

In several countries there is great controversy over the use of terms in this new branch of applied science. It is almost certain that these words will remain: television, in English-speaking countries; télévision in France; and fernsehen, in Germany. It would be well for the sake of preventing misunderstanding if the philological quibbles were dropped immediately.

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MR. BRITAIN raises the question of what is meant by radiovision and television. As a rule, we have to be guided largely not only by the context but also by the nationality of the user. At one time it was thought that radio-telegraphy should replace wireless telegraphy, and many committee meetings were held by electrical engineers to consider this question. It was found that commercial interests, including patent rights, had to be considered, and so as a compromise the British Engineering Standards Association agreed to sanction both. As a matter of fact it has become common practice to use both, and the question of the survival of the fittest may never arise. In America, 'radiovision' is largely used to denote the transmission of living pictures partly through the ether, and an attempt is made to restrict television to the transmission of living pictures through wires. Photo-telegraphy is another art altogether. It is the reproduction of photographs, pictures, etc., by electric impulses sent through wires or through the ether. The Post Office and the Marconi Company make extensive commercial use of this method, and we have seen admirable reproductions of photographs made in a few minutes sent from Berlin to London. Perhaps it would be best to use the hybrid word 'television' to denote the art of sending practically instantaneous living pictures over long distances either by wire or by the ether and restrict the hybrid word 'radiovision' to the latter method of transmission. The use of words like 'televisor,' which is a trade word registered by the Baird Company, to denote a special kind of apparatus, is obviously restricted.—[EDITOR, NATURE.]

#### Stellar Spectra in the Far Ultra-Violet.

STELLAR spectra cannot be studied in the far ultra-violet spectral region, because the earth's atmosphere has too strong an absorption beyond about 3000 Å., due to the amount of ozone in the upper atmosphere. There is no doubt that this ozone is formed by the photochemical action of the sun's radiation. Most of this ozone is at a height of 45-50 km., although the measurements of Dobson and his co-workers show that perhaps about 30 per cent of this ozone diffuses to deeper layers, probably to 20 km. or lower. On the other hand, we can suppose that in the higher layers (100 km. and more) less ozone will be formed, corresponding to the lower pressure.

If we consider that in the midwinter in a polar region of about 4000 km. diameter the sun's radiation does not penetrate deeper than to a height of 50 km. at the edge of this circle, and not deeper than to about 700 km. over the north pole, we should expect that at this time no ozone will be formed there. We should also expect that the ozone formed during the summer will be decomposed before midwinter. Then we should not find a strong absorption of ultra-violet light in this arctic region in the midwinter unless convection were to move ozone from southern regions to this polar zone. But under favourable conditions we can also expect that a large amount of ozone will be decomposed before it reaches the place of observation. It is not probable that the endothermic ozone can be driven 4000 km. or more from the place

of photochemical formation to the place of observation without any decomposition.

Therefore at a place in the polar region near the edge of the arctic night we should find a better chance of observing shorter wave-lengths in stellar spectra than at any other time and any other place. With only a small percentage of the normal amount of ozone, we should find the whole spectrum to about 2100 Å., where the absorption of the oxygen molecule begins. What the real conditions are we do not know, but in any case we can expect with certainty from a study of stellar ultra-violet spectra in the arctic night just as important results for astrophysics as for meteorology and geophysics.

This paper was communicated by Prof. H. N. Russell at the meeting of the International Astronomical Union in Leyden to Prof. S. Rosseland and Prof. C. Störmer (Oslo). They expect to arrange experiments to study this problem at Tromsø.

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#### The Structure of the Benzene Ring.

AN X-ray examination of hexa-methyl benzene,  $C_6(CH_3)_6$ , recently completed, has led to certain definite and fundamental conclusions concerning the symmetry and form of the benzene ring.

The crystals belong to the triclinic system and there is only one molecule in the unit cell. The maximum molecular symmetry is therefore a centre, in agreement with previous results on benzene and the fully halogenated benzene derivatives (E. Gordon Cox, NATURE, 122, 401, and others). One of the possible minimum cells, however, has its  $a$  and  $b$  axes very nearly equal (9.010 Å. and 8.926 Å. respectively), while the angle between them is  $119^\circ 34'$ , that is, nearly  $2\pi/3$ . There is an excellent cleavage parallel to the (001) plane, and the reflections from the various orders of this plane diminish in intensity in almost the same proportion as those from the (001) cleavage plane of graphite. There is also a marked periodicity in the intensities of reflection from planes in the [001] zone. The reflections from ( $h k 0$ ) planes correspond closely to those from ( $k \bar{h} + k 0$ ) and ( $\bar{h} + k h 0$ ) planes. There is a similar, though less obvious, resemblance between ( $h k l$ ) ( $k \bar{h} + k l$ ) and ( $\bar{h} + k h l$ ) planes.

These intensity variations prove quite clearly the existence (hitherto assumed for crystallographic purposes) of pseudo-hexagonal or hexagonal symmetry in the benzene ring, and also that, in this compound at least, the benzene ring is almost if not quite flat; that is, it resembles the rings of six carbon atoms existing in graphite rather than those in diamond.

A further analysis of the intensities shows that the only possible arrangement of carbon atoms is one in which the side of the benzene hexagon (distance between centres of neighbouring carbon atoms) is 1.42—1.48 Å. The least C—C distance in graphite is 1.42 Å., while the side of the hexagon obtained by projecting Bragg's 'puckered' benzene ring on to the mean plane of the ring is 1.45 Å. The substitution, therefore, of a flat benzene ring for the puckered rings in naphthalene and anthracene would not affect the periodicity in the  $c$  direction, which is one of the most striking features of those crystals (W. H. Bragg, Zeit. f. Krist., 66, 27).

A more detailed account of this investigation is now being prepared and will be published elsewhere.

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