

PHASE AND VOLUME RELATIONS IN GAS-LIQUID SYSTEMS AT HIGH PRESSURES:
EXPERIMENTAL TECHNIQUE

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Zhurnal Fizicheskoi Khimii, Vol. 24, No. 3, pp. 272-278, 1950

During the period of more than seventy years from the beginning of the 19th Century (1801 to 1873), problems of gaseous solutions did not exist in science.

In 1801 Dalton /1/ asserted in his law that the pressures of gases in a mixture are independent, which in principle eliminates the question of solubility of a liquid in gases. The dispute between the antagonists Berthollet, Saussure and Le Rou nd, who defended the chemical point of view of solution of water by air, and Dalton was decided in favor of Dalton and his followers. The concept of the gas mixture, which asserted the independent existence of water vapor in the gaseous medium, regardless of its composition and density, was maintained in science and in practical work for a long time.

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The first chemist to come forward against these firmly entrenched incorrect ideas was Mendeleev. In a course of theoretical chemistry given by him in 1873-74, he wrote /2/: "By solutions we usually mean only solutions of gases, liquids, and solids in liquids. But this concept is narrow and therefore incorrect. There may also occur solution of a gas in a solid, of a liquid in gases, etc.. Regnault made some remarks about the existence of the last phenomenon. He noted that the pressure of vapor in air is not equal to the pressure in an evacuated space, although one should expect the contrary, taking into account the properties of gases. From ^{#1}this fact the conclusion may be drawn that between vapors and air there exists a more intimate connection than a simple mixing, such as that between a solvent and a dissolved substance; we have here, it seems, an indication of the existence of solution of a liquid