The Apparatus for Study of Vapor-Liquid Equilibrium in Triple System Water-Salt-Gas Under High Temperature and Pressure

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The study of hydrothermal fluids in vapor-liquid equilibrium is very significant for thermobarogeochemistry. At present, synthetic fluid inclusions method is one of leading. The method includes crack-healing in minerals and eventual analysis of formed micro inclusions. This method is time-consuming, multi staged and does not provide high accuracy in determination of liquid and gas phase composition. The author of this paper devised and patented in Russia the apparatus for study of vapor-liquid equilibrium under high temperature and pressure. The apparatus consists of a bomb with a number of internal sample capsules, a part of which is in gas area and a part is located in liquid area **(Fig. 1)**. Filling system and pressure control system are connected to the apparatus. The apparatus works as follows: the bomb equipped with open sample capsules is filled with solution to be studied or with a mixture of solution-gas. This done, the filling system gets disconnected from the bomb and then the apparatus is heated to a required temperature. Pressure is measured with a pressure gauge. When experiment parameters are reached the apparatus is allowed to sit until gas-liquid equilibrium is reached. Then internal sample capsules are closed firmly with a special tap. By doing so, part of capsules traps liquid fluid,

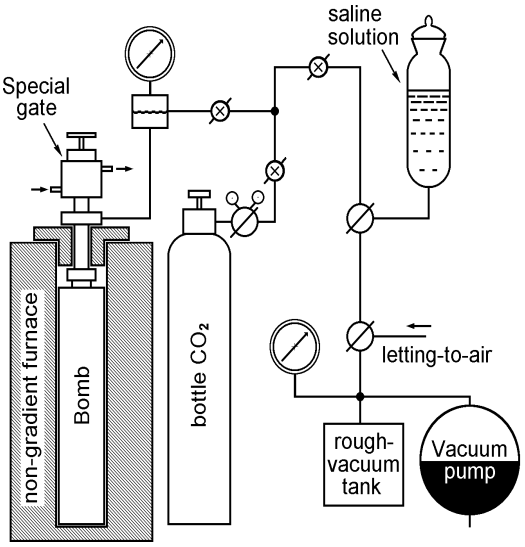

Fig. 1. The apparatus for study fluid-salt-gas equilibrium.

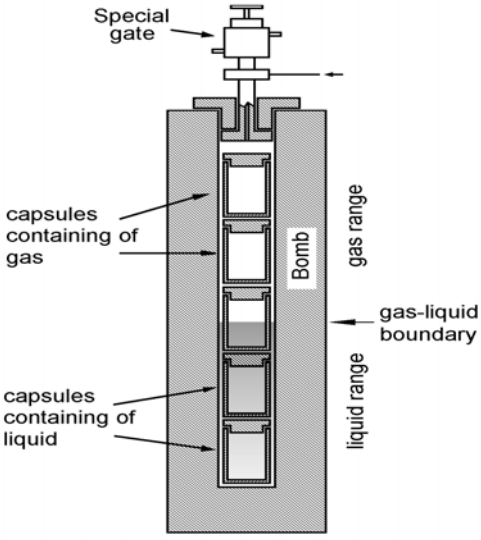

Fig. 2. A position of gas-liquid boundary and capsules during experiment.

another part traps vapor fluid **(Fig. 2)**. When the experiment is over the heating is stopped and closed sample capsules are extracted from the cooled bomb. Knowing the volume of sample capsules a density of fluid during experiment is determined by weight method. Then capsules are uncovered in a special device and contents is analyzed by means of various methods. Volume and quantity of sample capsules depend on a bomb volume and may reach 20 ml and 10 pieces. The device allows to obtain several takes of liquid and vapor phase equilibrium samples in one experiment.

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