Composition of the Vapour and Liquid phases of the System Methane-Nitrogen[1]

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SYNOPSIS

1. Introduction. 2. Measurement of Temperature. 3. Gases Used. 4. Method of Analysis. 5. General Description of Apparatus. 6. The Cryostat. 7. Manipulation. 8. Results. 9. Summary.

INTRODUCTION

The problem—now a commercial one—of the separation of helium from natural gases bears a resemblance to the recovery of argon from the atmosphere. Helium occurs in the richest natural gas wells in about the same proportion—0·9%—as argon does in the atmosphere, and its separation at present is being effected in a similar way, *viz.*: by the method of liquefaction and rectification.

There is this difference, however, that while argon is recovered as a by-product in a very important industry, *viz.*: the manufacture of oxygen and nitrogen from the air, the separation of helium from natural gases is being carried out for its own sake. This adds considerably to the cost of production, a cost which might be reduced and probably will be when the liquefaction method as applied to natural gases is made more efficient.

A detailed examination of the conditions under which these gases liquefy ought to give useful information in this direction.

Wells yielding helium to any extent are found to contain as the chief constituents, methane and nitrogen. For example, a well in Texas, U.S.A. yields a gas of the following composition:

N, 34·0%; CH_4, 52·0%; Hydrocarbons, 12·3%; CO_2, 0·8%; O_2, 0·8%; He, 0·9%.

Another in Alberta Canada, has:

N, 8[illegible] 1·1%; CO_2, 0·1%; O_2, 0·1%; He., 0·5%.

For the [illegible]he system CH_4—N was chosen for preliminary study, and [illegible]oiling points at atmospheric pressure of various

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