	0.99864	1.00000	0.00000	0.37596
3.650	-7.82447	3.67176	0.00040	0.99959	1.00000	0.00000	0.39367
3.700	-7.74805	3.79831	0.00014	0.99982	1.00000	0.00000	0.39487
3.750	-7.67019	3.92629	0.00005	0.99969	1.00000	0.00000	0.38386
3.800	-7.58492	4.06194	0.00003	0.99882	1.00000	0.00000	0.34849
3.850	-7.47767	4.22049	0.00001	0.99565	1.00000	0.00000	0.28019
3.900	-7.32211	4.42966	0.00001	0.98677	1.00000	0.00000	0.20414
3.950	-7.09328	4.71612	0.00001	0.96770	1.00000	0.00000	0.15248
4.000	-6.79231	5.07953	0.00001	0.93588	1.00000	0.00000	0.12694
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.00					
4.050	-6.44572	5.49271	0.00000	0.89203	0.99999	0.00001	0.11708
4.100	-6.08355	5.92432	0.00000	0.83844	0.99997	0.00003	0.11563
4.150	-5.72728	6.35168	0.00000	0.77752	0.99986	0.00014	0.11902
4.200	-5.38946	6.76132	0.00000	0.71138	0.99948	0.00052	0.12562
4.250	-5.07644	7.14614	0.00000	0.64187	0.99828	0.00172	0.13472
4.300	-4.79084	7.50301	0.00000	0.57077	0.99498	0.00502	0.14599
4.350	-4.53295	7.83119	0.00000	0.49995	0.98672	0.01328	0.15923
4.400	-4.30157	8.13152	0.00000	0.43138	0.96811	0.03189	0.17422
4.450	-4.09445	8.40601	0.00000	0.36711	0.93038	0.06962	0.19051
4.500	-3.90865	8.65745	0.00000	0.30896	0.86298	0.13702	0.20753
4.550	-3.74123	8.88878	0.00000	0.25807	0.75966	0.24034	0.22511
4.600	-3.58998	9.10223	0.00000	0.21454	0.62674	0.37325	0.24391
4.650	-3.45361	9.29911	0.00000	0.17765	0.48383	0.51611	0.26466
4.700	-3.33098	9.48054	0.00000	0.14655	0.35321	0.64650	0.28694
4.750	-3.22032	9.64836	0.00000	0.12064	0.24838	0.75041	0.30894
4.800	-3.11917	9.80519	0.00000	0.09944	0.17162	0.82428	0.32826
4.850	-3.02481	9.95401	0.00000	0.08247	0.11831	0.86966	0.34289
4.900	-2.93460	10.09778	0.00000	0.06917	0.08204	0.88723	0.35169
4.950	-2.84622	10.23915	0.00000	0.05894	0.05721	0.87409	0.35486
5.000	-2.75801	10.38006	0.00000	0.05118	0.03985	0.82585	0.35447
5.050	-2.66942	10.52128	0.00000	0.04531	0.02745	0.74277	0.35393
5.100	-2.58101	10.66226	0.00000	0.04078	0.01857	0.63460	0.35594
5.150	-2.49385	10.80182	0.00000	0.03715	0.01232	0.51799	0.36102
5.200	-2.40876	10.93904	0.00000	0.03411	0.00807	0.40881	0.36795
5.250	-2.32597	11.07361	0.00000	0.03150	0.00527	0.31647	0.37507
5.300	-2.24522	11.20579	0.00000	0.02925	0.00348	0.24356	0.38128
5.350	-2.16608	11.33606	0.00000	0.02729	0.00233	0.18832	0.38617
5.400	-2.08811	11.46490	0.00000	0.02559	0.00161	0.14731	0.38979
5.450	-2.01098	11.59272	0.00000	0.02413	0.00114	0.11706	0.39240
5.500	-1.93442	11.71982	0.00000	0.02287	0.00083	0.09468	0.39427
5.550	-1.85826	11.84641	0.00000	0.02179	0.00062	0.07798	0.39561
5.600	-1.78239	11.97263	0.00000	0.02086	0.00048	0.06538	0.39658
5.650	-1.70672	12.09859	0.00000	0.02005	0.00038	0.05576	0.39730
5.700	-1.63119	12.22435	0.00000	0.01935	0.00031	0.04830	0.39783
5.750	-1.55577	12.34997	0.00000	0.01875	0.00025	0.04246	0.39824
5.800	-1.48044	12.47547	0.00000	0.01822	0.00021	0.03782	0.39855
5.850	-1.40516	12.60088	0.00000	0.01776	0.00018	0.03410	0.39880
5.900	-1.32993	12.72623	0.00000	0.01736	0.00016	0.03107	0.39899
5.950	-1.25474	12.85152	0.00000	0.01701	0.00014	0.02860	0.39915
6.000	-1.17959	12.97677	0.00000	0.01671	0.00013	0.02656	0.39928
6.050	-1.10445	13.10197	0.00000	0.01644	0.00012	0.02485	0.39938
6.100	-1.02934	13.22715	0.00000	0.01620	0.00011	0.02343	0.39947
6.150	-0.95424	13.35231	0.00000	0.01599	0.00010	0.02222	0.39954
6.200	-0.87916	13.47744	0.00000	0.01581	0.00009	0.02120	0.39960
6.250	-0.80408	13.60256	0.00000	0.01565	0.00009	0.02032	0.39965
6.300	-0.72902	13.72766	0.00000	0.01550	0.00008	0.01958	0.39970
6.350	-0.65397	13.85275	0.00000	0.01538	0.00008	0.01893	0.39974
6.400	-0.57892	13.97782	0.00000	0.01527	0.00007	0.01837	0.39977
6.450	-0.50388	14.10289	0.00000	0.01517	0.00007	0.01789	0.39980
6.500	-0.42884	14.22795	0.00000	0.01508	0.00007	0.01747	0.39982
6.550	-0.35381	14.35300	0.00000	0.01500	0.00007	0.01711	0.39984
6.600	-0.27878	14.47805	0.00000	0.01493	0.00007	0.01679	0.39986
6.650	-0.20376	14.60309	0.00000	0.01487	0.00006	0.01651	0.39988
6.700	-0.12874	14.72812	0.00000	0.01482	0.00006	0.01626	0.39989

TABLE 2.08.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-9.50000	1.72206	0.06146	0.93854	1.00000	0.00000	0.08780
3.450	-9.14159	2.14808	0.01661	0.98339	1.00000	0.00000	0.17196
3.500	-8.98794	2.35713	0.00327	0.99673	1.00000	0.00000	0.31917
3.550	-8.89933	2.49679	0.00067	0.99933	1.00000	0.00000	0.38391
3.600	-8.82199	2.62434	0.00016	0.99983	1.00000	0.00000	0.39661
3.650	-8.74626	2.75012	0.00005	0.99993	1.00000	0.00000	0.39736
3.700	-8.66956	2.87688	0.00002	0.99985	1.00000	0.00000	0.38940
3.750	-8.58699	3.00970	0.00001	0.99926	1.00000	0.00000	0.35812
3.800	-8.48352	3.16421	0.00000	0.99674	1.00000	0.00000	0.28511
3.850	-8.32552	3.37554	0.00000	0.98853	1.00000	0.00000	0.19594
3.900	-8.07396	3.68498	0.00000	0.96887	1.00000	0.00000	0.13719
3.950	-7.72582	4.09665	0.00000	0.93427	1.00000	0.00000	0.11070
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.95					
4.000	-7.31814	4.57261	0.00000	0.88574	1.00000	0.00000	0.10146
4.050	-6.89217	5.07000	0.00000	0.82626	0.99999	0.00001	0.10057
4.100	-6.47551	5.55978	0.00000	0.75867	0.99995	0.00005	0.10422
4.150	-6.08333	6.02574	0.00000	0.68530	0.99978	0.00022	0.11090
4.200	-5.72297	6.45976	0.00000	0.60821	0.99917	0.00083	0.12001
4.250	-5.39736	6.85833	0.00000	0.52940	0.99727	0.00273	0.13145
4.300	-5.10686	7.22056	0.00000	0.45105	0.99189	0.00811	0.14526
4.350	-4.85024	7.54726	0.00000	0.37562	0.97812	0.02188	0.16151
4.400	-4.62489	7.84071	0.00000	0.30580	0.94631	0.05369	0.17989
4.450	-4.42689	8.10461	0.00000	0.24420	0.88157	0.11843	0.19947
4.500	-4.25168	8.34355	0.00000	0.19250	0.77055	0.22945	0.21943
4.550	-4.09568	8.56124	0.00000	0.15068	0.61717	0.38283	0.24067
4.600	-3.95730	8.75934	0.00000	0.11733	0.44969	0.55028	0.26512
4.650	-3.83547	8.93892	0.00000	0.09088	0.30250	0.69733	0.29245
4.700	-3.72789	9.10240	0.00000	0.07020	0.19353	0.80563	0.31916
4.750	-3.63093	9.25367	0.00000	0.05443	0.12155	0.87511	0.34103
4.800	-3.54074	9.39702	0.00000	0.04270	0.07670	0.91206	0.35526
4.850	-3.45376	9.53642	0.00000	0.03412	0.04912	0.91856	0.36064
4.900	-3.36693	9.67536	0.00000	0.02797	0.03182	0.88869	0.35800
4.950	-3.27820	9.81625	0.00000	0.02360	0.02055	0.81374	0.35171
5.000	-3.18749	9.95931	0.00000	0.02047	0.01300	0.69519	0.34823
5.050	-3.09673	10.10250	0.00000	0.01812	0.00794	0.55255	0.35126
5.100	-3.00817	10.24329	0.00000	0.01624	0.00470	0.41345	0.35966
5.150	-2.92292	10.38038	0.00000	0.01466	0.00273	0.29754	0.36986
5.200	-2.84082	10.51387	0.00000	0.01330	0.00159	0.21072	0.37895
5.250	-2.76113	10.64457	0.00000	0.01213	0.00094	0.14963	0.38578
5.300	-2.68309	10.77335	0.00000	0.01114	0.00058	0.10785	0.39045
5.350	-2.60609	10.90087	0.00000	0.01030	0.00037	0.07945	0.39351
5.400	-2.52976	11.02759	0.00000	0.00960	0.00024	0.06000	0.39550
5.450	-2.45385	11.15379	0.00000	0.00900	0.00017	0.04647	0.39680
5.500	-2.37821	11.27965	0.00000	0.00849	0.00012	0.03688	0.39766
5.550	-2.30275	11.40529	0.00000	0.00806	0.00009	0.02995	0.39825
5.600	-2.22740	11.53077	0.00000	0.00769	0.00007	0.02485	0.39866
5.650	-2.15214	11.65615	0.00000	0.00738	0.00005	0.02102	0.39895
5.700	-2.07694	11.78144	0.00000	0.00711	0.00004	0.01809	0.39917
5.750	-2.00178	11.90667	0.00000	0.00688	0.00003	0.01582	0.39933
5.800	-1.92665	12.03186	0.00000	0.00668	0.00003	0.01404	0.39945
5.850	-1.85155	12.15702	0.00000	0.00650	0.00002	0.01261	0.39954
5.900	-1.77646	12.28215	0.00000	0.00635	0.00002	0.01147	0.39962
5.950	-1.70139	12.40726	0.00000	0.00622	0.00002	0.01053	0.39968
6.000	-1.62633	12.53235	0.00000	0.00610	0.00002	0.00976	0.39973
6.050	-1.55128	12.65743	0.00000	0.00600	0.00002	0.00912	0.39977
6.100	-1.47624	12.78250	0.00000	0.00591	0.00001	0.00859	0.39980
6.150	-1.40120	12.90755	0.00000	0.00583	0.00001	0.00813	0.39983
6.200	-1.32617	13.03260	0.00000	0.00576	0.00001	0.00775	0.39985
6.250	-1.25114	13.15765	0.00000	0.00570	0.00001	0.00743	0.39987
6.300	-1.17612	13.28268	0.00000	0.00565	0.00001	0.00715	0.39989
6.350	-1.10110	13.40772	0.00000	0.00560	0.00001	0.00691	0.39990
6.400	-1.02608	13.53275	0.00000	0.00556	0.00001	0.00670	0.39991
6.450	-0.95107	13.65777	0.00000	0.00552	0.00001	0.00652	0.39992
6.500	-0.87605	13.78279	0.00000	0.00549	0.00001	0.00637	0.39993
6.550	-0.80104	13.90781	0.00000	0.00546	0.00001	0.00623	0.39994
6.600	-0.72603	14.03283	0.00000	0.00543	0.00001	0.00611	0.39995
6.650	-0.65102	14.15784	0.00000	0.00541	0.00001	0.00601	0.39995
6.700	-0.57601	14.28286	0.00000	0.00539	0.00001	0.00592	0.39996

