

Letters to the Editor.

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Fluorescence of Mercury Vapour under Low Excitation.

IN a letter published in NATURE of Aug. 18 under the above title, I described the excitation of mercury fluorescence using wave-lengths much longer than the resonance line $\lambda 2537$, and even as long as $\lambda 3125$. This fluorescence shows the well-known visual green with continuous spectrum. I have since found by photography that, at any rate when the vapour is dense, the spectrum shows, besides the visual maximum, the well-known broad maximum at about $\lambda 3300$ in the ultra-violet. In this experiment excitation was by the iron arc, filtered by a bromine cell combined with vita glass, and the effective exciting wave-length is somewhere about $\lambda 3000$.

It is important to determine whether the fluorescence thus excited by wave-lengths longer than the resonance line is of long duration—whether, in fact, it can be distilled away from the place of origin, as in Phillips's experiment with excitation by the core of the resonance line. I find, in fact, that such is the case. So far I have succeeded in carrying out this experiment with exciting wave-lengths up to about $\lambda 2650$, but have not been able to get the effect with much longer waves owing to experimental difficulties. It is hoped to overcome these and to carry the matter further. In the meantime it seems fairly clear that, contrary to views that have often been held, the long duration does not depend on anything that happens only in the immediate neighbourhood of the resonance level of the mercury atom.

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Oct. 29.

Higher Hydrocarbons from Methane.

THE importance of the formation of condensation products by thermal decomposition of methane is of interest to chemists and petroleum technologists alike, the latter being confronted with the problem of the better utilisation of 'dry' natural gas. The pyrolysis of ethane, propane, and the higher paraffins to form aromatic hydrocarbons is a well-established fact, while methane has not been found to show similar tendencies to any appreciable extent.

Several recent patents claim very high conversion yields of methane into ethylene, etc., but are still without published experimental verification. Fischer (*Brenn. Chem.*, 9, 309; 1928) has shown that under conditions of high gas speeds, and hence short heating periods, with temperatures above 1000°C ., the use of active catalytic material being avoided, methane can be made to fall into line with its homologues in yielding higher hydrocarbons, although the yield is very poor.

The formation of small amounts of acetylene has been recorded by Bone and Coward (*J.C.S.*, 93, 1197; 1908), and also by Fischer (loc. cit.), and it is of interest to know to what extent this gas occurs in the gaseous products of reaction.

As the result of work which has been carried out in this laboratory during the past year, we are in a position to confirm Fischer's recent claims, having used a purified methane gas throughout. This we

have found to yield, on subjection to passage through a silica tube at 1100°C . (heating duration of 12 seconds), approximately 10 per cent of liquid and solid hydrocarbons (free from carbon black) calculated on the original methane, while, in other experiments, the gaseous products of the reaction contained 0.9 per cent of acetylene as well as olefines. Analysis of the acetylene, regenerated from its metallic derivatives, indicated that there was not an appreciable quantity of its higher homologues present (n in $\text{C}_n\text{H}_{2n-2} = 2.03$).

It would appear impossible to decide at the moment the mechanism of this reaction. The condensation of molecule fragments 'CH,' 'CH₂,' and 'CH₃,' formed by loss of hydrogen, has been suggested by Bone and Coward and also by Fischer, and this theory is probably the correct one.

In a private communication from Prof. Aarts to one of us, a statement was made to the effect that a highly active form of carbon, prepared under special conditions, can combine with hydrogen to form liquid hydrocarbons at ordinary pressure. This has since become the subject of English Patent No. 278,745.

It would be interesting to know whether the carbon formed in this decomposition process, which we have always found in this reaction in increasing quantity, and probably of less activity, with decreasing gas rate, possesses, even temporarily in the nascent state, any such activity sufficient to form higher gaseous hydrocarbons.

This work fills a distinct gap in the recorded behaviour of pure methane on thermal decomposition, and opens up new fields for investigation.

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Oct. 30.

Long Wave Radio Reception and Atmospheric Ozone.

I THINK that it is desirable that I should add a note of warning to Mr. Sreenivasan's letter under the above title in NATURE of Oct. 27, as there are two or three points about the ozone values that would probably not be familiar to Mr. Sreenivasan, which make it doubtful whether the relation that he brings out is a real one.

First, the steady decrease in the ozone values during the period that he used is due to the regular annual variation of ozone which we have found every year in regions outside the tropics. It is always dangerous to assume a direct connexion between two quantities where the variations of at least one of them are chiefly due to an annual periodicity, and particularly where the two values show only a steady increase or decrease during the period under review.

Secondly, while our observations have not yet begun in India, the results that we have for other places of low latitude indicate that the annual variation of ozone in these latitudes is very small and the values are very constant all through the year (the monsoon conditions in India may make the ozone variations somewhat abnormal there).

Finally, we have no evidence of any world-wide variations of the amount of ozone, and it appears that the values depend chiefly on the time of year and on the atmospheric conditions in the immediate vicinity. I should not, therefore, expect that there would be any appreciable connexion between the ozone values found in Europe and those found in India. For these reasons it is very desirable to have more confirmation before accepting the connexion between radio signals in India and the ozone values in Europe as a certainty.