The constancy of this expression gave evidence of the existence of the above complex salt throughout the whole range of concentration taken.

6. A comparison of the value of this stability-constant (9.7×10^{21}) with those of the corresponding mercuric halide complexes showed that the relative tendency of the halogens and of the cyanogen and sulphocyanogen groups to form complexes increases in the following order: Cl, Br, SCN, I, CN.

7. In solutions where the mercury electrode caused precipitation of mercurous sulphocyanate, the concentration of the mercurous ions was calculated from the electromotive force measured against the normal electrode. The concentration of SCN— ions in such solutions was calculable from the concentration of the potassium sulphocyanate and the solubility of the mercurous salt. From these two values the solubility product of mercurous sulphocyanate,

$[Hg_2^{++}][SCN^-]^2$, was calculated to be 1.8×10^{-20}.

In conclusion we wish to express to Prof. A. A. Noyes our sincere thanks for his friendly interest in the investigation, and for the material assistance he has given us.

MOLECULAR WEIGHT DETERMINATIONS BY MEANS OF PLATINUM THERMOMETERS.

BY H. T. BARNES, E. H. ARCHIBALD, AND D. McINTOSH.

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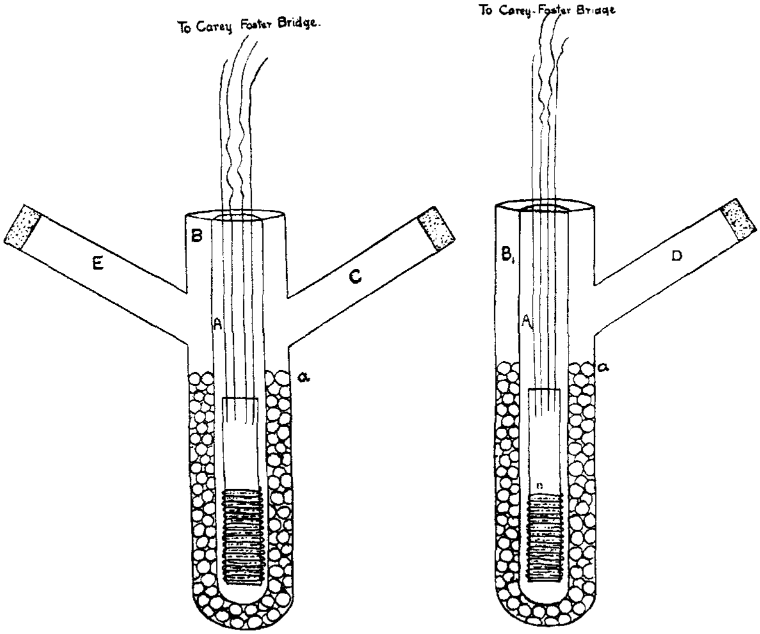
In the course of an extended investigation on the properties of liquefied gases, we found it necessary to determine the molecular weights of some substances dissolved in these liquids for the purpose of comparison with conductivity measurements; and since these measurements were to be made at temperatures as low as —80 C., we were compelled to modify the apparatus ordinarily used.

We have, therefore, used platinum thermometers; and as these have only, so far as we are aware, been employed in determinations of the rise in boiling-point by Noyes[1] and Abbott and that by a different method, we give here a description of our apparatus and some results of determinations of the molecular weights of inorganic salts when dissolved in water.

[1] *Ztschr. phys. Chem.*, **23**, 63 (1897).

Our bridge was of the Carey-Foster type and of such a resistance that 1.670 cm. on the bridge wire represented a difference in temperature of 1° C. in our platinum thermometers; with the galvanometer used the bridge could be read with certainty to 0.5 mm., *i. e.*, to 1/30° C.

The method,[1] as will be seen from the diagram, was a differential one. Two thermometers, exactly equal in resistance, each consisting of about 1 meter of 6-mil wire wound on a mica frame are, with their compensating leads, placed in the two tubes A and A_1, which are closed at the lower end and sealed into the larger tubes B and B_1. B and B_1 contain glass beads to prevent bumping and are filled with the solvent to the mark *a*, the amount in A being carefully weighed. The tubes are connected through C and D to condensers, E is tightly stoppered and the apparatus is heated in an air- or oil-bath. When the liquid is boiling freely the zero point of the bridge is found, and a weighed portion of the substance whose molecular weight is to be determined is introduced into A



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[1] For temperature measurements with platinum thermometers, see Barnes : *Trans. Roy. Soc.*, Series A., 199 (1902).

through the side-arm E. The point at which the galvanometer shows no deflection is then ascertained, and from the data the molecular weight is calculated in the usual manner.

The following determinations with the chloride, nitrate, and sulphate of potassium were made with water as solvent.

DETERMINATIONS (K = 510).

Salt.	Rise of B. P.	Molecular weight.	
	Potassium chloride.		
0.835	0.42	37.0	H_2O = 27.4 grams.
1.622	0.81	37.3	
2.295	1.19	35.9	
2.900	1.54	35.1	
	Potassium nitrate.		
1.691	0.54	58.3	H_2O = 27.4 grams.
2.207	0.67	61.3	
2.685	0.85	58.8	
	Potassium sulphate.		
0.887	0.28	82.4	
1.570	0.53	77.1	H_2O = 19.6 grams.
2.344	0.86	70.9	
2.960	1.08	71.3	
3.693	1.29	74.5	

The apparatus is convenient and in some ways much superior to that in which mercury thermometers are used, since neither adjustment for liquids having different boiling-points nor tapping device is necessary; changes in atmospheric pressure can introduce no error and the thermometers can be made of any degree of sensitiveness required.

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THE SOLUBILITY OF GYPSUM AS AFFECTED BY SIZE OF PARTICLES AND BY DIFFERENT CRYSTALLOGRAPHIC SURFACES.

BY G. A. HULETT.

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IT HAS been shown[1] that the effect of the size of particles on the solubility of the solid is detectable and measurable; the smaller particles not only dissolve more rapidly, but have a greater solubility. The theoretical possibility of such a relation was pointed

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[1] Ostwald: *Ztschr. phys. Chem.*, **34**, 495 (1900); Hulett: *Ztschr. phys. Chem.*, **37**, 385 (1901).