laboratory by Mr. P. C. Mahanti and Mr. R. N. Das Gupta with the Nernst bridge method, and the results clearly indicate that, so far as the *primary* alcohols are concerned, they have practically the same dipole moment in them.

Substance.	Chemical Formula.	$\mu \times 10^{18}$.	Observers.
1. Methyl alcohol .	CH_3OH	1·64 1·61	F.W.[1] J.[2]
2. Ethyl ,, .	C_2H_5OH	1·64 1·63	F.W. W.[3]
3. Propyl ,, .	C_3H_7OH	1·66	F.W.
4. Butyl ,, .	C_4H_9OH	1·65 1·62	L.[4] M.D[5].
5. Hexyl ,, .	$C_6H_{13}OH$	1·64	,,
6. Octyl ,, .	$C_8H_{17}OH$	1·62	,,
7. Noxyl ,, .	$C_9H_{19}OH$	1·60	,,
8. Decyl ,, .	$C_{10}H_{21}OH$	1·63	,,
9. Duo-Decyl ,, .	$C_{12}H_{25}OH$	1·62	,,
10. Benzyl ,, .	C_6H_5OH	1·66	W.
11. Iso-propyl alcohol	$CH_3CH(OH)CH_3$	1·78	M.D.
12. Iso-Butyl ,, .	$(CH_3)_2CH . CH_2(OH)$	1·79 1·72	,, L.
13. Iso-Amyl ,, .	$(CH_3)_2CH . CH_2CH_2OH$	1·82 ? 1·76 1·85 ?	M.D. L. W.

[1] F.W. Falckenberg and H. Weigt.
[2] J. M. Jona.
[3] W. J. W. Williams.
[4] L. Luise Lange.
[5] M.D. P. C. Mahanti and R. N. Das Gupta.

Since these alcohols are produced by the substitution of one atom of hydrogen by an OH-group in the normal hydrocarbon molecules, it is reasonable to infer that the dipole moment is due to the polarisation of the oxygen atom by the hydrogen atom on one hand and by the carbon atom on the other. In other words, it may be stated that the binding forces acting on the carbon atom reacting with the oxygen are just the same whether the chain is long or short, open or closed. It may also be pointed out that the carbon atoms associated with the CH group forming the iso-alcohols have quite different binding forces leading to different values of the permanent dipole moments. The details of the investigation will be published elsewhere.

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Action between Copper Salts and Glycerol.

A vigorous action occurs when a solution of any of the copper salts (hydrated or dehydrated) in glycerol is heated to about 150° to 200° C.

The salts, with the exception of cupric chloride, are invariably decomposed into metallic copper (fine powder more than 99 per cent pure) and free acid, which may also undergo further decomposition. The decomposition products of glycerol are ethyl alcohol, acrolein (when the salt acts as a dehydrating agent), carbon dioxide, methane, carbon monoxide, and hydrogen, the last two being present only in small quantities.

With cupric chloride instead of metallic copper a white precipitate of crystalline cuprous chloride is obtained. This may be regarded as due to a secondary action set up in presence of copper, hydrochloric acid, and cupric chloride which is still in solution. The action seems to be fairly general, as other polyhydroxy alcohols (glycol, erythritol, and mannitol) give nearly the same result.

It is known (Sabatier and Gaudion, *Compt. rend.*, **166**, 1033-1039; 1918) that glycerol vapour is decomposed into almost the same products mentioned above, at 330° C., in presence of finely divided copper. It is very likely, therefore, that in the present case a proportion at least of the decomposition products are due to the catalytic action of copper.

If, as is generally believed, metallic salts dissolve in polyhydroxy compounds, replacing the hydrogen of the hydroxyl group by the metal, copper and glycerol would form a compound of the formula: $C_6H_{10}O_6Cu_3$. Further, as copper, carbon dioxide, and methane are the chief products of the reaction a possible way of explaining it would be: $C_6H_{10}O_6Cu_3 = 3Cu + 3CO_2 + CH_4 + C_2H_6$, although there is no direct evidence of ethane.

Apart from the theoretical considerations the reaction gives a method for preparing pure, finely divided copper, which is very suitable for catalytic purposes. Even crude copper sulphate yields quite a good product. The method may be also employed for preparing cuprous chloride from cupric chloride, the reduction being quantitative.

A detailed paper on the subject will be published shortly.

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Effect of Electric and Magnetic Fields on the Helium Spectrum.

(By Imperial Wireless Services.)

With a nearly uniform magnetic field of fifteen thousand gauss perpendicular to an electric field which varies from zero to fifteen thousand volts per centimetre, I find many lines which are not ordinary Stark components and appear not to be due to impurities. Effects are similar in the corresponding parhelium and orthohelium line groups near the diffuse series lines. For example, strong lines appear on the violet side of 4388 A. and 4026 A. at distances nearly double those of the usual fundamental combination lines of the Stark effect. These well-defined lines show no decided polarisation, and at maximum field are displaced toward the red 0·5 A. and 0·2 A. respectively. At an intermediate value of electric field, components in 4026 group are displaced from the diffuse line 0·25 A., 0·47 A., 0·62 A., 0·78 A., 1·90 A., 2·10 A. The components in positions of usual Stark components of large displacements are relatively diffuse.

That new lines should appear in the presence of crossed fields was first stated by Prof. Bohr. It is now possible to make repeated observations on these, owing to experimental features which will be described in a later paper.

In this research, I have been assisted by Dr. Chalk through a grant from the National Research Council of Canada.

J. S. Foster.

McGill University,
Montreal, Mar. 10.

Band Spectrum of Chlorine or Hydrogen Chloride.

Further investigation of the bands described by me in Nature of Jan. 19, p. 86, leaves no doubt that these were caused by traces of sulphur introduced into the stream of hydrogen by the sulphuric acid wash bottle. They are very similar to the bands described by Johansen (*Zeit. wiss. Photographie*, **11**, 20; 1913).

E. B. Ludlam.

University Chemical Laboratory,
Edinburgh, Mar. 1.