

$$\frac{S \cdot (S-y)}{y} = \frac{1}{K_2} \cdot \frac{1}{t} = \frac{K_3}{t} \text{ where } K_3 = \frac{1}{K_2}$$

or,

$$\frac{K_3}{t} = \frac{S^2}{y} - S.$$

That is, if our proposition is correct, a straight line will be obtained when $1/t$ is plotted against $1/y$ (Figs. 1 & 2). Practically all the important enzymes with uncomplicated reactions have been found to show this relation, for example, phosphatase, amylases (α and β), proteinases, lactase, lipases, etc. The detailed study will be published elsewhere.

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ELASTIC CONSTANTS OF LITHIUM FLUORIDE

AMONG the alkali halides which show a remarkable gradation in all their physical properties, lithium fluoride is an exception in many ways. The elastic constants of the substance have been determined by Schaefer and Bergmann by the ultrasonic method of setting the crystal itself into vibrations and then using it as a three-dimensional grating to a beam of light. In view of the exceptional behaviour of the substance, it was considered desirable to repeat the measurements by other ultrasonic methods and the results of the investigation are given below:—

Lithium fluoride crystallises in the regular cubic class and has an easy cleavage parallel to the cube face. The sample used in the present investigation was artificially grown and supplied by Harshaw Chemical Company, Ohio, U.S.A. Sections (100) and (110) of different thickness (1.275-1.5 mm.) have been cut and used for the measurements. The acoustic velocities in these plates were determined by both the ultrasonic wedge method developed by Bhagavantam and Bhimasenachar (1941) and the modified plate method described by the author (1948), the frequencies used ranging from 1 to 12 mc./sec. The elastic constants were evaluated from the mean acoustic velocities. The results are given in the following table. The elastic constants c 's and the bulk modulus K are given in units of 10^{11} dynes/cm.² and the elastic moduli s 's

in units of 10^{-13} cm.²/dyne. The density of the substance is taken as 2.601 gm./cm.³

No.	Observer	c_{11}	c_{12}	c_{44}	s_{11}	s_{12}	s_{44}	K
1	Schaefer & Bergmann	11.8	4.34	6.28	10.6	-2.85	15.9	6.82
2	Author	11.9	4.58	5.42	10.7	-2.97	18.5	7.02
3	Bridgman	8.55

In the above table, the value of K obtained experimentally by Bridgman and those calculated from the relation.

$$K = \frac{1}{3} (c_{11} + 2c_{12})$$

are entered in the last column.

It can be seen from the table that for c_{11} and c_{12} the values obtained by the author are in good agreement with those of Schaefer and Bergmann. For c_{44} , on the other hand, the two values differ by about 16% which is far beyond the usual experimental error. It is not possible to give any explanation for this discrepancy. However, it is interesting to point out that the author's values are in better agreement with the theoretical Cauchy relationship, *viz.*, $c_{12} = c_{44}$ for cubic crystals, which is found to hold good to a very great extent in the case of alkali halides.

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KATABATIC EFFECT OVER JODHPUR

JODHPUR is situated on the eastern edge of the Thar desert about 20 miles from the Luni river which remains dry during the greater part of the year. The nearest distance from the sea is about 270 miles to the S W. The Aravalli range running NE to SW lies SE of the station at a distance of about 70 miles. Parts of the range are as high as 2,700 ft. or over. The NE end of the range descends into the desert and the SW edge is terminated abruptly at a point slightly over 120 miles south of the station near

Mt. Abu (elevation 5,650 ft.). To the North and West of the station is the semi-desert region of Jailsulmer and to the SW is the Thar Parkar region.

To the South and SSE of the airfield there is a slight downslope for about 20 miles to the Luni river. Beyond this, in the same direction, is the gradual upslope to some rolling and scattered rocky hills at a distance of 50 miles. To the SE and E is a gradual upslope to the foothills of Aravalli range followed by rapidly increasing upslope at the range. Close by in the North and West are scattered low rocky hills; to the WSW is gradual downslope to the Luni river system.

During the months of Dec. to Feb. Katabatic drainage of air from the high ground E and SE of the station is perceptible under the following conditions: (a) feeble pressure gradient, (b) clear or lightly clouded sky with dry air permitting radiation-cooling during the night. The prevailing wind over Jodhpur in winter, specially during second half of the night is dry NEly. The ground temperature starts falling rapidly after sunset becoming steady later during the night. The thermograph would have shown a smooth curve with a rapid fall at sunset and gradual stratification later, if the country were a perfect plain in the neighbourhood of Jodhpur, but due to the drainage of air from the hills in SE, there are kinks on the curve of thermograph. The kinks are followed by change in wind direction or speed and confirm the idea of Katabatic drainage from the hills.

Over the hills, cold air is collected in valleys and depressions and when during the night further cooling takes place it overflows as Katabatic wind. This Katabatic motion takes place under simple gravitational effect. When the conditions get out in para 3 are satisfied Jodhpur experiences a marked ground inversion and consequently the influx of colder air from the hills. From the photographs of anemograms and thermograms of the days when the flow was active it is gathered that when the change in wind takes place there is generally a fall of temperature by 2 to 4 deg. F. or even more at times. However, there are instances of rise in temperature by one or two deg. F. in advance of Katabatic flow. This may be due to sudden impingement of Katabatic wind upon the stratified layer of air which causes a temporary mixing or churning up and consequent rise of temperature. But

the net result of Katabatic effect seems to be cooling.

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*A NOTE ON PERFORATED CATHODE
SELF-QUENCHING G.-M. COUNTERS

IN self-quenching Geiger-Muller counters the slope of the plateau has been attributed by Korff and Present (1944), to the occurrence of multiple pulses which are counted as spurious counts. The multiple discharges in a counter are produced either by photo-emission, that is, a photon of sufficient energy falling on the cathode ejects an electron which in turn produces a multiple pulse or by the positive ions, which, on reaching the cathode attract an electron again giving a multiple pulse. Quenching vapour has a dual role of neutralising the positive ions and absorbing the photons, though Craggs and Jaffe (1947) have shown that the absorption of photons capable of ejecting electrons from the cathode in self-quenching counters is not complete. There will thus be a certain number of spurious counts due to the photons. Also, at higher potentials the average energy and the number of positive ions being greater (Stever, 1942), there is an increase in the number of ions reaching the cathode resulting in greater secondary emission and a corresponding increase in the frequency and the multiplicity of the multiple pulses. The slope of the plateau is thus to be attributed to the increasing frequency and multiplicity of the pulses, leading to an increase in the number of spurious counts. (Putman, 1948; Wilson and Carson, 1948.) Putman has further shown that the spurious counts, which are due to secondary electrons liberated from the cathode by the positive ions are the major cause of the plateau slope in argon-alcohol filled counters.

In order, therefore, to have a good counter *i.e.* having a long and flat plateau (Korff, 1948) so that the counting rate remains constant even when there are large variations in the voltage applied, we must reduce the number of multiple discharges or the spurious counts. Putman has used an external quenching circuit which renders the counter inoperative after each count for a period greater than the recovery time, thus obtaining a significant increase in the flatness of the plateau.