of molecular weight 400–500 should be four times as high when its depression is found as the naphthalene concentration when K_f is determined.

This method of calculation has been used for 'Litton' oil (Table 2), and it will be seen that the average result obtained is comparable with that obtained by the modified equation. The figures in the second column of this table are those obtained from the classical equation using the cryoscopic constant calculated from the modified equation.

TABLE 2. COMPARISON OF RESULTS OBTAINED USING MODIFIED AND CLASSICAL EQUATIONS.

("Litton" oil).

Modified equation		Classical equation		"Number average" (see text)	
495·1	491·0	451·2	460·0	476·8	481·4
489·8		455·9		478·7	
481·7		452·9		474·2	
488·9		463·3		483·1	
499·4		476·6		494·2	

From the figures obtained in this Laboratory, there seems to be little doubt as to the greater consistency of results using the modified equation over those obtained by the classical method of calculation. For purposes of laboratory control of products, this is essential.

A comparison of results obtained by osmotic and cryoscopic methods of determination of molecular weight would be interesting and may prove of considerable importance in the determination of molecular weights of high polymers.

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Formation of Sulphamic Acid during the Thermal Decomposition of Ammonium Sulphate

THE thermal decomposition of ammonium sulphate appears to have received little attention since the recorded observations of Jänecke in 1921[1]. Consequently it has become accepted that decomposition results first in the formation of ammonium acid sulphate with the liberation of ammonia, and then, after partial elimination of water from the acid sulphate, the pyrosulphate is formed.

Recent observations in this laboratory have revealed that sulphamic acid is also formed during the thermal decomposition of either the normal or the acid sulphate. Analyses of residues obtained from heating A.R. ammonium sulphate at 400° C. indicated that they consisted predominantly (90 per cent) of ammonium pyrosulphate, together with small amounts of the acid salt and unchanged ammonium sulphate. However, it was found that when the residues were treated with water and redried at 150° C., the resulting increase in weight was greater than could be accounted for by hydrolysis of pyrosulphate to the acid salt. This indicated that one of the components of the mixture contained even less water than ammonium pyrosulphate, and the presence of sulphamic acid was thus suspected.

Quantitative measurements of sulphamic acid by the gas volumetric method of Meuwsen and Merkel[2] have shown that about 5 per cent of sulphamic acid is present after 1 hour at 400° C. The results given in the accompanying table are representative of the composition of the residues obtained.

The evolution of sulphur dioxide and nitrogen from strongly heated ammonium sulphate, which has previously been ascribed to the decomposition of the acid salt[3], is probably due to the thermal decomposition of sulphamic acid which is first formed.

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Application of a Randomly Operated Large Wilson Cloud Chamber for the Determination of the Mass of the Meson

DURING recent years, increasing interest has been shown in the accurate determination of the mass of mesons, which have been supposed to constitute the penetrating component of cosmic rays. The most direct evidence that such particles have an intermediate mass lying between that of an electron and a proton comes from cloud chamber observations. The momenta of the particles and ionization they produce are directly available from the measurements on the cloud chamber tracks, and are found to be compatible with theory only when the particles are assumed to possess a mass roughly equal to 200 times the mass of an electron. An accurate determination of the mass is possible only when the particle can be photographed near the end of its path through space, and this occurs rarely. Slow mesons seem to be particularly rare in counter-controlled photographs with a thick lead plate inserted inside the chamber, apparently because (1) they have extremely short range in heavy material, (2) they have a large probability of decay, nuclear absorption and transformation into neutrettos[1]. Hence they fail to trip the lower counter of the coincidence system.

A large randomly operated cloud chamber has been found[2,3] to be very satisfactory for such investigations, and with the view of determining the mass of mesons, their decay products and the absorption processes, such a cloud chamber has been built. Progress has been very slow, and due to shortage of films only three hundred photographs could be taken altogether, of which the accompanying photo-

$(NH_4)_2SO_4$ (gm.)	Temperature °C.	Time of heating (hr.)	Residue (gm.)	Composition of residue (per cent).			
				$(NH_4)_2SO_4$	NH_4HSO_4	$(NH_4)_2S_2O_7$	NH_2SO_3H
5·0000	400	1·0	3·5499	10·3	13·5	70·2	5·7
5·0000	400	1·25	3·4817	9·9	11·2	73·2	5·7