

V-Centers in Metaphosphate Glass

Metaphosphate glass on X-irradiation develops characteristic absorption bands in the visible and ultra violet regions. The visible band has been attributed to trapped electrons at the negative ion vacancy, so called F-centers, and the ultra violet band to trapped holes at positive ion vacancy, so called V-centers. It has been observed by OTLEY and WEYL²⁾ that metaphosphate glass containing dissolved sulphur is bluish green in colour. They attributed this to S_2 molecules. This glass system on X-irradiation becomes colourless which has been explained as due to conversion of S_2 molecule to sulphur anion by electron trapping. Now since the electrons are trapped on the sulphur molecules the familiar F-bands are absent in systems containing sulphur. If this mechanism be justified then the metaphosphate glass rendered colourless by X-irradiation should still show the V-band.

Spectrophotometric measurements with BECKMAN spectrophotometer model DU on sulphur (about 7%) containing metaphosphate glass showed a broad absorption band in the range of 570 to 600 m μ . On X-irradiation the intensity of the band diminished and became more diffuse. At the same time it showed one weak but distinct absorption band at 340 m μ , which in the previous communication has been attributed to V-band.

Incidentally it has been noted that metaphosphate glasses containing cations like Fe^{3+} , Cr^{3+} , Cu^{2+} and Ni^{2+} on X-irradiation also developed the characteristic V-band at 340 m μ before the appearance of the F-band. This may be explained as due to a change in the valency state of metal by electron trapping. But unfortunately such oxidised-reduced state of the metal has not been possible to detect by chemical means.

Thanks are due to Dr. S. BHATTACHARYA for his kind help during the course of this investigation.

*Department of Chemistry, University College of Science,
92 Upper Circular Road, Calcutta-9, India*

SADHAN BASU

Eingegangen am 20. April 1956

¹⁾ BASU, S.: Nature [London] 176, 265 (1955).

²⁾ OTLEY u. WEYL: J. Appl. Physics 23, 499 (1952).