The distribution and geochemical characteristics of biogenetic gas in China

YING ZHANG[1]*, JINXING DAI[2] AND XIAOBAO WANG[1]

[1]Research Institute of Petroleum Exploration and Development-Langfang, PetroChina, Hebei, 065007, China
(*correspondence: Zhangying69@petrochina.com.cn)
[2]Research Institute of Petroleum Exploration and Development, PetroChina, Beijing, 100083, China

The biogenetic gases are mainly distributed in Qaidam basin, Songliao basin, Bohai Bay basin, Ying-Qiong basin, some small basins of Yunnan province and eastern coastal region in China. Most of the biogenetic gases are accumulated in Quaternary, Tertiary and Cretaceous . The distribution formations of the biogenetic gases are distinguished in different area. The burial depth of biogenic gas reservoir is generally less than 1900m with the shallowest reservoir is only about ten meters.

The main component of biogenetic gas is methane which is usually more than 85%. Some heavy hydrocarbons such as ethane and propane can be detected in some samples. The distribution of carbon isotopic value of methane is from -89.4‰ to -55.1‰, mainly distributing from -75‰ to -55‰. The carbon isotopic sequence is positive,$\delta^{13}C_1<\delta^{13}C_2<\delta^{13}C_3$. The carbon isotopic value of CO_2 is mainly from -25‰–5‰. The hydrogen isotopic value of methane main is from -277‰–-200‰.

The resources of biogenetic gas in many Mesozoic and Cenozoic basin are abundant in China. Paying more attention to the Qaidam basin, Songliao basin and Bohai Bay basin was suggested for the afterwards biogeneticc gas exploration activities.

Degassing of lunar basalts

YOUXUE ZHANG

Department of Geological Sciences, the University of Michigan, Ann Arbor, MI 48109-1005

Lunar basalts are often vesicular with mm-size bubbles. This report investigates bubble growth in lunar basalts. Using conditions relevant to lunar basalts, bubble growth is calculated using the program of Proussevitch and Sahagian [1] with slight modification [2] and compared with bubble growth in terrestrial melts. First, the accuracy of the bubble growth program is verified using rhyolitic melt for which extensive data are available. Experimental bubble growth data in rhyolite [2] are compared with program calculations using models of H_2O solubility [3] and diffusivity [4] and melt viscosity [5]. The comparison verifies that as long as solubility, diffusivity and viscosity are known well, bubble growth rates can be calculated fairly well (often within 20% relative). To treat bubble growth in lunar basalts, initial H_2O content of 700 ppm [6] is used and the effect of other volatiles is ignored. Because lunar atmospheric pressure is essentially zero, the confining pressure on bubbles is supplied by overlying magma. Due to low H_2O content in lunar basaltic melt (corresponding to a saturation pressure of 75 kPa), H_2O bubbles only grow in the upper 16 m of a basalt flow or lake. A depth of 20 mm corresponds to a confining pressure of 100 Pa; and a depth of 1 m corresponds to pressure of 5 kPa. In the modeling, H_2O solubility at low pressures [7], diffusivity in basalt [8], and lunar basalt viscosity [9] are used. Some findings are as follows. (a) Because pertinent pressures are low, bubble pressure due to surface tension plays a main role in lunar bubble growth, contrary to terrestrial bubble growth. (b) Bubble growth is very rapid; at 1523 K mm-size bubbles can be formed in time scale of seconds or less for confining pressure of 5 kPa or less. (c) Time scale to reach equilibrium bubble size increases as the confining pressure increases. The presence of other volatile components will complicate the modeling.

[1]. Proussevitch AA, Sahagian DL (1998) *J. Geophys. Res.* **103**, 18223. [2]. Liu Y, Zhang YX (2000) *Earth Planet. Sci. Lett.* **181**, 251. [3]. Zhang YX, Xu ZJ, Zhu M, Wang H (2007) *Rev. Geophys.* **45**, RG4004. [4]. Ni HW, Zhang YX (2008) *Chem. Geol.* **250**, 68. [5]. Zhang YX, Xu ZJ, Liu Y (2003) *Am. Mineral*. **88**, 1741. [6]. Saal AE, Hauri EH, Cascio ML, *et al*. (2008) *Nature* **454**, 192. [7]. Liu Y, Zhang YX, Behrens H (2005) *J. Volcanol. Geotherm. Res.* **143**, 219. [8]. Zhang YX, Stolper EM (1991) *Nature* **351**, 306. [9]. Murase T, McBirney A (1970) *Science* **167**, 1491.