

for common plankton animals such as *Calanus*, *Sagitta* and *Limacina* were very skilfully made for me by Mr. J. H. Fraser, when a member of my staff. Such scales are mounted in a frame to wind off one roller on to another below a circular opening as in Fig. 2, the rollers being turned at X and Y. Alongside is placed the sample in a circular dish of the same size as the said opening, and the sample is spread as evenly as possible by a needle or brush. The scale is turned to right or left until its number

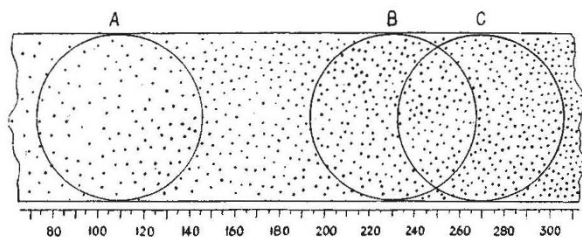


Fig. 1.

of images appears to equal that of the objects in the sample; with practice this may be done very quickly, and usually to within ± 10 per cent. The number is read off through the opening n , which may be kept screened by the slide s , until the judgment is made. When once such a scale is made, hundreds of samples can be dealt with in a very short time. Even without a photographic scale, a scale of dots roughly the size of the objects in the sample will serve for providing an approximate estimation.

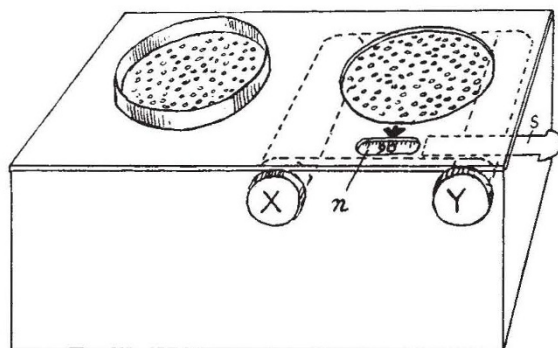


Fig. 2.

My friend, Dr. E. O. Halliwell, has suggested that it might be applied to the rapid estimation of blood corpuscles in place of the usual counts. A double microscope with a single but divided eyepiece would enable one to compare a blood sample with a photographic scale or a slide of increasing numbers of actual corpuscles prepared as a permanent mount. Experiments we have made using two microscopes and a comparator eyepiece indicate that it should be as accurate as the use of the ruled counting slide, and very much quicker.

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Assignment of the Fundamental Frequencies and Computation of the Potential Function of Tetrachlorethylene

THE vibration spectrum of tetrachlorethylene has been discussed by me¹ and later by Linnett and Thompson². It is of particular interest in that the value for the C—C force constant (6.25×10^6 dynes/cm.) seemed abnormally low for a double bond. This was taken to indicate resonance between other possible structures in which the carbon atoms were linked by a single bond.

In both the above investigations a simplified type of potential function was employed in which many interaction terms were ignored. The importance of those terms has since been demonstrated by the work of Manneback³ and others⁴ on the spectrum of C_2D_4 . I have therefore undertaken a re-investigation of the spectrum of C_2Cl_4 using a potential function of the type employed by Manneback and Verleysen³.

Assuming for the nine planar frequencies of the molecule the values (in Manneback's notation) S_1 (1569, 445, 383); A_1 (913, 400*); A_2 (802, 346*); S_2 (512, 341) a thirteen-constant potential function is necessary to obtain real solutions in the four groups. I have attempted to approach as much as possible the valency-deformation system; nevertheless the values of interaction constants are very important (20 per cent of the principal terms) so demonstrating the great influence of Cl atoms.

The detailed result cannot be quoted here, but it is sufficient to remark that the value for the C—C force constant is now 8×10^6 dynes/cm. instead of 6.25×10^6 . It would therefore appear that the earlier conclusions regarding the existence of resonance in this molecule may be premature, since it is possible to correlate the frequencies with a force field in which the C—C constant has its normal double-bond value.

The other important point to which I would direct attention concerns the assignment of the fundamentals, where it will be noticed that the value for the lowest of the S_1 group is taken as 383 cm^{-1} instead of 236 cm^{-1} , which represents a motion out of the plane. This is based on the polarization measurements of Heidenreich⁵. The above set of fundamentals allows of easy interpretation of the remaining observed frequencies as simple addition bands.

Detailed calculations and discussion will appear shortly elsewhere.

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* 400 and 346 frequencies have been computed from the relations between the forces and the known frequencies.

¹ Duchesne, *NATURE*, **139**, 288 (1936); **139**, 634 (1937).

² Linnett and Thompson, *NATURE*, **139**, 509 (1937).

³ Manneback and Verleysen, *Ann. Soc. Sci. Brux.*, **56**, 349 (1936); **57**, 31 (1937).

⁴ de Hemptinne, Jungers and Delfosse, *NATURE*, **140**, 323 (1937). Sutherland and Conn, *NATURE*, **140**, 644 (1937).

⁵ Heidenreich, *Z. Phys.*, **97**, 277 (1935).

Distribution of Fluorescence Excitation of Bivalent Europium in Calcium Fluoride and of Bivalent Samarium in Calcium Sulphate

IN the course of the investigation of the fluorescence of fluorite conducted in the Institut für Radiumforschung, Vienna¹, it seemed desirable to determine the distribution of excitation in fluorite for the blue Eu^{++} band.