

This relaxation process exhibited by carbon disulphide is of special interest since it can be correlated with a particular internal vibration of the molecule, whereas the similar behaviour of acetic³ and propionic⁶ acids has not yet been satisfactorily explained.

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¹ Rapuano, R. A., Res. Lab. of Electronics, Massachusetts Institute of Technology, Report No. 151 (April 15, 1950).

² Herzberg, G., "Infra-Red and Raman Spectra", 173 (D. van Nostrand, Inc., 1945).

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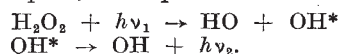
⁴ Huddart, D. H. A., M.Sc. Thesis, London (1950).

⁵ Bazulin, P., *J. Exp. Theor. Phys., U.S.S.R.*, **8**, 457 (1938).

⁶ Lamb, J., and Huddart, D. H. A., *Trans. Farad. Soc.*, **46**, 540 (1950).

Excitation of OH- and SH-Band Systems in Fluorescence

Dawsey, Urey and Rice¹ claimed to have excited the OH-band 3064 Å. in fluorescence in hydrogen peroxide vapour, the processes involved being:

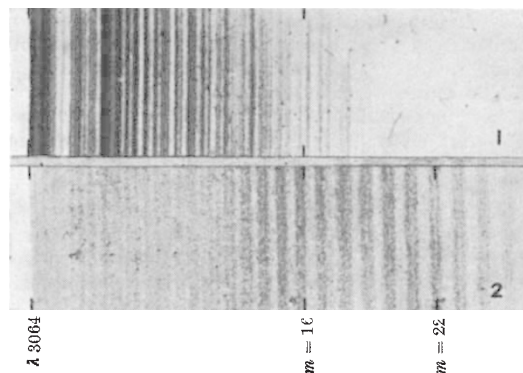


In these experiments, light from a zinc spark was passed through an acetone filter, which removed light of wave-lengths shorter than $\lambda 2025$, down a quartz tube containing hydrogen peroxide vapour and thence to the slit of the spectrograph. The OH-band appeared weakly against a spark 'background', the intensity of which in this region was partly reduced by the acetone filter. No exposure-time was given, and it is to be supposed that the spark was running in air.

The elimination of wave-lengths shorter than $\lambda 2025$ in this experiment is support for a value of about 35 kcal. for the O—O band dissociation energy in hydrogen peroxide which was then current. Walsh² has derived from thermo-chemical data a value of 56 kcal., which would correspond to a long wave-length limit for the excitation of this fluorescence at about 1900 Å.

The apparatus and spectrograph used in the present experiments is similar to that previously described³. Light from a powerful hydrogen discharge tube passed through a 1-mm. crystal quartz window (transparency known, from other experiments, to be good at 1850 Å.) into a glass fluorescence cell through which hydrogen peroxide vapour was pumped continuously at a pressure of a few tenths of 1 mm. The fluorescence was observed at right angles to the path of the exciting beam.

Under these conditions, the OH-band at 3064 Å. was recorded in 1 hr. and gave a well-exposed plate in $2\frac{1}{2}$ hr. (using fast ortho plates and a slit of width 0.04 mm.). The fluorescence could be excited with an enclosed zinc spark running in nitrogen when a fluorite window was used, but could not be excited through a quartz window or when the spark was run in air.



OH band; $\lambda 3064$; excited from H_2O ; $\times 21$. The m values are those given by Fortrat. (1) 40-min. exposure on process plate; narrow slit. (2) $3\frac{1}{2}$ -hr. exposure on fast ortho plate; wide slit

These observations are in agreement with the thermal data, and suggest that the fluorescence reported by Dawsey, Urey and Rice was an artefact.

The intensity distribution was markedly different when excited from hydrogen peroxide, as shown in the accompanying spectra. Identifying the doublets by Fortrat's values⁴ of m , the highest member visible is 20 in the spectrum emitted from water, whereas with hydrogen peroxide 28 is clearly recorded, although the head of the band is very much weaker. A similar intensity distribution has been observed by Lyman⁵ in the band from a high-frequency discharge through water vapour in the presence of several mm. pressure of helium.

The SH-band at 3236 Å. was first observed in absorption by Lewis and White⁶ in hydrogen sulphide which had been partially decomposed by an electric discharge, and was later observed by Gaydon and Whittingham⁷ in hydrocarbon flames containing oxides of sulphur.

This band has been excited as a fluorescence from hydrogen sulphide with the hydrogen discharge through a fluorite window. The intensity was only about one-hundredth of that of the OH-band from water. Heads were observed at 3238, 3242 and 3280 Å. Lewis and White give 3236.6 Å. (R_1), 3240.7 Å. (Q_1) and 3279.1 Å. (Q_2).

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² Walsh, *J. Chem. Soc.*, 331 (1948).

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⁴ Fortrat, *J. Phys.*, **5**, 20 (1924).

⁵ Lyman, *Phys. Rev.*, **53**, 379 (1938).

⁶ Lewis and White, *Phys. Rev.*, **55**, 894 (1939).

⁷ Gaydon and Whittingham, *Proc. Roy. Soc., A*, **189**, 313 (1947).

Relation of Changes in the Cementite Curie Temperature to Textural Strains in Steel

Andrew, Lee and Fang¹ have shown that, when a carbon steel is plastically deformed, changes occur in the apparent cementite Curie temperature. The characteristics of the modified magnetic saturation intensity/temperature relationship (curve 2 in the graph) resemble those observed in the case of heat-treated carbon steels: in the latter case, this behaviour has been ascribed to the initial precipitation