TABLE 2.09.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-10.00000	1.23754	0.02193	0.97807	1.00000	0.00000	0.13201
3.450	-9.80258	1.49228	0.00377	0.99623	1.00000	0.00000	0.29126
3.500	-9.70855	1.63759	0.00063	0.99937	1.00000	0.00000	0.38063
3.550	-9.63090	1.76545	0.00013	0.99987	1.00000	0.00000	0.39681
3.600	-9.55538	1.89101	0.00003	0.99996	1.00000	0.00000	0.39876
3.650	-9.47967	2.01675	0.00001	0.99995	1.00000	0.00000	0.39535
3.700	-9.40094	2.14558	0.00000	0.99969	1.00000	0.00000	0.37662
3.750	-9.30869	2.28840	0.00000	0.99832	1.00000	0.00000	0.31640
3.800	-9.17178	2.47753	0.00000	0.99283	1.00000	0.00000	0.21691
3.850	-8.93722	2.76850	0.00000	0.97694	1.00000	0.00000	0.14006
3.900	-8.57935	3.18896	0.00000	0.94499	1.00000	0.00000	0.10492
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.90					
3.950	-8.13448	3.70214	0.00000	0.89691	1.00000	0.00000	0.09263
4.000	-7.65699	4.25173	0.00000	0.83603	1.00000	0.00000	0.09044
4.050	-7.18496	4.79798	0.00000	0.76570	0.99999	0.00001	0.09326
4.100	-6.73908	5.31895	0.00000	0.68858	0.99993	0.00007	0.09919
4.150	-6.32935	5.80377	0.00000	0.60689	0.99969	0.00031	0.10758
4.200	-5.95999	6.24754	0.00000	0.52280	0.99883	0.00117	0.11835
4.250	-5.63213	6.64855	0.00000	0.43868	0.99608	0.00392	0.13173
4.300	-5.34506	7.00697	0.00000	0.35732	0.98807	0.01193	0.14812
4.350	-5.09657	7.32456	0.00000	0.28193	0.96687	0.03313	0.16766
4.400	-4.88259	7.60507	0.00000	0.21591	0.91679	0.08321	0.18951
4.450	-4.69705	7.85453	0.00000	0.16185	0.81647	0.18353	0.21166
4.500	-4.53391	8.07925	0.00000	0.12011	0.65787	0.34213	0.23397
4.550	-4.39034	8.28227	0.00000	0.08872	0.46940	0.53059	0.25996
4.600	-4.26575	8.46417	0.00000	0.06518	0.30000	0.69993	0.29095
4.650	-4.15796	8.62727	0.00000	0.04772	0.17855	0.82104	0.32219
4.700	-4.06247	8.77640	0.00000	0.03512	0.10359	0.89448	0.34721
4.750	-3.97436	8.91699	0.00000	0.02624	0.06059	0.93181	0.36243
4.800	-3.88935	9.05381	0.00000	0.02009	0.03627	0.93856	0.36658
4.850	-3.80366	9.19112	0.00000	0.01587	0.02216	0.90785	0.36017
4.900	-3.71443	9.33222	0.00000	0.01302	0.01355	0.82542	0.34854
4.950	-3.62146	9.47747	0.00000	0.01107	0.00806	0.68900	0.34147
5.000	-3.52783	9.62357	0.00000	0.00965	0.00457	0.52394	0.34471
5.050	-3.43716	9.76648	0.00000	0.00853	0.00247	0.36847	0.35597
5.100	-3.35103	9.90436	0.00000	0.00757	0.00130	0.24694	0.36925
5.150	-3.26893	10.03770	0.00000	0.00676	0.00068	0.16279	0.38021
5.200	-3.18962	10.16783	0.00000	0.00607	0.00037	0.10816	0.38771
5.250	-3.11204	10.29596	0.00000	0.00550	0.00021	0.07349	0.39236
5.300	-3.03547	10.42291	0.00000	0.00502	0.00012	0.05142	0.39516
5.350	-2.95949	10.54915	0.00000	0.00463	0.00008	0.03712	0.39684
5.400	-2.88385	10.67497	0.00000	0.00430	0.00005	0.02765	0.39786
5.450	-2.80842	10.80053	0.00000	0.00402	0.00003	0.02121	0.39850
5.500	-2.73313	10.92593	0.00000	0.00379	0.00002	0.01672	0.39892
5.550	-2.65791	11.05122	0.00000	0.00359	0.00002	0.01351	0.39920
5.600	-2.58276	11.17644	0.00000	0.00343	0.00001	0.01117	0.39939
5.650	-2.50764	11.30161	0.00000	0.00328	0.00001	0.00942	0.39953
5.700	-2.43255	11.42674	0.00000	0.00316	0.00001	0.00809	0.39962
5.750	-2.35747	11.55185	0.00000	0.00306	0.00001	0.00707	0.39970
5.800	-2.28242	11.67693	0.00000	0.00297	0.00001	0.00626	0.39975
5.850	-2.20737	11.80200	0.00000	0.00289	0.00000	0.00562	0.39980
5.900	-2.13233	11.92706	0.00000	0.00282	0.00000	0.00510	0.39983
5.950	-2.05730	12.05211	0.00000	0.00276	0.00000	0.00468	0.39986
6.000	-1.98227	12.17715	0.00000	0.00271	0.00000	0.00434	0.39988
6.050	-1.90725	12.30219	0.00000	0.00266	0.00000	0.00405	0.39990
6.100	-1.83223	12.42722	0.00000	0.00262	0.00000	0.00381	0.39991
6.150	-1.75722	12.55224	0.00000	0.00259	0.00000	0.00361	0.39992
6.200	-1.68220	12.67726	0.00000	0.00255	0.00000	0.00344	0.39993
6.250	-1.60719	12.80228	0.00000	0.00253	0.00000	0.00330	0.39994
6.300	-1.53218	12.92730	0.00000	0.00250	0.00000	0.00317	0.39995
6.350	-1.45717	13.05231	0.00000	0.00248	0.00000	0.00306	0.39996
6.400	-1.38216	13.17733	0.00000	0.00246	0.00000	0.00297	0.39996
6.450	-1.30716	13.30234	0.00000	0.00245	0.00000	0.00289	0.39997
6.500	-1.23215	13.42735	0.00000	0.00243	0.00000	0.00282	0.39997
6.550	-1.15715	13.55236	0.00000	0.00242	0.00000	0.00276	0.39997
6.600	-1.08214	13.67736	0.00000	0.00241	0.00000	0.00271	0.39998
6.650	-1.00714	13.80237	0.00000	0.00240	0.00000	0.00266	0.39998
6.700	-0.93213	13.92738	0.00000	0.00239	0.00000	0.00262	0.39998

TABLE 2.10.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-10.50000	0.74345	0.00725	0.99275	1.00000	0.00000	0.21494
3.450	-10.38164	0.91435	0.00100	0.99900	1.00000	0.00000	0.36211
3.500	-10.30151	1.04482	0.00016	0.99984	1.00000	0.00000	0.39481
3.550	-10.22581	1.17057	0.00003	0.99997	1.00000	0.00000	0.39906
3.600	-10.15054	1.29586	0.00001	0.99998	1.00000	0.00000	0.39854
3.650	-10.07426	1.42217	0.00000	0.99991	1.00000	0.00000	0.39110
3.700	-9.99194	1.55470	0.00000	0.99939	1.00000	0.00000	0.35657
3.750	-9.88370	1.71402	0.00000	0.99675	1.00000	0.00000	0.26666
3.800	-9.69797	1.95375	0.00000	0.98690	1.00000	0.00000	0.16430
3.850	-9.37578	2.33585	0.00000	0.96209	1.00000	0.00000	0.10921
3.900	-8.92654	2.85173	0.00000	0.91909	1.00000	0.00000	0.08903
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.90					
3.950	-8.41386	3.43604	0.00000	0.86070	1.00000	0.00000	0.08369
4.000	-7.89233	4.03210	0.00000	0.79089	1.00000	0.00000	0.08483
4.050	-7.39287	4.60743	0.00000	0.71281	0.99998	0.00002	0.08950
4.100	-6.93069	5.14581	0.00000	0.62892	0.99991	0.00009	0.09673
4.150	-6.51254	5.63967	0.00000	0.54149	0.99959	0.00041	0.10631
4.200	-6.14091	6.08589	0.00000	0.45296	0.99845	0.00155	0.11849
4.250	-5.81605	6.48361	0.00000	0.36621	0.99470	0.00530	0.13385
4.300	-5.53670	6.83349	0.00000	0.28475	0.98341	0.01659	0.15308
4.350	-5.29971	7.13821	0.00000	0.21256	0.95252	0.04748	0.17618
4.400	-5.09888	7.40375	0.00000	0.15335	0.87874	0.12126	0.20089
4.450	-4.92546	7.63912	0.00000	0.10868	0.73746	0.26254	0.22416
4.500	-4.77324	7.85101	0.00000	0.07673	0.53931	0.46068	0.24910
4.550	-4.64146	8.04029	0.00000	0.05400	0.34152	0.65846	0.28107
4.600	-4.52933	8.20776	0.00000	0.03783	0.19463	0.80523	0.31660
4.650	-4.43228	8.35831	0.00000	0.02660	0.10593	0.89325	0.34648
4.700	-4.34437	8.49846	0.00000	0.01901	0.05784	0.93835	0.36523
4.750	-4.26055	8.63379	0.00000	0.01394	0.03250	0.95268	0.37158
4.800	-4.17647	8.76916	0.00000	0.01059	0.01884	0.93325	0.36509
4.850	-4.08820	8.90899	0.00000	0.00840	0.01105	0.86235	0.34939
4.900	-3.99415	9.05518	0.00000	0.00696	0.00634	0.72691	0.33635
4.950	-3.89751	9.20436	0.00000	0.00597	0.00344	0.54783	0.33647
5.000	-3.80367	9.35061	0.00000	0.00521	0.00175	0.37300	0.34881
5.050	-3.71544	9.49068	0.00000	0.00456	0.00085	0.23767	0.36516
5.100	-3.63238	9.62499	0.00000	0.00401	0.00041	0.14771	0.37873
5.150	-3.55279	9.75536	0.00000	0.00355	0.00020	0.09248	0.38761
5.200	-3.47523	9.88342	0.00000	0.00317	0.00011	0.05943	0.39281
5.250	-3.39876	10.01019	0.00000	0.00286	0.00006	0.03954	0.39572
5.300	-3.32290	10.13626	0.00000	0.00261	0.00003	0.02730	0.39736
5.350	-3.24737	10.26193	0.00000	0.00240	0.00002	0.01954	0.39830
5.400	-3.17203	10.38736	0.00000	0.00222	0.00001	0.01447	0.39887
5.450	-3.09681	10.51266	0.00000	0.00208	0.00001	0.01106	0.39921
5.500	-3.02165	10.63787	0.00000	0.00196	0.00001	0.00869	0.39943
5.550	-2.94654	10.76302	0.00000	0.00185	0.00000	0.00701	0.39958
5.600	-2.87146	10.88813	0.00000	0.00177	0.00000	0.00579	0.39968
5.650	-2.79640	11.01322	0.00000	0.00169	0.00000	0.00488	0.39975
5.700	-2.72135	11.13829	0.00000	0.00163	0.00000	0.00418	0.39980
5.750	-2.64631	11.26334	0.00000	0.00158	0.00000	0.00365	0.39984
5.800	-2.57128	11.38839	0.00000	0.00153	0.00000	0.00323	0.39987
5.850	-2.49626	11.51343	0.00000	0.00149	0.00000	0.00290	0.39989
5.900	-2.42124	11.63846	0.00000	0.00145	0.00000	0.00263	0.39991
5.950	-2.34622	11.76348	0.00000	0.00142	0.00000	0.00242	0.39993
6.000	-2.27121	11.88850	0.00000	0.00139	0.00000	0.00224	0.39994
6.050	-2.19620	12.01352	0.00000	0.00137	0.00000	0.00209	0.39995
6.100	-2.12119	12.13854	0.00000	0.00135	0.00000	0.00197	0.39995
6.150	-2.04618	12.26355	0.00000	0.00133	0.00000	0.00186	0.39996
6.200	-1.97117	12.38856	0.00000	0.00132	0.00000	0.00177	0.39997
6.250	-1.89616	12.51357	0.00000	0.00130	0.00000	0.00170	0.39997
6.300	-1.82116	12.63858	0.00000	0.00129	0.00000	0.00163	0.39997
6.350	-1.74616	12.76359	0.00000	0.00128	0.00000	0.00158	0.39998
6.400	-1.67115	12.88859	0.00000	0.00127	0.00000	0.00153	0.39998
6.450	-1.59615	13.01360	0.00000	0.00126	0.00000	0.00149	0.39998
6.500	-1.52114	13.13860	0.00000	0.00125	0.00000	0.00145	0.39998
6.550	-1.44614	13.26361	0.00000	0.00125	0.00000	0.00142	0.39999
6.600	-1.37114	13.38861	0.00000	0.00124	0.00000	0.00140	0.39999
6.650	-1.29614	13.51362	0.00000	0.00123	0.00000	0.00137	0.39999
6.700	-1.22114	13.63862	0.00000	0.00123	0.00000	0.00135	0.39999

