

equipment which would allow reliable measurements of partial molar volumes of liquids dissolved in compressed gases, over a wide range of concentrations. In addition to the volume relationships, the equipment permits a study to be made at the same time of phase equilibria in liquid-gas systems.

This paper is devoted to a description of the technique that we have developed for simultaneous determination of phase and volume relationships in gas-liquid systems in the special high pressure equipment that we have built in the Institute of the Nitrogen Industry.

We shall give the experimental data obtained and their thermodynamic reduction in subsequent articles.

Description of the Equipment and the Principle of its Operation

Values of the partial molar volumes may be calculated from the experimental P-V-T--N₂ data.

In spite of this apparently being the most direct approach, in fact, in an approximate examination, it proves to be the least accurate. In very dilute gas solutions, in which our only interest lies, the unavoidable errors in measuring temperature and pressure may distort the dependence of the volume of a gas solution on the concentration of the dissolved substance. The danger is all the greater, since calculation of the value of the partial molar volume involves the taking of the derivative of molar volume of the solution with respect to the molar fraction of the dissolved substance.

We have developed another experimental technique, whose principle will become clear from the following analogy.

We shall suppose that we require to study the vapor pressures of a solution as a function of its composition.