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*On the Mobilities of Ions in Air at High Pressures.*

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I. INTRODUCTION.

In a paper by the writers, "On the electrical conductivity imparted to Liquid Air by alpha rays," attention was called to the exceedingly high insulating properties possessed by liquid air. The paper also included some measurements on the saturation currents in liquid air and in air at high pressures, when these were ionised by alpha rays. In the discussion of some phenomena connected with these currents, attention was drawn to the necessity of making measurements on the mobilities of ions both in liquid air and in air at very high pressures. Since the publication of that paper we have on several occasions made attempts to measure the mobilities of ions produced in liquid air; but up to the present have not succeeded in getting any trustworthy results. Convection currents due to the motion of air bubbles formed in the liquid air and the contamination of the liquid air by ice crystals formed from condensed atmospheric water vapour, have been two disturbing factors which we have not as yet been able to satisfactorily eliminate. It has been difficult, too, to reduce the size of the ionisation chamber of the measuring apparatus to dimensions small enough to permit of its use in a mass of liquid air small enough to be jacketted and kept at a low temperature by an outside vessel of liquid air maintained at a low temperature by rapid evaporation.

With regard to measurements on the mobilities of ions in air at high pressures, however, it has been quite different, for it has been found easy to make measurements on the mobilities at all pressures up to as high as approximately one hundred and ninety atmospheres, for such high pressures were obtained quite readily by the use of a liquid air compressor.