TABLE 2.11.0

NU 1 = 0.94117647

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-11.00000	0.24545	0.00233	0.99767	1.00000	0.00000	0.30647
3.450	-10.91073	0.38555	0.00030	0.99970	1.00000	0.00000	0.38780
3.500	-10.83420	0.51218	0.00005	0.99995	1.00000	0.00000	0.39844
3.550	-10.75897	0.63743	0.00001	0.99999	1.00000	0.00000	0.39950
3.600	-10.68363	0.76278	0.00000	0.99998	1.00000	0.00000	0.39754
3.650	-10.60631	0.89015	0.00000	0.99983	1.00000	0.00000	0.38395
3.700	-10.51793	1.02892	0.00000	0.99888	1.00000	0.00000	0.32755
3.750	-10.38434	1.21442	0.00000	0.99422	1.00000	0.00000	0.21540
3.800	-10.13299	1.52211	0.00000	0.97847	1.00000	0.00000	0.12723
3.850	-9.71992	1.99871	0.00000	0.94419	1.00000	0.00000	0.09097
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.85					
3.900	-9.19485	2.59379	0.00000	0.89148	1.00000	0.00000	0.07976
3.950	-8.63217	3.23056	0.00000	0.82468	1.00000	0.00000	0.07831
4.000	-8.07983	3.85910	0.00000	0.74769	1.00000	0.00000	0.08137
4.050	-7.56204	4.45389	0.00000	0.66337	0.99998	0.00002	0.08723
4.100	-7.08991	5.00287	0.00000	0.57412	0.99988	0.00012	0.09543
4.150	-6.66809	5.50068	0.00000	0.48237	0.99948	0.00052	0.10608
4.200	-6.29809	5.94513	0.00000	0.39097	0.99800	0.00200	0.11976
4.250	-5.97977	6.33569	0.00000	0.30345	0.99298	0.00702	0.13745
4.300	-5.71146	6.67338	0.00000	0.22414	0.97728	0.02272	0.16012
4.350	-5.48848	6.96240	0.00000	0.15768	0.93294	0.06706	0.18697
4.400	-5.30130	7.21234	0.00000	0.10730	0.82785	0.17215	0.21306
4.450	-5.13874	7.43504	0.00000	0.07243	0.64271	0.35729	0.23648
4.500	-4.99675	7.63502	0.00000	0.04898	0.42048	0.57951	0.26588
4.550	-4.87652	7.81103	0.00000	0.03302	0.23680	0.76317	0.30392
4.600	-4.77510	7.96617	0.00000	0.02226	0.12275	0.87698	0.33992
4.650	-4.68574	8.10778	0.00000	0.01522	0.06276	0.93574	0.36427
4.700	-4.60227	8.24263	0.00000	0.01069	0.03299	0.96001	0.37510
4.750	-4.51990	8.37605	0.00000	0.00778	0.01807	0.95514	0.37201
4.800	-4.43395	8.51320	0.00000	0.00592	0.01018	0.90623	0.35535
4.850	-4.34076	8.65824	0.00000	0.00475	0.00570	0.78887	0.33521
4.900	-4.24181	8.80972	0.00000	0.00399	0.00303	0.60697	0.32810
4.950	-4.14387	8.96029	0.00000	0.00343	0.00148	0.41100	0.33856
5.000	-4.05220	9.10405	0.00000	0.00297	0.00068	0.25335	0.35764
5.050	-3.96720	9.24043	0.00000	0.00258	0.00030	0.14961	0.37483
5.100	-3.88678	9.37169	0.00000	0.00225	0.00014	0.08841	0.38609
5.150	-3.80891	9.50004	0.00000	0.00198	0.00007	0.05367	0.39241
5.200	-3.73239	9.62686	0.00000	0.00176	0.00003	0.03386	0.39576
5.250	-3.65654	9.75289	0.00000	0.00159	0.00002	0.02228	0.39754
5.300	-3.58105	9.87849	0.00000	0.00144	0.00001	0.01528	0.39850
5.350	-3.50575	10.00387	0.00000	0.00133	0.00001	0.01089	0.39905
5.400	-3.43056	10.12911	0.00000	0.00123	0.00000	0.00804	0.39937
5.450	-3.35543	10.25428	0.00000	0.00115	0.00000	0.00613	0.39956
5.500	-3.28035	10.37940	0.00000	0.00108	0.00000	0.00481	0.39969
5.550	-3.20529	10.50448	0.00000	0.00102	0.00000	0.00388	0.39977
5.600	-3.13024	10.62954	0.00000	0.00098	0.00000	0.00320	0.39982
5.650	-3.05521	10.75459	0.00000	0.00093	0.00000	0.00269	0.39986
5.700	-2.98018	10.87963	0.00000	0.00090	0.00000	0.00231	0.39989
5.750	-2.90516	11.00466	0.00000	0.00087	0.00000	0.00202	0.39991
5.800	-2.83015	11.12968	0.00000	0.00084	0.00000	0.00179	0.39993
5.850	-2.75513	11.25470	0.00000	0.00082	0.00000	0.00160	0.39994
5.900	-2.68012	11.37972	0.00000	0.00080	0.00000	0.00145	0.39995
5.950	-2.60511	11.50473	0.00000	0.00078	0.00000	0.00133	0.39996
6.000	-2.53010	11.62974	0.00000	0.00077	0.00000	0.00124	0.39997
6.050	-2.45510	11.75475	0.00000	0.00076	0.00000	0.00115	0.39997
6.100	-2.38009	11.87976	0.00000	0.00074	0.00000	0.00108	0.39997
6.150	-2.30509	12.00477	0.00000	0.00073	0.00000	0.00103	0.39998
6.200	-2.23008	12.12977	0.00000	0.00073	0.00000	0.00098	0.39998
6.250	-2.15508	12.25478	0.00000	0.00072	0.00000	0.00094	0.39998
6.300	-2.08008	12.37978	0.00000	0.00071	0.00000	0.00090	0.39999
6.350	-2.00508	12.50479	0.00000	0.00071	0.00000	0.00087	0.39999
6.400	-1.93007	12.62979	0.00000	0.00070	0.00000	0.00085	0.39999
6.450	-1.85507	12.75480	0.00000	0.00070	0.00000	0.00082	0.39999
6.500	-1.78007	12.87980	0.00000	0.00069	0.00000	0.00080	0.39999
6.550	-1.70507	13.00480	0.00000	0.00069	0.00000	0.00079	0.39999
6.600	-1.63007	13.12980	0.00000	0.00068	0.00000	0.00077	0.39999
6.650	-1.55507	13.25480	0.00000	0.00068	0.00000	0.00076	0.39999
6.700	-1.48006	13.37981	0.00000	0.00068	0.00000	0.00075	0.39999

TABLE 3.01.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-6.00000	4.95399	0.90599	0.09401	1.00000	0.00000	0.11867
3.450	-5.61774	5.40169	0.82423	0.17577	1.00000	0.00000	0.10716
3.500	-5.21604	5.87358	0.72352	0.27648	1.00000	0.00000	0.10603
3.550	-4.82735	6.33585	0.61403	0.38597	1.00000	0.00000	0.11119
3.600	-4.47083	6.76799	0.50418	0.49582	1.00000	0.00000	0.12111
3.650	-4.15606	7.15909	0.40020	0.59980	1.00000	0.00000	0.13565
3.700	-3.88663	7.50421	0.30664	0.69336	1.00000	0.00000	0.15552
3.750	-3.66228	7.80226	0.22664	0.77336	1.00000	0.00000	0.18186
3.800	-3.47975	8.05524	0.16202	0.83797	1.00000	0.00000	0.21561
3.850	-3.33307	8.26831	0.11305	0.88691	1.00000	0.00000	0.25559
3.900	-3.21390	8.44962	0.07830	0.92158	1.00000	0.00000	0.29639
3.950	-3.11292	8.60907	0.05499	0.94465	1.00000	0.00000	0.32930
4.000	-3.02147	8.75625	0.03997	0.95909	1.00000	0.00000	0.34761
4.050	-2.93263	8.89907	0.03054	0.96728	1.00000	0.00000	0.35010
4.100	-2.84116	9.04364	0.02475	0.97065	1.00000	0.00000	0.33997
4.150	-2.74325	9.19445	0.02135	0.96980	1.00000	0.00000	0.32248
4.200	-2.63654	9.35440	0.01962	0.96477	0.99998	0.00002	0.30298
4.250	-2.52031	9.52455	0.01912	0.95543	0.99992	0.00008	0.28548
4.300	-2.39544	9.70418	0.01961	0.94173	0.99973	0.00027	0.27208
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.30					
4.350	-2.27228	9.89120	0.00000	0.94426	0.99921	0.00079	0.26335
4.400	-2.13781	10.08294	0.00000	0.92451	0.99797	0.00203	0.25885
4.450	-2.00216	10.27668	0.00000	0.90226	0.99533	0.00467	0.25780
4.500	-1.86733	10.47018	0.00000	0.87821	0.99026	0.00974	0.25936
4.550	-1.73476	10.66179	0.00000	0.85308	0.98140	0.01860	0.26278
4.600	-1.60531	10.85043	0.00000	0.82758	0.96723	0.03277	0.26751
4.675	-1.41803	11.12646	0.00000	0.79000	0.93297	0.06703	0.27623
4.750	-1.23961	11.39322	0.00000	0.75459	0.88123	0.11877	0.28633
4.825	-1.07020	11.65025	0.00000	0.72214	0.81398	0.18597	0.29745
4.900	-0.90959	11.89758	0.00000	0.69280	0.73707	0.26264	0.30915
4.975	-0.75714	12.13569	0.00000	0.66640	0.65763	0.34124	0.32080
5.050	-0.61186	12.36554	0.00000	0.64276	0.58157	0.41505	0.33169
5.125	-0.47251	12.58835	0.00000	0.62182	0.51243	0.47922	0.34132
5.200	-0.33788	12.80542	0.00000	0.60353	0.45158	0.53086	0.34949
5.275	-0.20694	13.01788	0.00000	0.58784	0.39900	0.56874	0.35633
5.350	-0.07892	13.22663	0.00000	0.57460	0.35396	0.59311	0.36210
5.425	0.04672	13.43230	0.00000	0.56358	0.31557	0.60538	0.36710
5.500	0.17035	13.63536	0.00000	0.55445	0.28297	0.60780	0.37154
5.575	0.29223	13.83613	0.00000	0.54691	0.25541	0.60293	0.37552
5.650	0.41260	14.03489	0.00000	0.54065	0.23221	0.59323	0.37908
5.725	0.53165	14.23190	0.00000	0.53544	0.21276	0.58076	0.38223
5.800	0.64958	14.42739	0.00000	0.53107	0.19652	0.56710	0.38499
5.875	0.76657	14.62159	0.00000	0.52739	0.18297	0.55335	0.38736
5.950	0.88277	14.81468	0.00000	0.52428	0.17172	0.54019	0.38939
6.025	0.99833	15.00686	0.00000	0.52165	0.16236	0.52802	0.39111
6.100	1.11335	15.19825	0.00000	0.51942	0.15459	0.51703	0.39255
6.175	1.22793	15.38901	0.00000	0.51753	0.14813	0.50728	0.39377
6.250	1.34215	15.57922	0.00000	0.51592	0.14276	0.49872	0.39478
6.325	1.45608	15.76899	0.00000	0.51456	0.13828	0.49129	0.39563
6.400	1.56976	15.95838	0.00000	0.51341	0.13456	0.48487	0.39634
6.475	1.68325	16.14746	0.00000	0.51243	0.13145	0.47937	0.39693
6.550	1.79657	16.33629	0.00000	0.51161	0.12885	0.47466	0.39743
6.625	1.90975	16.52490	0.00000	0.51091	0.12669	0.47064	0.39784
6.700	2.02282	16.71333	0.00000	0.51032	0.12487	0.46723	0.39819

