

of the states in kev., and on the left side their presumed spins. As seen, the total disintegration energy of ^{82}Br is 3.1 Mev. The assignation of the spin values was based on the absence of direct γ -transitions from the upper levels to the ground-state, and on the small abundance of the more energetic β -ray group. A more definite determination of the spins could not be made without establishing the nature of the γ -transitions.

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¹ Downing, J. R., and Roberts, A., *Phys. Rev.*, **59**, 940 (1941).

² Feather, N., *Proc. Camb. Phil. Soc.*, **34**, 599 (1938).

Refraction Patterns of the Surfaces of Opaque and Translucent Solids

IN a previous note, one of us (Rivlin¹) has described a method for studying the distribution of facets of various orientations on the rough surfaces (ground, scratched or etched) of transparent solids.

We have since developed a similar method for studying such surfaces of opaque or translucent solids. This consists in making a cast of the rough surface using some transparent substance and in obtaining the refraction pattern in a manner similar to that previously described.



We have found 'Diakon' a suitable substance for the cast. A solution of 'Diakon' in ethyl acetate is painted on to the rough surface and is allowed to harden. The painting process is repeated until a suitable thickness of 'Diakon', say $\frac{1}{2}$ mm., is obtained. The cast is then peeled from the surface. A point source of light is viewed through the cast and a refraction pattern which is characteristic of the surface under consideration is obtained.

The accompanying figure shows the refraction pattern obtained from a cast of the (100) surface of a hypersthene crystal ground with 60-mesh carborundum abrasive. This indicates strongly preferential fracture of the crystal on planes parallel to the zone axis [001]. The b axis of the crystal is horizontal.

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¹ Rivlin, R. S., *NATURE*, **146**, 806 (1940).

Observational Clue to the Size of Meteors

CONSIDERABLE difference of opinion prevails concerning the size and mass of meteors. While one school of investigators, attacking the problem from theoretical considerations based on certain relations between amount of light emitted by an incandescent body and its extent of surface and mass, is prepared to give the nucleus of average naked-eye meteors a volume scarcely greater than a few cubic millimetres, another school, consisting mainly of experienced observers, but by no means indifferent to theoretical calculations, argues in favour of much larger dimensions for them—at least several cubic inches. As there is no possibility of observing meteors at close quarters, much less handling them, while on their aerial path, the question has remained undecided.

An observational clue, however, is available. Even in strong moonlight, one can often see distinctly meteors of the 2nd and 3rd magnitude. Owing to the illumination of their background, moonlight meteors not only appear to be much nearer objects, marking their trails, not *on* the dark background of the sky, as they usually do in moonless nights, but *in front of* the illuminated background. Occasionally, they send forth a momentary flash (which greatly adds to their brightness), due undoubtedly to the reflexion of moonlight from their surface. For such a thing to happen, not only should the reflecting surface of the meteor be suitably disposed towards the moon, but also it should have an appreciable area also.

Having observed the phenomenon a number of times quite distinctly, I believe that it furnishes observational evidence in favour of the relative large size of meteors.

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Ionization Potentials of Polyatomic Molecules

THE recent development of our knowledge of the electronic structures of molecules makes it possible to specify with reasonable certainty the particular electron with which a definite molecular ionization potential is to be associated. In an organic molecule the variation of an ionization potential with, for example, alkyl or halogen substitution reflects the change in negative charge density in that part of the molecule in which the electron is located. The existence of resonance in a molecule also considerably affects the ionization potentials of the resonating electrons. It is clear, too, that ionization potentials are intimately bound up with chemical activity, dipole moments, refractivities, combination radii, electronegativities, etc.

In a programme concerned with the determination of molecular ionization potentials we have used absorption spectra in the vacuum ultra-violet whenever the absorption bands obtained were sufficiently discrete for the photo-ionization limit to be observed. When this was not the case electron impact methods were employed, the values being substantiated by whatever limited spectroscopic evidence was available. The spectroscopic values are accurate to at least 0.01 v., while the electron impact ones have the lower accuracy of about 0.1 v. Higher ionization potentials than the minimum have in general been obtained only by the electron impact method and are of a somewhat lower accuracy. Some of the values so far derived for the *first* ionization potentials