

The estimated accuracy of the present measurements is rather better than 0.5 per cent. The difference between my result and that given by Cabrera and Fahlenbrach for 20° C. is 1.7 per cent. The causes of this relatively large difference in the values are not apparent.

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¹ Selwood and Frost, *J. Amer. Chem. Soc.*, **55**, 4335 (1933).

² Cabrera and Fahlenbrach, *Naturwiss.*, **22**, 417 (1934).

³ Hoare, *Proc. Roy. Soc.*, **A**, **147**, 88 (1934).

Origin of the Broad Bands in Selenium and Tellurium Vapours

IN recent papers, we have investigated a series of broad bands appearing on the long wave-length side of the main system ${}^1\Sigma - {}^1\Sigma$ of Se_2 . These bands were observed under electrical¹ and optical excitation^{2,3} as well as in thermoluminescence³.

According to the suggested interpretation¹, this series of bands corresponds to transitions between a quasi-stable excited state (with a vibrational frequency of about 50 cm^{-1}) and high vibrational levels of the normal ${}^1\Sigma$ state of Se_2 . Similar bands appear also in tellurium vapour; the first results of our investigation of Te_2 show that the interpretation of these bands is essentially the same as in the case of

selenium. From the position of the potential energy curves of several electronic states investigated in Se_2 , it appears that absorption from the lowest vibrational levels of the ground state leads probably to the part of the quasi-stable energy curve situated above the limit of dissociation. This will accordingly give only a continuous absorption background superposed on the intense absorption bands of the main system and therefore not easily observable. If our interpretation is correct, the broad bands ought to appear in absorption when the temperature of the vapour is sufficiently high.

We have investigated the absorption spectra of Se_2 and Te_2 for temperatures as high as 1,000° C. and we have succeeded in observing the broad bands discussed above. This confirms the interpretation of these bands which we have given above and previously.

Details concerning the structure of these absorption bands and consequent data concerning the dissociation energy of Se_2 (probably 1.9 v.) will be published later elsewhere.

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¹ B. Rosen and M. Désirant, *Bull. Acad. Roy. Belgique, Cl. d. Sciences*, No. 7, 723 (1935).

² M. Désirant and A. Minne, *Bull. Soc. Roy. Sci. Liège*, Nos. 6-7, 229 (1935).

³ B. Rosen, *Z. Phys.*, **43**, 69 (1927).

Points from Foregoing Letters

AN apparatus which produces in the laboratory a lightning-stroke closely resembling in its effects the natural phenomenon (for example, lengthwise splitting of full-sized wooden poles) is described by P. L. Bellaschi. The test piece is 'flashed over' with a steep fronted impulse from a three million volt generator. A heavy current generator is immediately afterwards connected to the test piece by means of a micro-second switch, thus enabling the full low-voltage discharge to follow the high-voltage breakdown across the piece tested.

The temperature change of iron, nickel and cobalt with magnetisation has been calculated by means of the Honda-Okubo theory of ferromagnetism by Prof. K. Honda and T. Hirone. They find the theoretically deduced values in fair agreement with those obtained experimentally by Okamura.

Dr. J. L. Snoek considers that Lichtenberger's explanation of the high magnetic permeability possessed by the specially heat-treated 78 per cent nickel alloy (permalloy) is supported by recent experiments on the influence of a magnetic field applied during cooling, and by the influence of grain size and crystal orientation on the permeability of iron and of silicon iron.

The electrical resistance of films of rubidium metal a few atoms in thickness deposited, in a vacuum on glass cooled by liquid oxygen, has been determined by A. C. B. Lovell. He finds the resistivity of the films to be a few times greater than that of the metal in bulk, and not so large as found by previous investigators.

From experiments upon ovariectomised rats, Dr. V. Korenchevsky concludes that testosterone, like the other two known male sex hormones, androsterone and androsterone-diol, has some of the properties of the female hormones.

The typical nitrogen-fixing bacteria which form nodules on many leguminous plants secrete substances able to produce a characteristic curling of the host's root-hairs, without which infection of the plant does not occur. Dr. H. G. Thornton and Dr. Hugh Nicol have studied some properties of these secretions, and have found that they increase the number and length of the root-hairs.

Photographs of Raman spectra of solutions of formic acid and formates, and also infra-red absorption curves of sodium formate (solid and in solution) are submitted by P. B. Sarkar and B. C. Rây in support of their theory that formic acid and solid formates are normal in structure; abnormality appears in the aqueous solution of formates, due to prototropy (isomeric change depending on the displacement of a hydrogen atom, accompanied by a rearrangement of valence bonds).

The absorption spectra of the vapours of potassium, silver, magnesium and leadnitrates, examined by Md. I. Haq and Prof. R. Samuel, show a flat and diffused maximum of selective absorption in the ultra-violet (2700-2600 Å.) indicating that these compounds possess a co-valent bond in the vapour state.

From the rate of combination of certain organic compounds (bi-molecular diene syntheses), A. Wassermann deduces that in the case of slow reactions in solution, the collision frequency of molecules is not lower than in the gas phase. The slowness of reactions involving certain complex molecules may be due to the passage of translational and rotational degrees of freedom of the reactants into vibrational degrees of freedom in the 'intermediate configuration'. Working with B. S. Khambata, the author finds that the rate of formation and decomposition of dicyclopentadiene follows the Arrhenius equation.