TABLE 3.02.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-6.50000	4.46608	0.84161	0.15839	1.00000	0.00000	0.09728
3.450	-6.04324	4.99388	0.73563	0.26437	1.00000	0.00000	0.09376
3.500	-5.59252	5.51978	0.61806	0.38194	1.00000	0.00000	0.09732
3.550	-5.17555	6.01449	0.49919	0.50081	1.00000	0.00000	0.10567
3.600	-4.80609	6.46266	0.38668	0.61332	1.00000	0.00000	0.11850
3.650	-4.49006	6.85672	0.28608	0.71392	1.00000	0.00000	0.13673
3.700	-4.22880	7.19362	0.20129	0.79871	1.00000	0.00000	0.16224
3.750	-4.02015	7.47392	0.13459	0.86541	1.00000	0.00000	0.19744
3.800	-3.85801	7.70267	0.08625	0.91373	1.00000	0.00000	0.24270
3.850	-3.73198	7.89020	0.05417	0.94577	1.00000	0.00000	0.29171
3.900	-3.62935	8.05015	0.03441	0.96539	1.00000	0.00000	0.33181
3.950	-3.53863	8.19539	0.02275	0.97666	1.00000	0.00000	0.35363
4.000	-3.45126	8.33569	0.01596	0.98250	1.00000	0.00000	0.35617
4.050	-3.36100	8.47823	0.01201	0.98441	1.00000	0.00000	0.34333
4.100	-3.26300	8.62860	0.00974	0.98278	1.00000	0.00000	0.32093
4.150	-3.15371	8.79091	0.00853	0.97730	0.99999	0.00001	0.29556
4.200	-3.03151	8.96721	0.00803	0.96746	0.99997	0.00003	0.27271
4.250	-2.89714	9.15702	0.00807	0.95291	0.99987	0.00013	0.25536
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.25					
4.300	-2.75629	9.35802	0.00000	0.94198	0.99959	0.00041	0.24364
4.350	-2.60656	9.56608	0.00000	0.91920	0.99882	0.00118	0.23785
4.400	-2.45478	9.77722	0.00000	0.89313	0.99702	0.00298	0.23638
4.450	-2.30393	9.98817	0.00000	0.86460	0.99325	0.00675	0.23812
4.500	-2.15610	10.19655	0.00000	0.83451	0.98612	0.01388	0.24211
4.550	-2.01254	10.40083	0.00000	0.80373	0.97383	0.02617	0.24763
4.600	-1.87388	10.60019	0.00000	0.77312	0.95444	0.04556	0.25415
4.650	-1.74037	10.79422	0.00000	0.74335	0.92630	0.07370	0.26136
4.700	-1.61203	10.98278	0.00000	0.71495	0.88864	0.11136	0.26910
4.750	-1.48881	11.16583	0.00000	0.68819	0.84189	0.15809	0.27732
4.800	-1.37061	11.34340	0.00000	0.66319	0.78776	0.21218	0.28595
4.850	-1.25729	11.51558	0.00000	0.63989	0.72883	0.27098	0.29489
4.900	-1.14859	11.68259	0.00000	0.61821	0.66796	0.33151	0.30392
4.950	-1.04417	11.84474	0.00000	0.59803	0.60779	0.39091	0.31280
5.000	-0.94360	12.00244	0.00000	0.57929	0.55034	0.44681	0.32126
5.050	-0.84641	12.15619	0.00000	0.56197	0.49691	0.49739	0.32908
5.100	-0.75209	12.30649	0.00000	0.54606	0.44817	0.54137	0.33611
5.150	-0.66019	12.45386	0.00000	0.53158	0.40427	0.57792	0.34232
5.200	-0.57028	12.59876	0.00000	0.51851	0.36503	0.60660	0.34774
5.250	-0.48204	12.74155	0.00000	0.50684	0.33011	0.62734	0.35247
5.300	-0.39520	12.88255	0.00000	0.49650	0.29909	0.64043	0.35666
5.350	-0.30959	13.02199	0.00000	0.48740	0.27157	0.64646	0.36045
5.400	-0.22506	13.16003	0.00000	0.47941	0.24717	0.64633	0.36394
5.450	-0.14151	13.29680	0.00000	0.47241	0.22557	0.64106	0.36721
5.500	-0.05888	13.43239	0.00000	0.46627	0.20648	0.63178	0.37028
5.550	0.02291	13.56689	0.00000	0.46087	0.18965	0.61959	0.37318
5.600	0.10393	13.70038	0.00000	0.45610	0.17483	0.60545	0.37589
5.650	0.18424	13.83295	0.00000	0.45188	0.16181	0.59022	0.37841
5.700	0.26391	13.96468	0.00000	0.44811	0.15040	0.57456	0.38073
5.750	0.34300	14.09563	0.00000	0.44475	0.14041	0.55899	0.38284
5.800	0.42159	14.22590	0.00000	0.44175	0.13167	0.54387	0.38476
5.850	0.49973	14.35556	0.00000	0.43905	0.12403	0.52946	0.38649
5.900	0.57747	14.48467	0.00000	0.43662	0.11736	0.51593	0.38803
5.950	0.65487	14.61329	0.00000	0.43445	0.11152	0.50334	0.38940
6.000	0.73197	14.74149	0.00000	0.43249	0.10642	0.49174	0.39062
6.050	0.80881	14.86931	0.00000	0.43072	0.10195	0.48112	0.39171
6.100	0.88541	14.99680	0.00000	0.42914	0.09804	0.47145	0.39266
6.150	0.96182	15.12399	0.00000	0.42772	0.09461	0.46268	0.39351
6.200	1.03806	15.25093	0.00000	0.42644	0.09160	0.45475	0.39425
6.250	1.11415	15.37765	0.00000	0.42529	0.08895	0.44761	0.39491
6.300	1.19010	15.50416	0.00000	0.42426	0.08663	0.44118	0.39549
6.350	1.26594	15.63050	0.00000	0.42333	0.08458	0.43540	0.39600
6.400	1.34169	15.75669	0.00000	0.42251	0.08278	0.43022	0.39646
6.450	1.41734	15.88274	0.00000	0.42176	0.08119	0.42559	0.39686
6.500	1.49292	16.00867	0.00000	0.42110	0.07978	0.42144	0.39721
6.550	1.56843	16.13450	0.00000	0.42050	0.07854	0.41772	0.39753
6.600	1.64388	16.26023	0.00000	0.41997	0.07745	0.41441	0.39780
6.650	1.71928	16.38588	0.00000	0.41949	0.07648	0.41144	0.39805
6.700	1.79463	16.51146	0.00000	0.41907	0.07562	0.40879	0.39827

TABLE 3.03.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-7.00000	3.98569	0.74263	0.25737	1.00000	0.00000	0.08216
3.450	-6.47358	4.58905	0.61661	0.38339	1.00000	0.00000	0.08454
3.500	-5.98343	5.15913	0.48892	0.51108	1.00000	0.00000	0.09167
3.550	-5.54850	5.67515	0.36847	0.63153	1.00000	0.00000	0.10311
3.600	-5.17741	6.12651	0.26181	0.73819	1.00000	0.00000	0.11994
3.650	-4.87362	6.50760	0.17365	0.82635	1.00000	0.00000	0.14494
3.700	-4.63683	6.81668	0.10678	0.89322	1.00000	0.00000	0.18252
3.750	-4.46090	7.05865	0.06135	0.93865	1.00000	0.00000	0.23532
3.800	-4.33159	7.24798	0.03403	0.96594	1.00000	0.00000	0.29462
3.850	-4.23045	7.40475	0.01912	0.98076	1.00000	0.00000	0.34081
3.900	-4.14222	7.54604	0.01132	0.98830	1.00000	0.00000	0.36317
3.950	-4.05707	7.68303	0.00722	0.99169	1.00000	0.00000	0.36354
4.000	-3.96822	7.82339	0.00500	0.99219	1.00000	0.00000	0.34657
4.050	-3.86979	7.97368	0.00379	0.98978	1.00000	0.00000	0.31786
4.100	-3.75661	8.13969	0.00315	0.98368	1.00000	0.00000	0.28516
4.150	-3.62559	8.32503	0.00287	0.97286	0.99999	0.00001	0.25597
4.200	-3.47707	8.52969	0.00283	0.95658	0.99995	0.00005	0.23436
4.250	-3.31470	8.75003	0.00298	0.93467	0.99979	0.00021	0.22089
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.25					
4.300	-3.14490	8.98074	0.00000	0.91077	0.99934	0.00066	0.21392
4.350	-2.97097	9.21567	0.00000	0.87976	0.99816	0.00184	0.21247
4.400	-2.79849	9.45003	0.00000	0.84556	0.99546	0.00454	0.21475
4.450	-2.63044	9.68044	0.00000	0.80927	0.98987	0.01013	0.21962
4.500	-2.46855	9.90488	0.00000	0.77200	0.97947	0.02053	0.22620
4.550	-2.31355	10.12232	0.00000	0.73479	0.96180	0.03820	0.23386
4.600	-2.16560	10.33245	0.00000	0.69856	0.93441	0.06559	0.24219
4.650	-2.02454	10.53527	0.00000	0.66403	0.89558	0.10442	0.25097
4.700	-1.89012	10.73095	0.00000	0.63163	0.84508	0.15491	0.26020
4.750	-1.76211	10.91965	0.00000	0.60149	0.78454	0.21543	0.26989
4.800	-1.64029	11.10154	0.00000	0.57356	0.71712	0.28277	0.28001
4.850	-1.52435	11.27688	0.00000	0.54766	0.64672	0.35291	0.29040
4.900	-1.41389	11.44605	0.00000	0.52361	0.57708	0.42193	0.30078
4.950	-1.30838	11.60955	0.00000	0.50130	0.51110	0.48652	0.31078
5.000	-1.20718	11.76804	0.00000	0.48068	0.45060	0.54424	0.32008
5.050	-1.10963	11.92221	0.00000	0.46176	0.39644	0.59341	0.32841
5.100	-1.01507	12.07276	0.00000	0.44458	0.34867	0.63296	0.33565
5.150	-0.92292	12.22034	0.00000	0.42916	0.30692	0.66227	0.34181
5.200	-0.83271	12.36548	0.00000	0.41549	0.27056	0.68117	0.34704
5.250	-0.74409	12.50861	0.00000	0.40348	0.23893	0.68995	0.35156
5.300	-0.65681	12.65001	0.00000	0.39302	0.21141	0.68942	0.35559
5.350	-0.57073	12.78988	0.00000	0.38393	0.18745	0.68083	0.35934
5.400	-0.48576	12.92833	0.00000	0.37604	0.16662	0.66575	0.36291
5.450	-0.40185	13.06545	0.00000	0.36916	0.14853	0.64587	0.36636
5.500	-0.31893	13.20131	0.00000	0.36313	0.13286	0.62284	0.36968
5.550	-0.23695	13.33598	0.00000	0.35781	0.11933	0.59813	0.37284
5.600	-0.15582	13.46955	0.00000	0.35308	0.10767	0.57290	0.37580
5.650	-0.07548	13.60211	0.00000	0.34886	0.09764	0.54805	0.37854
5.700	0.00416	13.73375	0.00000	0.34506	0.08904	0.52422	0.38104
5.750	0.08319	13.86458	0.00000	0.34165	0.08166	0.50181	0.38330
5.800	0.16167	13.99467	0.00000	0.33857	0.07533	0.48103	0.38531
5.850	0.23969	14.12414	0.00000	0.33578	0.06990	0.46199	0.38709
5.900	0.31730	14.25304	0.00000	0.33327	0.06524	0.44469	0.38866
5.950	0.39457	14.38145	0.00000	0.33100	0.06123	0.42906	0.39004
6.000	0.47153	14.50944	0.00000	0.32896	0.05777	0.41501	0.39125
6.050	0.54824	14.63706	0.00000	0.32711	0.05479	0.40243	0.39231
6.100	0.62472	14.76435	0.00000	0.32545	0.05221	0.39120	0.39324
6.150	0.70101	14.89137	0.00000	0.32395	0.04997	0.38117	0.39405
6.200	0.77714	15.01814	0.00000	0.32261	0.04803	0.37225	0.39476
6.250	0.85313	15.14470	0.00000	0.32140	0.04634	0.36431	0.39538
6.300	0.92900	15.27107	0.00000	0.32031	0.04486	0.35725	0.39592
6.350	1.00476	15.39728	0.00000	0.31934	0.04358	0.35098	0.39639
6.400	1.08042	15.52335	0.00000	0.31847	0.04245	0.34540	0.39681
6.450	1.15601	15.64930	0.00000	0.31769	0.04146	0.34045	0.39718
6.500	1.23153	15.77513	0.00000	0.31699	0.04059	0.33605	0.39750
6.550	1.30698	15.90087	0.00000	0.31636	0.03983	0.33213	0.39779
6.600	1.38239	16.02652	0.00000	0.31580	0.03915	0.32866	0.39804
6.650	1.45774	16.15210	0.00000	0.31530	0.03856	0.32557	0.39826
6.700	1.53306	16.27762	0.00000	0.31485	0.03804	0.32282	0.39846

