

points, then a current I enters the condenser. Let the condenser be now connected between the grid and the anode of the valve, the grid-cathode potential being still V . The potential of the anode will be $-mV$ if the gain of the valve is m (assuming the anode and grid potentials to be in antiphase), and the potential difference across C will be $(m+1)V$. Accordingly, the current entering C will be increased $(m+1)$ times. This new current is the same as that which would be taken by a condenser of capacity $(m+1)C$ between grid and cathode. As the gain may be of the order of hundreds, the equivalent of many microfarads may easily be obtained.

Using this effect, I have built an oscillator with a periodic time of several minutes, although the largest condensers and resistances employed are 0.2 microfarad and 2 megohms respectively. With periodic times of a few seconds available, one may demonstrate the production of rotating magnetic fields, for the synchronous speed is low enough to be followed by a compass needle.

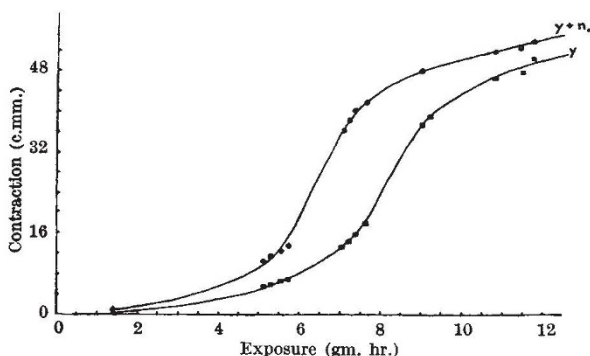
In a similar manner, the 'equivalent' resistance of a grid leak may be increased many times. An additional phase-reversing valve stage is necessary here. This possibility has not been developed, as other and simpler means for producing the same effect exist.

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Polymerization of Liquids by Irradiation with Neutrons and Other Rays

IN continuation of previous work on the effects of radiations on liquids¹, we have for some time been investigating the action of neutrons, alpha-, beta- and gamma-rays in inducing polymerization of a number of hydrocarbon compounds. Of the different methods used for observing the rate of polymerization—changes in colour, refractive index, viscosity, streaming polarization, etc.—we have found it convenient to follow the changes in density consequent on irradiation by means of a volume dilatometer. The sources of radiation were sometimes placed inside the bulb of the dilatometer, and sometimes surrounded it.



POLYMERIZATION OF METHYLACRYLATE BY IRRADIATION WITH NEUTRONS AND GAMMA RAYS.

Strength of source: $\gamma = 78$ mgm. Ra [SO₄] in Pt needles 0.5, 0.6 mm. filter; $\gamma + n_0 = 78$ mgm. Ra [SO₄] + Be in monel metal tubes, 2 mm. filter. Irradiated volume = 6 c.c.

In the case of neutron irradiation, the liquid under test was placed in a small double-walled vessel, similar to a Dewar vessel, to which a capillary stem had been sealed. The gamma-ray or neutron sources were placed in the central cavity and the whole apparatus immersed in a large bath of water. A typical series of observations during the gamma-ray and neutron irradiation of methyl methacrylate is shown in the accompanying graph. Similar results were obtained with beta-rays.

The liquids investigated so far include, in addition to methyl methacrylate, styrene, vinyl acetate, and a ketone. The expulsion of dissolved substances which had been deliberately added, for example, ceresin, indole, etc., was often strikingly shown during the polymerization.

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¹ Hopwood and Phillips, *NATURE*, 136, 1028 (1935). Hopwood and Phillips, *Proc. Phys. Soc.*, 50, 438 (1938).

New Acetylated Derivatives of Amino Sugars

A RECENT communication from this laboratory reported the preparation of 3-amino α -methylaltroside hydrochloride and 2-amino α -methylaltroside¹. Development in this field of work has been rapid, and it therefore seems desirable to publish additional information which has been obtained since our last letter on the subject.

The material obtained by the action of ammonia on 2:3-anhydro 4:6-benzylidene α -methylalloside has been acetylated and separated into two fractions, which prove to be 2-acetamido 3-acetyl 4:6-benzylidene α -methylaltroside (1) in sixty per cent yield, and 2-acetyl 3-acetamido 4:6-benzylidene α -methylglucoside (2) in 1 per cent yield. The production of (1) and (2) in this reaction, previously shown by Peat and Wiggins², has thus been confirmed, but the yield of (2) obtained by us shows a wide discrepancy from that claimed by the authors mentioned above.

In analogous fashion, we have found that the material obtained by the action of ammonia on 2:3-anhydro 4:6-benzylidene α -methylmannoside, followed by acetylation, may be separated into two isomeric substances which prove to be 2-acetyl 3-acetamido 4:6-benzylidene α -methylaltroside (3) in 60 per cent yield and 2-acetamido 3-acetyl 4:6-benzylidene α -methylglucoside (4) in about 1 per cent yield. Substance (4) is therefore a derivative of glucosamine.

Galactose has been converted into a 2:3-anhydro 4:6-benzylidene α -methylhexoside, which has either the gulose or talose configuration³. When this substance is submitted to the action of ammonia followed by acetylation, the product may be separated into two isomeric 4:6-benzylidene amino α -methylhexoside diacetates, (5) and (6), which have not yet been identified.

Robertson and Dunlop⁴ obtained two isomeric α -methylhexoside chlorhydrins by the action of very dilute hydrochloric acid on 2:3-anhydro 4:6-benzylidene α -methylalloside. These substances give amino α -methylhexosides on treatment with ammonia, and when the product so obtained is acetylated, the resulting material may in both cases be separated