Solid Carbon Dioxide

THE commercial and workshop value of solid carbon dioxide is fully described in a recent article in *NATURE*¹; there are, however, further interesting uses of this material to which it may be worth while to direct attention.

(1) Diamonds and pearls may at once be distinguished from their counterfeits, inasmuch as the real substances emit a rattle or squeak when touched with solid carbon dioxide. Similarly, a quartz lens may at once be distinguished from a glass one.

(2) Metal bars and tuning forks of high pitch may be powerfully excited by touching them with the substance, and the overtones of low-pitched forks and bars may similarly be picked out—a fact of practical importance in the tuning of metal bars of musical instruments.

(3) Brittle materials, of suitably high thermal conductivity, may also be set into vibration.

These facts, and the manner of their discovery, were demonstrated before Section A at the York meeting of the British Association. As no trustworthy account exists on the origin of these experimental researches, I should like to put on record the actual

facts. The well-known fact that solid carbon dioxide will make a bicycle bell rattle was brought to my notice on July 11, 1932, by an itinerant vendor of ice-creams, and investigations were at once entered into, the results of which, together with an explanation of the phenomenon, have recently been published^{2,3}. Briefly, the loss of heat from the hotter to the colder body supplies the energy, and the efficacy of carbon dioxide is due to the fact that it sublimates, thereby producing considerable gas pressure.

I have recently noticed that solid carbon dioxide in the form of 'Drikold' can set soft metals into vibration in a manner impossible with a hammer.

The accidental nature of the discovery and the mechanism of the phenomenon may well be compared and contrasted with that of Trevelyan's rocking bar.

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¹ *NATURE*, 135, 293, Feb. 23, 1935.

² *Proc. Phys. Soc.*, 45, 101; 1933.

³ *Proc. Phys. Soc.*, 43, 116; 1934.

Points from Foregoing Letters

PROF. S. SUGDEN has investigated the radioactivity induced by neutron bombardment (Fermi effect) in the rarer elements europium, erbium, terbium, ytterbium, etc.). He tabulates the relative intensity and half-life periods of the radioactive elements produced, comparing them with the intensity produced in silver and iodine in the same circumstances.

Curare and tubocurarine—plant extracts employed by South American Indians as arrow poisons because of their paralysing properties—have been used medically to alleviate muscular rigidity in man. Dr. Harold King has investigated several species of *Strychnos* and other plants from which curare is said to be obtained. Of these, *S. toxifera* alone contains the active principle curarine, having paralysing properties. Chemical examination of bamboo-tube curare (tubocurarine)¹ yielded crystalline tubocurarine, which has properties similar to those of curarine, together with an allied substance *d*-bebeerine, which is much less active.

The temperature of flames as measured by the increased resistance of a platinum wire does not agree with that determined by the 'sodium line reversal' method. (The spectral lines of sodium present in the flame seen against a background of a continuous spectrum of a tungsten filament, of known temperature, appear dark when the flame is cooler and bright when it is hotter than the filament.) Prof. W. T. David maintains that the 'sodium temperatures' are too high, as they do not agree with the calculated temperatures of flames of carbon monoxide while the 'platinum' temperatures do. The sodium temperatures show an unexpected constancy over a wide range of variations in the mixture strength and in the nature of the combustible material.

Stokes's formula shows how, from a knowledge of the variations in gravity at different known points of the earth's surface, one may calculate the shape

of the earth's figure (geoid). Mr. B. L. Gulatee suggested that minute systematic errors in the determination of *g* might completely vitiate the results. Dr. J. de Graaff Hunter now calculates that if gravity determination were made at a large number of stations suitably distributed over the earth, Stokes's formula would give the 'absolute elevation' with a fair degree of accuracy.

According to theory, there should be three different heights in a given ionic layer (of the upper atmosphere) from which radio waves can be reflected; these correspond to certain values in electronic density. Only doublet echo patterns are, however, usually found. Mr. G. R. Toshniwal states that triplet radio echoes have been observed at Allahabad from the *F* layer—especially after sunset; the separation of the components indicates an equivalent height difference of about 15 km.

Mr. H. J. Walke points out that the Klein-Nishina formula by means of which the wave-lengths of γ -rays are calculated when their absorption coefficient is known neglects nuclear absorption. It should not therefore be applied in the case of γ -rays of more than one million electron volts energy, such as those supposed to exist in cosmic rays, since such hard γ -rays can interact with atomic nuclei.

Mr. D. C. Lloyd reports that experiments with the parasite wasp (*Schedius Kuvanae*) which deposits its eggs within those of the gypsy moth, show that the female *Schedius* possesses a selective faculty enabling it to pick the best available material as host.

Mr. G. W. Brindley and Dr. F. E. Hoare have investigated the diamagnetic susceptibilities of the alkaline halides in order to test how nearly additive are the ionic susceptibilities in this group of crystals. They find that the additive rule holds to within about one per cent in all cases except CsCl, CsBr and CsI (which have different structures from the other halides), and LiCl, LiBr and LiI (where the negative ions are in unusually close proximity).