TABLE 3.04.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-7.50000	3.51546	0.60400	0.39600	1.00000	0.00000	0.07275
3.450	-6.92044	4.17736	0.46777	0.53223	1.00000	0.00000	0.07907
3.500	-6.40731	4.77398	0.34060	0.65940	1.00000	0.00000	0.08948
3.550	-5.97232	5.29125	0.22982	0.77018	1.00000	0.00000	0.10542
3.600	-5.62210	5.71987	0.14088	0.85912	1.00000	0.00000	0.13091
3.650	-5.35954	6.05436	0.07710	0.92290	1.00000	0.00000	0.17370
3.700	-5.17754	6.30053	0.03803	0.96197	1.00000	0.00000	0.23944
3.750	-5.05296	6.48265	0.01792	0.98207	1.00000	0.00000	0.31083
3.800	-4.95784	6.63129	0.00869	0.99125	1.00000	0.00000	0.35770
3.850	-4.87380	6.76699	0.00455	0.99522	1.00000	0.00000	0.37513
3.900	-4.79125	6.90050	0.00261	0.99660	1.00000	0.00000	0.37066
3.950	-4.70354	7.03916	0.00166	0.99605	1.00000	0.00000	0.34796
4.000	-4.60357	7.19067	0.00117	0.99301	1.00000	0.00000	0.31097
4.050	-4.48367	7.36341	0.00092	0.98609	1.00000	0.00000	0.26913
4.100	-4.33838	7.56352	0.00082	0.97361	1.00000	0.00000	0.23305
4.150	-4.16759	7.79152	0.00080	0.95438	0.99998	0.00002	0.20793
4.200	-3.97694	8.04177	0.00086	0.92813	0.99991	0.00009	0.19342
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.20					
4.250	-3.77514	8.30558	0.00000	0.89641	0.99965	0.00035	0.18694
4.300	-3.56987	8.57402	0.00000	0.85867	0.99890	0.00110	0.18635
4.350	-3.36772	8.84029	0.00000	0.81703	0.99700	0.00300	0.18975
4.400	-3.17274	9.09987	0.00000	0.77285	0.99271	0.00729	0.19588
4.450	-2.98705	9.35023	0.00000	0.72746	0.98400	0.01600	0.20384
4.500	-2.81143	9.59029	0.00000	0.68214	0.96799	0.03201	0.21291
4.550	-2.64573	9.81998	0.00000	0.63811	0.94126	0.05874	0.22260
4.600	-2.48942	10.03970	0.00000	0.59634	0.90082	0.09918	0.23264
4.675	-2.27119	10.35174	0.00000	0.53916	0.81232	0.18768	0.24838
4.750	-2.07110	10.64396	0.00000	0.48879	0.69758	0.30236	0.26535
4.825	-1.88791	10.91743	0.00000	0.44437	0.57365	0.42591	0.28346
4.900	-1.71981	11.17387	0.00000	0.40498	0.45764	0.54032	0.30151
4.975	-1.56414	11.41596	0.00000	0.37028	0.35937	0.63350	0.31778
5.050	-1.41774	11.64702	0.00000	0.34039	0.28096	0.69915	0.33087
5.125	-1.27767	11.87028	0.00000	0.31547	0.22006	0.73425	0.34047
5.200	-1.14178	12.08823	0.00000	0.29537	0.17296	0.73832	0.34747
5.275	-1.00896	12.30226	0.00000	0.27950	0.13636	0.71459	0.35329
5.350	-0.87887	12.51286	0.00000	0.26698	0.10786	0.67027	0.35898
5.425	-0.75150	12.72011	0.00000	0.25692	0.08577	0.61452	0.36480
5.500	-0.62677	12.92410	0.00000	0.24863	0.06880	0.55566	0.37051
5.575	-0.50445	13.12507	0.00000	0.24163	0.05587	0.49951	0.37575
5.650	-0.38419	13.32344	0.00000	0.23563	0.04606	0.44922	0.38031
5.725	-0.26560	13.51963	0.00000	0.23045	0.03864	0.40592	0.38412
5.800	-0.14833	13.71406	0.00000	0.22599	0.03302	0.36953	0.38722
5.875	-0.03208	13.90711	0.00000	0.22214	0.02873	0.33938	0.38970
5.950	0.08338	14.09905	0.00000	0.21884	0.02543	0.31458	0.39168
6.025	0.19823	14.29014	0.00000	0.21602	0.02287	0.29425	0.39325
6.100	0.31260	14.48054	0.00000	0.21361	0.02087	0.27760	0.39451
6.175	0.42661	14.67040	0.00000	0.21156	0.01929	0.26395	0.39551
6.250	0.54034	14.85982	0.00000	0.20982	0.01804	0.25273	0.39631
6.325	0.65383	15.04890	0.00000	0.20835	0.01703	0.24350	0.39696
6.400	0.76714	15.23771	0.00000	0.20710	0.01622	0.23588	0.39749
6.475	0.88031	15.42628	0.00000	0.20604	0.01555	0.22958	0.39792
6.550	0.99336	15.61468	0.00000	0.20515	0.01501	0.22436	0.39827
6.625	1.10632	15.80292	0.00000	0.20440	0.01457	0.22002	0.39856
6.700	1.21919	15.99103	0.00000	0.20377	0.01421	0.21641	0.39880

TABLE 3.05.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-8.00000	3.05614	0.43487	0.56513	1.00000	0.00000	0.06802
3.450	-7.39507	3.74683	0.30298	0.69702	1.00000	0.00000	0.07771
3.500	-6.88806	4.33765	0.19085	0.80915	1.00000	0.00000	0.09333
3.550	-6.49124	4.81301	0.10468	0.89532	1.00000	0.00000	0.12116
3.600	-6.21318	5.16114	0.04825	0.95175	1.00000	0.00000	0.17526
3.650	-6.04043	5.39470	0.01919	0.98081	1.00000	0.00000	0.26247
3.700	-5.92983	5.55979	0.00739	0.99261	1.00000	0.00000	0.34050
3.750	-5.84323	5.69807	0.00305	0.99692	1.00000	0.00000	0.37706
3.800	-5.76334	5.82864	0.00140	0.99845	1.00000	0.00000	0.38541
3.850	-5.68284	5.95958	0.00072	0.99868	1.00000	0.00000	0.37538
3.900	-5.59542	6.09764	0.00042	0.99759	1.00000	0.00000	0.34581
3.950	-5.49182	6.25271	0.00027	0.99406	1.00000	0.00000	0.29799
4.000	-5.36006	6.43762	0.00021	0.98594	1.00000	0.00000	0.24522
4.050	-5.19085	6.66262	0.00018	0.97074	1.00000	0.00000	0.20312
4.100	-4.98439	6.92800	0.00018	0.94679	1.00000	0.00000	0.17681
4.150	-4.75073	7.22357	0.00020	0.91399	0.99996	0.00004	0.16347
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.15						
4.200	-4.50371	7.53496	0.00000	0.87368	0.99982	0.00018	0.15887
4.250	-4.25528	7.84930	0.00000	0.82707	0.99936	0.00064	0.16002
4.300	-4.01389	8.15750	0.00000	0.77601	0.99807	0.00193	0.16499
4.350	-3.78445	8.45406	0.00000	0.72212	0.99485	0.00515	0.17263
4.400	-3.56930	8.73622	0.00000	0.66698	0.98768	0.01232	0.18211
4.450	-3.36892	9.00312	0.00000	0.61218	0.97324	0.02676	0.19279
4.500	-3.18266	9.25519	0.00000	0.55925	0.94702	0.05298	0.20408
4.550	-3.00925	9.49355	0.00000	0.50955	0.90422	0.09578	0.21558
4.600	-2.84738	9.71944	0.00000	0.46396	0.84180	0.15820	0.22725
4.675	-2.62417	10.03687	0.00000	0.40377	0.71471	0.28528	0.24583
4.750	-2.42303	10.32999	0.00000	0.35218	0.56732	0.43251	0.26655
4.825	-2.24226	10.60033	0.00000	0.30742	0.42731	0.57162	0.28864
4.900	-2.07872	10.85102	0.00000	0.26868	0.31225	0.68297	0.30948
4.975	-1.92793	11.08674	0.00000	0.23600	0.22586	0.75789	0.32611
5.050	-1.78517	11.31265	0.00000	0.20958	0.16364	0.79248	0.33697
5.125	-1.64672	11.53301	0.00000	0.18919	0.11906	0.78453	0.34319
5.200	-1.51079	11.75008	0.00000	0.17393	0.08672	0.73697	0.34784
5.275	-1.37737	11.96407	0.00000	0.16244	0.06307	0.66111	0.35340
5.350	-1.24711	12.17429	0.00000	0.15344	0.04589	0.57298	0.36030
5.425	-1.12035	12.38035	0.00000	0.14603	0.03360	0.48658	0.36766
5.500	-0.99688	12.58242	0.00000	0.13972	0.02493	0.41022	0.37449
5.575	-0.87615	12.78112	0.00000	0.13427	0.01889	0.34685	0.38025
5.650	-0.75753	12.97713	0.00000	0.12955	0.01467	0.29615	0.38481
5.725	-0.64047	13.17111	0.00000	0.12549	0.01170	0.25632	0.38830
5.800	-0.52455	13.36357	0.00000	0.12201	0.00959	0.22525	0.39094
5.875	-0.40946	13.55491	0.00000	0.11905	0.00806	0.20101	0.39292
5.950	-0.29497	13.74540	0.00000	0.11655	0.00694	0.18203	0.39442
6.025	-0.18092	13.93526	0.00000	0.11443	0.00609	0.16708	0.39557
6.100	-0.06721	14.12464	0.00000	0.11264	0.00546	0.15521	0.39645
6.175	0.04626	14.31365	0.00000	0.11114	0.00497	0.14573	0.39713
6.250	0.15953	14.50237	0.00000	0.10987	0.00459	0.13811	0.39767
6.325	0.27265	14.69086	0.00000	0.10880	0.00428	0.13195	0.39810
6.400	0.38566	14.87918	0.00000	0.10791	0.00405	0.12693	0.39844
6.475	0.49857	15.06734	0.00000	0.10716	0.00386	0.12283	0.39871
6.550	0.61141	15.25539	0.00000	0.10652	0.00370	0.11947	0.39893
6.625	0.72419	15.44335	0.00000	0.10599	0.00357	0.11670	0.39912
6.700	0.83692	15.63122	0.00000	0.10554	0.00347	0.11441	0.39926

