

mixtures with the composition of the vapour and liquid phases are now given in this paper.

MEASUREMENT OF TEMPERATURE

Temperatures were measured by means of a Cu-Const. thermocouple, the E.M.F. being read on a slide wire potentiometer. An accumulator was used as a source of electric supply and a Weston cell as a standard.

The fixed points chosen for calibration were¹:

Boiling point of Nitrogen 77.3 abs.

" " " Oxygen 90.0 "

" " " Methane 109.0 "

at atmospheric pressure. The reference junction of the thermocouple was kept in melting ice.

Variations in the E.M.F. of the accumulator were corrected by frequent comparison with the Weston standard.

GASES USED

The Methane, oxygen and nitrogen used were all obtained commercially.

METHANE

This was obtained from Messrs. Insoles, Cymmer Collieries, Porth, Wales, and had a purity of 95% to 97%. The impurities, carbon dioxide, oxygen, nitrogen and hydrogen were removed by absorption and liquefaction followed by fractional distillation.

NITROGEN

This was supplied by the British Oxygen Company from their Birmingham Works, and was fairly pure. Any carbon dioxide present was absorbed in potassium hydroxide solution and the remainder liquefied. It was found to boil away at a fairly constant temperature.

These gases were stored separately in aspirator bottles over boiled water containing caustic soda in solution. These bottles were graduated roughly in half-litres. When a mixture was to be made, the two gases were admitted to the cryostat in the proportions desired, approximately, and liquefied.

This mixture, after a reading of it was taken, was stored in a third bottle and reserved for making other mixtures.

No attempt was made to prepare mixtures of a known composition but merely to obtain mixtures in sufficient variety for the purpose.

¹ Kaye and Laby's, Phys. and Chem. Constants.