TABLE 3.06.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-8.50000	2.60315	0.26440	0.73560	1.00000	0.00000	0.06772
3.450	-7.91354	3.27436	0.15315	0.84685	1.00000	0.00000	0.08339
3.500	-7.47315	3.79243	0.07240	0.92760	1.00000	0.00000	0.11577
3.550	-7.19583	4.13661	0.02631	0.97369	1.00000	0.00000	0.19050
3.600	-7.04629	4.34309	0.00800	0.99200	1.00000	0.00000	0.30210
3.650	-6.95132	4.49018	0.00248	0.99752	1.00000	0.00000	0.36952
3.700	-6.87110	4.62103	0.00086	0.99912	1.00000	0.00000	0.39014
3.750	-6.79375	4.74862	0.00034	0.99956	1.00000	0.00000	0.39142
3.800	-6.71445	4.87812	0.00016	0.99938	1.00000	0.00000	0.37784
3.850	-6.62667	5.01644	0.00008	0.99813	1.00000	0.00000	0.34120
3.900	-6.51750	5.17716	0.00005	0.99420	1.00000	0.00000	0.28015
3.950	-6.36772	5.38066	0.00004	0.98450	1.00000	0.00000	0.21591
4.000	-6.16226	5.64331	0.00003	0.96545	1.00000	0.00000	0.17046
4.050	-5.90380	5.96299	0.00003	0.93511	1.00000	0.00000	0.14596
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.05					
4.100	-5.61092	6.32065	0.00000	0.89399	0.99998	0.00002	0.13556
4.150	-5.30509	6.69380	0.00000	0.84392	0.99991	0.00009	0.13350
4.200	-5.00270	7.06506	0.00000	0.78706	0.99965	0.00035	0.13654
4.250	-4.71388	7.42347	0.00000	0.72542	0.99884	0.00116	0.14300
4.300	-4.44399	7.76302	0.00000	0.66088	0.99657	0.00343	0.15197
4.350	-4.19521	8.08103	0.00000	0.59527	0.99093	0.00907	0.16289
4.400	-3.96756	8.37711	0.00000	0.53051	0.97836	0.02164	0.17520
4.450	-3.75961	8.65240	0.00000	0.46862	0.95309	0.04691	0.18828
4.500	-3.56905	8.90906	0.00000	0.41147	0.90782	0.09218	0.20147
4.550	-3.39344	9.14950	0.00000	0.36041	0.83661	0.16339	0.21456
4.600	-3.23100	9.37555	0.00000	0.31577	0.73938	0.26062	0.22811
4.650	-3.08094	9.58798	0.00000	0.27691	0.62431	0.37566	0.24310
4.700	-2.94308	9.78695	0.00000	0.24279	0.50492	0.49495	0.26002
4.750	-2.81698	9.97279	0.00000	0.21254	0.39419	0.60531	0.27842
4.800	-2.70152	10.14662	0.00000	0.18576	0.30027	0.69805	0.29694
4.850	-2.59489	10.31029	0.00000	0.16235	0.22570	0.76937	0.31376
4.900	-2.49488	10.46619	0.00000	0.14233	0.16899	0.81832	0.32708
4.950	-2.39913	10.61688	0.00000	0.12568	0.12683	0.84426	0.33573
5.000	-2.30555	10.76478	0.00000	0.11221	0.09562	0.84569	0.33975
5.050	-2.21261	10.91167	0.00000	0.10161	0.07232	0.82109	0.34070
5.100	-2.11970	11.05837	0.00000	0.09339	0.05468	0.77133	0.34104
5.150	-2.02708	11.20468	0.00000	0.08698	0.04118	0.70129	0.34282
5.200	-1.93556	11.34976	0.00000	0.08183	0.03083	0.61918	0.34682
5.250	-1.84587	11.49277	0.00000	0.07751	0.02297	0.53397	0.35272
5.300	-1.75846	11.63317	0.00000	0.07373	0.01708	0.45295	0.35961
5.350	-1.67337	11.77087	0.00000	0.07034	0.01273	0.38068	0.36657
5.400	-1.59039	11.90608	0.00000	0.06726	0.00955	0.31904	0.37294
5.450	-1.50918	12.03915	0.00000	0.06446	0.00726	0.26805	0.37839
5.500	-1.42939	12.17049	0.00000	0.06193	0.00560	0.22663	0.38284
5.550	-1.35069	12.30047	0.00000	0.05965	0.00439	0.19334	0.38638
5.600	-1.27282	12.42939	0.00000	0.05761	0.00351	0.16668	0.38915
5.650	-1.19559	12.55751	0.00000	0.05579	0.00286	0.14532	0.39130
5.700	-1.11882	12.68501	0.00000	0.05418	0.00237	0.12814	0.39296
5.750	-1.04242	12.81202	0.00000	0.05275	0.00200	0.11425	0.39426
5.800	-0.96628	12.93867	0.00000	0.05148	0.00171	0.10295	0.39529
5.850	-0.89037	13.06503	0.00000	0.05037	0.00149	0.09369	0.39609
5.900	-0.81461	13.19116	0.00000	0.04938	0.00131	0.08606	0.39674
5.950	-0.73899	13.31710	0.00000	0.04851	0.00117	0.07972	0.39726
6.000	-0.66347	13.44289	0.00000	0.04774	0.00106	0.07442	0.39768
6.050	-0.58803	13.56857	0.00000	0.04706	0.00097	0.06997	0.39802
6.100	-0.51266	13.69414	0.00000	0.04645	0.00089	0.06620	0.39831
6.150	-0.43734	13.81963	0.00000	0.04592	0.00083	0.06301	0.39855
6.200	-0.36208	13.94506	0.00000	0.04545	0.00078	0.06027	0.39874
6.250	-0.28684	14.07042	0.00000	0.04503	0.00073	0.05793	0.39891
6.300	-0.21165	14.19574	0.00000	0.04466	0.00070	0.05591	0.39906
6.350	-0.13647	14.32102	0.00000	0.04433	0.00066	0.05417	0.39918
6.400	-0.06132	14.44626	0.00000	0.04404	0.00064	0.05266	0.39928
6.450	0.01381	14.57147	0.00000	0.04378	0.00061	0.05134	0.39937
6.500	0.08892	14.69665	0.00000	0.04355	0.00059	0.05020	0.39945
6.550	0.16402	14.82182	0.00000	0.04334	0.00058	0.04920	0.39951
6.600	0.23911	14.94696	0.00000	0.04316	0.00056	0.04832	0.39957
6.650	0.31419	15.07208	0.00000	0.04300	0.00055	0.04755	0.39962
6.700	0.38925	15.19719	0.00000	0.04286	0.00054	0.04688	0.39967

TABLE 3.07.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-9.00000	2.14540	0.13061	0.86939	1.00000	0.00000	0.07402
3.450	-8.50828	2.71420	0.05328	0.94672	1.00000	0.00000	0.11016
3.500	-8.23268	3.05403	0.01501	0.98499	1.00000	0.00000	0.20832
3.550	-8.10212	3.23899	0.00350	0.99650	1.00000	0.00000	0.33435
3.600	-8.01598	3.37614	0.00088	0.99912	1.00000	0.00000	0.38486
3.650	-7.93860	3.50376	0.00026	0.99973	1.00000	0.00000	0.39575
3.700	-7.86242	3.63003	0.00009	0.99985	1.00000	0.00000	0.39479
3.750	-7.78418	3.75839	0.00004	0.99965	1.00000	0.00000	0.38135
3.800	-7.69715	3.89586	0.00002	0.99854	1.00000	0.00000	0.34095
3.850	-7.58456	4.05996	0.00001	0.99462	1.00000	0.00000	0.26750
3.900	-7.41747	4.28117	0.00001	0.98386	1.00000	0.00000	0.19200
3.950	-7.17189	4.58521	0.00001	0.96141	1.00000	0.00000	0.14429
4.000	-6.85414	4.96632	0.00001	0.92506	1.00000	0.00000	0.12196
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 4.00					
4.050	-6.49453	5.39332	0.00000	0.87607	0.99999	0.00001	0.11402
4.100	-6.12363	5.83425	0.00000	0.81712	0.99996	0.00004	0.11371
4.150	-5.76217	6.26719	0.00000	0.75082	0.99984	0.00016	0.11789
4.200	-5.42183	6.67953	0.00000	0.67945	0.99939	0.00061	0.12515
4.250	-5.10835	7.06485	0.00000	0.60509	0.99799	0.00201	0.13488
4.300	-4.82379	7.42051	0.00000	0.52987	0.99408	0.00592	0.14679
4.350	-4.56787	7.74638	0.00000	0.45612	0.98421	0.01579	0.16057
4.400	-4.33852	8.04417	0.00000	0.38643	0.96183	0.03817	0.17559
4.450	-4.13225	8.31720	0.00000	0.32345	0.91677	0.08323	0.19081
4.500	-3.94491	8.56964	0.00000	0.26916	0.83840	0.16160	0.20539
4.550	-3.77323	8.80488	0.00000	0.22398	0.72395	0.27605	0.22007
4.600	-3.61617	9.02404	0.00000	0.18664	0.58516	0.41482	0.23698
4.650	-3.47415	9.22662	0.00000	0.15530	0.44376	0.55617	0.25754
4.700	-3.34714	9.41253	0.00000	0.12866	0.31952	0.68012	0.28102
4.750	-3.23359	9.58328	0.00000	0.10615	0.22239	0.77617	0.30468
4.800	-3.13057	9.74195	0.00000	0.08757	0.15249	0.84269	0.32488
4.850	-3.03450	9.89245	0.00000	0.07271	0.10461	0.88142	0.33834
4.900	-2.94173	10.03885	0.00000	0.06123	0.07243	0.89236	0.34328
4.950	-2.84902	10.18483	0.00000	0.05266	0.05067	0.87212	0.34080
5.000	-2.75444	10.33272	0.00000	0.04646	0.03562	0.81724	0.33537
5.050	-2.65801	10.48266	0.00000	0.04199	0.02493	0.73038	0.33231
5.100	-2.56145	10.63285	0.00000	0.03864	0.01723	0.62275	0.33447
5.150	-2.46686	10.78093	0.00000	0.03594	0.01172	0.50986	0.34153
5.200	-2.37560	10.92531	0.00000	0.03360	0.00787	0.40513	0.35140
5.250	-2.28803	11.06551	0.00000	0.03147	0.00526	0.31627	0.36182
5.300	-2.20375	11.20190	0.00000	0.02953	0.00354	0.24541	0.37115
5.350	-2.12209	11.33521	0.00000	0.02777	0.00241	0.19109	0.37868
5.400	-2.04237	11.46621	0.00000	0.02620	0.00168	0.15033	0.38438
5.450	-1.96401	11.59556	0.00000	0.02480	0.00120	0.11998	0.38852
5.500	-1.88660	11.72374	0.00000	0.02358	0.00088	0.09736	0.39148
5.550	-1.80985	11.85110	0.00000	0.02251	0.00066	0.08039	0.39359
5.600	-1.73355	11.97787	0.00000	0.02157	0.00051	0.06752	0.39511
5.650	-1.65757	12.10424	0.00000	0.02076	0.00041	0.05766	0.39621
5.700	-1.58182	12.23030	0.00000	0.02006	0.00033	0.05001	0.39701
5.750	-1.50623	12.35614	0.00000	0.01944	0.00027	0.04399	0.39762
5.800	-1.43077	12.48181	0.00000	0.01891	0.00023	0.03921	0.39807
5.850	-1.35540	12.60736	0.00000	0.01844	0.00020	0.03537	0.39842
5.900	-1.28010	12.73281	0.00000	0.01803	0.00017	0.03225	0.39870
5.950	-1.20485	12.85818	0.00000	0.01767	0.00015	0.02969	0.39891
6.000	-1.12965	12.98349	0.00000	0.01735	0.00014	0.02757	0.39909
6.050	-1.05448	13.10875	0.00000	0.01708	0.00013	0.02581	0.39923
6.100	-0.97934	13.23398	0.00000	0.01683	0.00012	0.02433	0.39934
6.150	-0.90421	13.35917	0.00000	0.01662	0.00011	0.02308	0.39944
6.200	-0.82911	13.48433	0.00000	0.01643	0.00010	0.02202	0.39952
6.250	-0.75402	13.60947	0.00000	0.01626	0.00009	0.02112	0.39958
6.300	-0.67895	13.73459	0.00000	0.01611	0.00009	0.02034	0.39964
6.350	-0.60388	13.85970	0.00000	0.01598	0.00008	0.01967	0.39969
6.400	-0.52882	13.98479	0.00000	0.01587	0.00008	0.01910	0.39973
6.450	-0.45377	14.10987	0.00000	0.01577	0.00008	0.01860	0.39976
6.500	-0.37873	14.23494	0.00000	0.01568	0.00008	0.01816	0.39979
6.550	-0.30369	14.36000	0.00000	0.01559	0.00007	0.01778	0.39982
6.600	-0.22866	14.48506	0.00000	0.01552	0.00007	0.01745	0.39984
6.650	-0.15363	14.61010	0.00000	0.01546	0.00007	0.01716	0.39986
6.700	-0.07860	14.73515	0.00000	0.01540	0.00007	0.01690	0.39987

TABLE 3.08.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-9.50000	1.67270	0.05267	0.94733	1.00000	0.00000	0.09490
3.450	-9.18298	2.05459	0.01274	0.98726	1.00000	0.00000	0.19711
3.500	-9.04977	2.24177	0.00238	0.99762	1.00000	0.00000	0.33999
3.550	-8.96540	2.37687	0.00048	0.99952	1.00000	0.00000	0.38891
3.600	-8.88880	2.50361	0.00012	0.99988	1.00000	0.00000	0.39757
3.650	-8.81319	2.62926	0.00003	0.99994	1.00000	0.00000	0.39735
3.700	-8.73634	2.75618	0.00001	0.99983	1.00000	0.00000	0.38827
3.750	-8.65291	2.88988	0.00000	0.99913	1.00000	0.00000	0.35391
3.800	-8.54631	3.04763	0.00000	0.99617	1.00000	0.00000	0.27670
3.850	-8.38038	3.26721	0.00000	0.98664	1.00000	0.00000	0.18768
3.900	-8.11621	3.58981	0.00000	0.96430	1.00000	0.00000	0.13208
3.950	-7.75549	4.01468	0.00000	0.92587	1.00000	0.00000	0.10790
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.95					
4.000	-7.33865	4.50031	0.00000	0.87284	1.00000	0.00000	0.09991
4.050	-6.90718	5.00354	0.00000	0.80854	0.99999	0.00001	0.09973
4.100	-6.48789	5.49611	0.00000	0.73601	0.99994	0.00006	0.10389
4.150	-6.09528	5.96254	0.00000	0.65776	0.99975	0.00025	0.11103
4.200	-5.73624	6.39512	0.00000	0.57610	0.99906	0.00094	0.12068
4.250	-5.41342	6.79061	0.00000	0.49338	0.99685	0.00315	0.13277
4.300	-5.12687	7.14845	0.00000	0.41217	0.99051	0.00949	0.14734
4.350	-4.87452	7.47019	0.00000	0.33599	0.97410	0.02590	0.16406
4.400	-4.65230	7.75970	0.00000	0.26793	0.93608	0.06392	0.18161
4.450	-4.45405	8.02313	0.00000	0.21105	0.86039	0.13961	0.19790
4.500	-4.27387	8.26665	0.00000	0.16615	0.73732	0.26268	0.21294
4.550	-4.10959	8.49269	0.00000	0.13135	0.57878	0.42122	0.23050
4.600	-3.96261	8.69973	0.00000	0.10376	0.41577	0.58419	0.25396
4.650	-3.83401	8.88647	0.00000	0.08139	0.27765	0.72215	0.28262
4.700	-3.72195	9.05473	0.00000	0.06342	0.17708	0.82197	0.31175
4.750	-3.62216	9.20902	0.00000	0.04944	0.11108	0.88518	0.33524
4.800	-3.52957	9.35491	0.00000	0.03896	0.07013	0.91743	0.34827
4.850	-3.43916	9.49799	0.00000	0.03139	0.04511	0.91961	0.34853
4.900	-3.34645	9.64332	0.00000	0.02612	0.02955	0.88548	0.33840
4.950	-3.24890	9.79392	0.00000	0.02256	0.01950	0.80817	0.32621
5.000	-3.14752	9.94888	0.00000	0.02015	0.01273	0.69209	0.32067
5.050	-3.04601	10.10419	0.00000	0.01839	0.00811	0.55611	0.32476
5.100	-2.94806	10.25570	0.00000	0.01694	0.00502	0.42361	0.33623
5.150	-2.85543	10.40132	0.00000	0.01562	0.00304	0.31108	0.35076
5.200	-2.76799	10.54106	0.00000	0.01440	0.00183	0.22441	0.36454
5.250	-2.68465	10.67609	0.00000	0.01329	0.00111	0.16170	0.37556
5.300	-2.60427	10.80773	0.00000	0.01229	0.00000	0.11789	0.38364
5.350	-2.52569	10.93715	0.00000	0.01143	0.00045	0.08745	0.38881
5.400	-2.44835	11.06512	0.00000	0.01068	0.00030	0.06639	0.39233
5.450	-2.37176	11.19217	0.00000	0.01004	0.00021	0.05161	0.39463
5.500	-2.29567	11.31861	0.00000	0.00949	0.00015	0.04107	0.39616
5.550	-2.21990	11.44465	0.00000	0.00902	0.00011	0.03341	0.39719
5.600	-2.14434	11.57041	0.00000	0.00861	0.00008	0.02776	0.39790
5.650	-2.06892	11.69599	0.00000	0.00827	0.00007	0.02350	0.39840
5.700	-1.99361	11.82143	0.00000	0.00797	0.00005	0.02025	0.39875
5.750	-1.91837	11.94678	0.00000	0.00771	0.00004	0.01772	0.39901
5.800	-1.84318	12.07206	0.00000	0.00749	0.00004	0.01573	0.39921
5.850	-1.76802	12.19728	0.00000	0.00729	0.00003	0.01414	0.39935
5.900	-1.69290	12.32247	0.00000	0.00712	0.00003	0.01285	0.39947
5.950	-1.61780	12.44762	0.00000	0.00697	0.00002	0.01181	0.39956
6.000	-1.54272	12.57274	0.00000	0.00685	0.00002	0.01095	0.39963
6.050	-1.46765	12.69785	0.00000	0.00673	0.00002	0.01023	0.39969
6.100	-1.39259	12.82294	0.00000	0.00663	0.00002	0.00963	0.39973
6.150	-1.31754	12.94802	0.00000	0.00654	0.00002	0.00913	0.39977
6.200	-1.24250	13.07308	0.00000	0.00647	0.00002	0.00870	0.39981
6.250	-1.16747	13.19814	0.00000	0.00640	0.00001	0.00834	0.39983
6.300	-1.09244	13.32319	0.00000	0.00634	0.00001	0.00802	0.39985
6.350	-1.01741	13.44823	0.00000	0.00629	0.00001	0.00775	0.39987
6.400	-0.94239	13.57327	0.00000	0.00624	0.00001	0.00752	0.39989
6.450	-0.86737	13.69830	0.00000	0.00620	0.00001	0.00732	0.39990
6.500	-0.79235	13.82333	0.00000	0.00616	0.00001	0.00715	0.39992
6.550	-0.71733	13.94835	0.00000	0.00613	0.00001	0.00700	0.39993
6.600	-0.64232	14.07337	0.00000	0.00610	0.00001	0.00686	0.39994
6.650	-0.56731	14.19839	0.00000	0.00607	0.00001	0.00675	0.39994
6.700	-0.49230	14.32341	0.00000	0.00605	0.00001	0.00665	0.39995

TABLE 3.09.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-10.00000	1.18540	0.01848	0.98152	1.00000	0.00000	0.14673
3.450	-9.82568	1.41563	0.00299	0.99701	1.00000	0.00000	0.31144
3.500	-9.73637	1.55590	0.00049	0.99951	1.00000	0.00000	0.38546
3.550	-9.65940	1.68302	0.00010	0.99990	1.00000	0.00000	0.39762
3.600	-9.58399	1.80846	0.00002	0.99997	1.00000	0.00000	0.39887
3.650	-9.50826	1.93422	0.00001	0.99994	1.00000	0.00000	0.39508
3.700	-9.42928	2.06331	0.00000	0.99965	1.00000	0.00000	0.37514
3.750	-9.33588	2.20731	0.00000	0.99810	1.00000	0.00000	0.31216
3.800	-9.19525	2.40031	0.00000	0.99194	1.00000	0.00000	0.21151
3.850	-8.95323	2.69903	0.00000	0.97432	1.00000	0.00000	0.13659
3.900	-8.58688	3.12835	0.00000	0.93943	1.00000	0.00000	0.10318
	MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.90						
3.950	-8.13580	3.64804	0.00000	0.88755	1.00000	0.00000	0.09179
4.000	-7.65494	4.20119	0.00000	0.82236	1.00000	0.00000	0.09008
4.050	-7.18181	4.74860	0.00000	0.74746	0.99998	0.00002	0.09323
4.100	-6.73659	5.26886	0.00000	0.66570	0.99992	0.00008	0.09950
4.150	-6.32904	5.75133	0.00000	0.57954	0.99965	0.00035	0.10831
4.200	-5.96329	6.19118	0.00000	0.49150	0.99867	0.00133	0.11967
4.250	-5.64035	6.58677	0.00000	0.40442	0.99549	0.00451	0.13389
4.300	-5.35916	6.93862	0.00000	0.32178	0.98604	0.01396	0.15118
4.350	-5.11619	7.24979	0.00000	0.24765	0.96073	0.03927	0.17080
4.400	-4.90455	7.52707	0.00000	0.18606	0.90144	0.09856	0.18972
4.450	-4.71493	7.78010	0.00000	0.13901	0.78813	0.21187	0.20519
4.500	-4.54156	8.01518	0.00000	0.10473	0.62235	0.37764	0.22112
4.550	-4.38588	8.23091	0.00000	0.07926	0.43889	0.56110	0.24439
4.600	-4.25120	8.42364	0.00000	0.05955	0.28019	0.71973	0.27625
4.650	-4.13661	8.59411	0.00000	0.04431	0.16743	0.83212	0.31076
4.700	-4.03704	8.74770	0.00000	0.03293	0.09756	0.90036	0.33903
4.750	-3.94608	8.89139	0.00000	0.02478	0.05730	0.93461	0.35455
4.800	-3.85761	9.03197	0.00000	0.01914	0.03454	0.93900	0.35403
4.850	-3.76584	9.17590	0.00000	0.01536	0.02141	0.90638	0.33901
4.900	-3.66675	9.32782	0.00000	0.01294	0.01346	0.82470	0.31999
4.950	-3.56110	9.48712	0.00000	0.01140	0.00837	0.69496	0.31007
5.000	-3.45433	9.64792	0.00000	0.01031	0.00504	0.54023	0.31402
5.050	-3.35213	9.80389	0.00000	0.00942	0.00290	0.39184	0.32852
5.100	-3.25710	9.95196	0.00000	0.00858	0.00162	0.27105	0.34714
5.150	-3.16882	10.09245	0.00000	0.00781	0.00089	0.18344	0.36420
5.200	-3.08555	10.22724	0.00000	0.00710	0.00050	0.12422	0.37698
5.250	-3.00552	10.35829	0.00000	0.00648	0.00029	0.08549	0.38548
5.300	-2.92745	10.48704	0.00000	0.00594	0.00017	0.06032	0.39079
5.350	-2.85054	10.61441	0.00000	0.00549	0.00011	0.04379	0.39405
5.400	-2.77432	10.74096	0.00000	0.00511	0.00007	0.03274	0.39604
5.450	-2.69852	10.86699	0.00000	0.00479	0.00005	0.02518	0.39729
5.500	-2.62298	10.99271	0.00000	0.00452	0.00003	0.01988	0.39810
5.550	-2.54760	11.11822	0.00000	0.00428	0.00002	0.01608	0.39862
5.600	-2.47233	11.24359	0.00000	0.00409	0.00002	0.01331	0.39898
5.650	-2.39712	11.36887	0.00000	0.00392	0.00001	0.01123	0.39922
5.700	-2.32197	11.49408	0.00000	0.00377	0.00001	0.00965	0.39940
5.750	-2.24686	11.61925	0.00000	0.00365	0.00001	0.00843	0.39952
5.800	-2.17176	11.74438	0.00000	0.00354	0.00001	0.00747	0.39962
5.850	-2.09669	11.86949	0.00000	0.00345	0.00001	0.00671	0.39969
5.900	-2.02163	11.99458	0.00000	0.00337	0.00001	0.00609	0.39975
5.950	-1.94659	12.11965	0.00000	0.00330	0.00001	0.00559	0.39979
6.000	-1.87155	12.24471	0.00000	0.00323	0.00000	0.00518	0.39982
6.050	-1.79651	12.36976	0.00000	0.00318	0.00000	0.00484	0.39985
6.100	-1.72149	12.49480	0.00000	0.00313	0.00000	0.00455	0.39987
6.150	-1.64646	12.61984	0.00000	0.00309	0.00000	0.00431	0.39989
6.200	-1.57144	12.74487	0.00000	0.00305	0.00000	0.00411	0.39991
6.250	-1.49643	12.86990	0.00000	0.00302	0.00000	0.00394	0.39992
6.300	-1.42141	12.99492	0.00000	0.00299	0.00000	0.00379	0.39993
6.350	-1.34640	13.11994	0.00000	0.00297	0.00000	0.00366	0.39994
6.400	-1.27139	13.24496	0.00000	0.00294	0.00000	0.00355	0.39995
6.450	-1.19638	13.36997	0.00000	0.00292	0.00000	0.00346	0.39995
6.500	-1.12137	13.49499	0.00000	0.00291	0.00000	0.00337	0.39996
6.550	-1.04636	13.62000	0.00000	0.00289	0.00000	0.00330	0.39996
6.600	-0.97136	13.74501	0.00000	0.00288	0.00000	0.00324	0.39997
6.650	-0.89635	13.87002	0.00000	0.00286	0.00000	0.00318	0.39997
6.700	-0.82135	13.99503	0.00000	0.00285	0.00000	0.00314	0.39998

TABLE 3.10.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-10.50000	0.69012	0.00607	0.99393	1.00000	0.00000	0.23528
3.450	-10.39048	0.85166	0.00082	0.99918	1.00000	0.00000	0.36997
3.500	-10.31151	0.98090	0.00013	0.99987	1.00000	0.00000	0.39599
3.550	-10.23597	1.10648	0.00003	0.99997	1.00000	0.00000	0.39923
3.600	-10.16071	1.23175	0.00001	0.99998	1.00000	0.00000	0.39851
3.650	-10.08439	1.35811	0.00000	0.99990	1.00000	0.00000	0.39071
3.700	-10.00173	1.49098	0.00000	0.99932	1.00000	0.00000	0.35483
3.750	-9.89205	1.65179	0.00000	0.99640	1.00000	0.00000	0.26302
3.800	-9.70227	1.89571	0.00000	0.98559	1.00000	0.00000	0.16126
3.850	-9.37392	2.28421	0.00000	0.95866	1.00000	0.00000	0.10771
3.900	-8.91952	2.80548	0.00000	0.91245	1.00000	0.00000	0.08837
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.90					
3.950	-8.40407	3.39271	0.00000	0.85012	1.00000	0.00000	0.08345
4.000	-7.88181	3.98953	0.00000	0.77594	1.00000	0.00000	0.08485
4.050	-7.38326	4.56390	0.00000	0.69329	0.99998	0.00002	0.08978
4.100	-6.92340	5.09979	0.00000	0.60487	0.99990	0.00010	0.09734
4.150	-6.50899	5.58963	0.00000	0.51325	0.99954	0.00046	0.10741
4.200	-6.14259	6.03017	0.00000	0.42129	0.99824	0.00176	0.12036
4.250	-5.82444	6.42050	0.00000	0.33253	0.99386	0.00614	0.13682
4.300	-5.55263	6.76193	0.00000	0.25132	0.98039	0.01961	0.15712
4.350	-5.32161	7.05962	0.00000	0.18257	0.94318	0.05682	0.17918
4.400	-5.12048	7.32465	0.00000	0.12999	0.85670	0.14330	0.19734
4.450	-4.93748	7.56955	0.00000	0.09327	0.70325	0.29675	0.21109
4.500	-4.77027	7.79712	0.00000	0.06791	0.50649	0.49351	0.23042
4.550	-4.62449	8.00138	0.00000	0.04937	0.32061	0.67937	0.26180
4.600	-4.50251	8.17955	0.00000	0.03545	0.18425	0.81560	0.30075
4.650	-4.39968	8.33644	0.00000	0.02530	0.10114	0.89800	0.33563
4.700	-4.30842	8.48028	0.00000	0.01823	0.05557	0.94045	0.35712
4.750	-4.22154	8.61895	0.00000	0.01348	0.03143	0.95323	0.36085
4.800	-4.13229	8.75992	0.00000	0.01038	0.01845	0.93269	0.34573
4.850	-4.03456	8.91006	0.00000	0.00845	0.01112	0.86292	0.32035
4.900	-3.92681	9.07132	0.00000	0.00727	0.00670	0.73503	0.30250
4.950	-3.81483	9.23753	0.00000	0.00651	0.00389	0.56874	0.30219
5.000	-3.70692	9.39954	0.00000	0.00590	0.00214	0.40275	0.31711
5.050	-3.60770	9.55207	0.00000	0.00534	0.00112	0.26736	0.33917
5.100	-3.51714	9.69497	0.00000	0.00480	0.00057	0.17179	0.36013
5.150	-3.43292	9.83072	0.00000	0.00431	0.00029	0.11006	0.37562
5.200	-3.35263	9.96198	0.00000	0.00388	0.00016	0.07178	0.38548
5.250	-3.27459	10.09062	0.00000	0.00352	0.00009	0.04820	0.39131
5.300	-3.19781	10.21780	0.00000	0.00321	0.00005	0.03346	0.39468
5.350	-3.12173	10.34415	0.00000	0.00296	0.00003	0.02404	0.39664
5.400	-3.04605	10.47001	0.00000	0.00275	0.00002	0.01784	0.39780
5.450	-2.97061	10.59558	0.00000	0.00257	0.00001	0.01365	0.39851
5.500	-2.89531	10.72097	0.00000	0.00242	0.00001	0.01075	0.39896
5.550	-2.82011	10.84624	0.00000	0.00230	0.00001	0.00867	0.39925
5.600	-2.74496	10.97145	0.00000	0.00219	0.00001	0.00716	0.39945
5.650	-2.66985	11.09660	0.00000	0.00210	0.00000	0.00604	0.39958
5.700	-2.59477	11.22171	0.00000	0.00202	0.00000	0.00518	0.39967
5.750	-2.51970	11.34680	0.00000	0.00195	0.00000	0.00452	0.39974
5.800	-2.44465	11.47187	0.00000	0.00190	0.00000	0.00401	0.39980
5.850	-2.36962	11.59693	0.00000	0.00185	0.00000	0.00360	0.39983
5.900	-2.29458	11.72198	0.00000	0.00180	0.00000	0.00326	0.39986
5.950	-2.21956	11.84702	0.00000	0.00176	0.00000	0.00300	0.39989
6.000	-2.14454	11.97205	0.00000	0.00173	0.00000	0.00277	0.39991
6.050	-2.06952	12.09708	0.00000	0.00170	0.00000	0.00259	0.39992
6.100	-1.99451	12.22210	0.00000	0.00167	0.00000	0.00244	0.39993
6.150	-1.91949	12.34712	0.00000	0.00165	0.00000	0.00231	0.39994
6.200	-1.84448	12.47214	0.00000	0.00163	0.00000	0.00220	0.39995
6.250	-1.76947	12.59715	0.00000	0.00161	0.00000	0.00211	0.39996
6.300	-1.69447	12.72216	0.00000	0.00160	0.00000	0.00203	0.39996
6.350	-1.61946	12.84717	0.00000	0.00159	0.00000	0.00196	0.39997
6.400	-1.54445	12.97218	0.00000	0.00157	0.00000	0.00190	0.39997
6.450	-1.46945	13.09719	0.00000	0.00156	0.00000	0.00185	0.39998
6.500	-1.39444	13.22220	0.00000	0.00155	0.00000	0.00180	0.39998
6.550	-1.31944	13.34720	0.00000	0.00155	0.00000	0.00177	0.39998
6.600	-1.24444	13.47221	0.00000	0.00154	0.00000	0.00173	0.39998
6.650	-1.16943	13.59721	0.00000	0.00153	0.00000	0.00170	0.39999
6.700	-1.09443	13.72222	0.00000	0.00153	0.00000	0.00168	0.39999

TABLE 3.11.0

NU 1 = 0.88888889

LOG T	LOG RHO	LOG P	MOL. H	AT. H	HE ONE	HE TWO	GRAD
3.400	-11.00000	0.19171	0.00194	0.99806	1.00000	0.00000	0.32177
3.450	-10.91371	0.32865	0.00025	0.99975	1.00000	0.00000	0.39038
3.500	-10.83752	0.45493	0.00004	0.99996	1.00000	0.00000	0.39877
3.550	-10.76233	0.58013	0.00001	0.99999	1.00000	0.00000	0.39954
3.600	-10.68698	0.70548	0.00000	0.99998	1.00000	0.00000	0.39746
3.650	-10.60958	0.83295	0.00000	0.99982	1.00000	0.00000	0.38337
3.700	-10.52070	0.97223	0.00000	0.99877	1.00000	0.00000	0.32539
3.750	-10.38512	1.15978	0.00000	0.99367	1.00000	0.00000	0.21230
3.800	-10.12919	1.47223	0.00000	0.97656	1.00000	0.00000	0.12541
3.850	-9.71089	1.95425	0.00000	0.93967	1.00000	0.00000	0.09020
		MOLECULAR HYDROGEN CUT OFF AT LOG T = 3.85					
3.900	-9.18253	2.55276	0.00000	0.88339	1.00000	0.00000	0.07948
3.950	-8.61875	3.19069	0.00000	0.81240	1.00000	0.00000	0.07828
4.000	-8.06702	3.81859	0.00000	0.73087	1.00000	0.00000	0.08156
4.050	-7.55129	4.41119	0.00000	0.64189	0.99997	0.00003	0.08768
4.100	-7.08265	4.95645	0.00000	0.54816	0.99987	0.00013	0.09627
4.150	-6.66591	5.44879	0.00000	0.45248	0.99942	0.00058	0.10755
4.200	-6.30280	5.88575	0.00000	0.35826	0.99771	0.00229	0.12227
4.250	-5.99316	6.26676	0.00000	0.26987	0.99174	0.00826	0.14147
4.300	-5.73403	6.59413	0.00000	0.19266	0.97263	0.02737	0.16517
4.350	-5.51638	6.87667	0.00000	0.13189	0.91864	0.08136	0.18838
4.400	-5.32405	7.13125	0.00000	0.08969	0.79765	0.20235	0.20314
4.450	-5.14569	7.37029	0.00000	0.06243	0.60539	0.39460	0.21655
4.500	-4.98557	7.58954	0.00000	0.04404	0.39358	0.60642	0.24280
4.550	-4.85137	7.78064	0.00000	0.03074	0.22371	0.77625	0.28316
4.600	-4.74155	7.94496	0.00000	0.02118	0.11739	0.88233	0.32528
4.650	-4.64777	8.09144	0.00000	0.01465	0.06053	0.93790	0.35508
4.700	-4.56146	8.22942	0.00000	0.01037	0.03202	0.96076	0.36643
4.750	-4.47521	8.36704	0.00000	0.00762	0.01770	0.95496	0.35657
4.800	-4.38140	8.51271	0.00000	0.00593	0.01019	0.90629	0.32833
4.850	-4.27476	8.67242	0.00000	0.00493	0.00596	0.79470	0.30025
4.900	-4.15877	8.84266	0.00000	0.00434	0.00340	0.62658	0.29105
4.950	-4.04397	9.01194	0.00000	0.00391	0.00182	0.44296	0.30274
5.000	-3.93854	9.17112	0.00000	0.00352	0.00091	0.28685	0.32692
5.050	-3.84406	9.31825	0.00000	0.00314	0.00043	0.17653	0.35247
5.100	-3.75790	9.45609	0.00000	0.00279	0.00021	0.10730	0.37194
5.150	-3.67682	9.58818	0.00000	0.00248	0.00010	0.06627	0.38412
5.200	-3.59852	9.71708	0.00000	0.00222	0.00005	0.04224	0.39101
5.250	-3.52169	9.84427	0.00000	0.00200	0.00003	0.02796	0.39479
5.300	-3.44564	9.97056	0.00000	0.00182	0.00002	0.01924	0.39688
5.350	-3.37001	10.09634	0.00000	0.00168	0.00001	0.01374	0.39805
5.400	-3.29462	10.22183	0.00000	0.00156	0.00001	0.01016	0.39873
5.450	-3.21937	10.34716	0.00000	0.00145	0.00000	0.00776	0.39915
5.500	-3.14420	10.47238	0.00000	0.00137	0.00000	0.00609	0.39941
5.550	-3.06908	10.59754	0.00000	0.00130	0.00000	0.00491	0.39957
5.600	-2.99399	10.72265	0.00000	0.00124	0.00000	0.00405	0.39968
5.650	-2.91893	10.84774	0.00000	0.00119	0.00000	0.00341	0.39976
5.700	-2.84389	10.97281	0.00000	0.00114	0.00000	0.00293	0.39982
5.750	-2.76885	11.09786	0.00000	0.00110	0.00000	0.00256	0.39986
5.800	-2.69382	11.22290	0.00000	0.00107	0.00000	0.00226	0.39988
5.850	-2.61880	11.34793	0.00000	0.00104	0.00000	0.00203	0.39991
5.900	-2.54378	11.47296	0.00000	0.00102	0.00000	0.00184	0.39992
5.950	-2.46877	11.59798	0.00000	0.00099	0.00000	0.00169	0.39994
6.000	-2.39376	11.72300	0.00000	0.00098	0.00000	0.00157	0.39995
6.050	-2.31875	11.84801	0.00000	0.00096	0.00000	0.00146	0.39995
6.100	-2.24374	11.97302	0.00000	0.00094	0.00000	0.00138	0.39996
6.150	-2.16873	12.09804	0.00000	0.00093	0.00000	0.00130	0.39997
6.200	-2.09373	12.22304	0.00000	0.00092	0.00000	0.00124	0.39997
6.250	-2.01872	12.34805	0.00000	0.00091	0.00000	0.00119	0.39998
6.300	-1.94372	12.47306	0.00000	0.00090	0.00000	0.00114	0.39998
6.350	-1.86871	12.59807	0.00000	0.00089	0.00000	0.00110	0.39998
6.400	-1.79371	12.72307	0.00000	0.00089	0.00000	0.00107	0.39998
6.450	-1.71871	12.84808	0.00000	0.00088	0.00000	0.00104	0.39999
6.500	-1.64370	12.97308	0.00000	0.00088	0.00000	0.00102	0.39999
6.550	-1.56870	13.09808	0.00000	0.00087	0.00000	0.00100	0.39999
6.600	-1.49370	13.22309	0.00000	0.00087	0.00000	0.00098	0.39999
6.650	-1.41870	13.34809	0.00000	0.00086	0.00000	0.00096	0.39999
6.700	-1.34370	13.47309	0.00000	0.00086	0.00000	0.00095	0.39999