

河南吴城天然碱矿床地质特征及成因探讨 (摘要)<sup>①</sup>

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吴城碱矿是世界罕见的古代天然碱矿床之一,属于典型的陆相碳酸盐型盐湖沉积。

矿床赋存于一个早第三纪断陷盆地中,该盆地发育了厚约2400余米的陆相碎屑—蒸发岩。天然碱距地表650—900余米,呈多层状产出,下部为天然碱矿层,上部则为含岩盐天然碱层。

矿床盐类矿物组合以天然碱为主,次为石盐、重碳酸钠盐。共生矿物有磷钠钙石、氯碳钠镁石,未见通常在碳酸盐湖中出现的硫酸盐矿物——芒硝。

含矿地层沉积韵律特别发育是该矿床最显著的特征。其基本韵律由泥质白云岩—油页岩—(含盐)天然碱矿组成。矿层特定地沉积在每个韵律中油页岩层之上。盆地具环带状岩相分区,天然碱受中心的油页岩—白云岩相的严格控制。

天然碱矿床是盐类矿床成矿系列之一,但它不是简单的卤水蒸发产物,而有其特殊的成矿条件及沉积机理。

天然碱是标准的陆相碳酸盐湖产物,它的形成需要富钠的碳酸盐型水的大量补给,而这些水是流经盆地周缘变质岩和火成岩的地表水和潜水,它们的汇聚蒸发是产生天然碱沉积的必要条件。同时,溶液中碳酸根离子和重碳酸根的含量与二氧化碳分压有关,只有得到CO<sub>2</sub>的不断补充,才能形成重碳酸钠盐及天然碱,而CO<sub>2</sub>则有赖于盆地中有机质的大量存在。上述两点是形成天然碱矿床的最重要条件,明显地区别于其它盐类矿床。

吴城碱矿形成的其它基本条件,如由构造控制的闭流盆地地形,干旱—半干旱气候的交替,则是和其它盐类矿床相一致的。

本文还提出在天然碱矿床研究中一些需探讨的问题,如古代碱矿和现代碱矿在有否硫酸盐矿物上的巨大差异,物源和气候条件对形成不同类型碱矿的控制作用,吴城邻区高浓度碱卤水的成因等。

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## A PRELIMINARY STUDY ON THE GEOLOGIC CHARACTERISTICS AND GENESIS OF THE WUCHENG TRONA DEPOSIT IN HENAN PROVINCE

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### Abstract

The Wucheng trona deposit, one of the rare ancient trona deposits in the world, is genetically of typical terrestrial facies carbonate sediments of brine lake. Contained in an Eocene block basin composed of terrigenous clastic-evaporite rocks some 2400m in thickness, it occurs 650 to over 900m beneath the earth's surface in the form of multilayers, the lower part being pure trona beds while the upper part consisting of trona beds interbedded with halite streaks.

Saline minerals are trona and to a much less amount, halite and nahcolite, associated with such minerals as shortite and northupite. Mirabilite, a rather common mineral in the carbonate salt lake, has not yet been found here.

The unusually developed sedimentary cyclothem of the host rock, predominantly argillaceous dolomite-kuchersite-(halite-bearing) trona, makes up a most striking feature of this deposit, and the trona bed lies invariably on the kuchersite-dolomite facies.

Although belonging to one of the minerogenetic series of saline deposit, the trona deposit, instead of being simply a product of the evaporation of brine, has its specific mineral-forming conditions and sedimentation mechanism.

Trona is a typical product of the terrestrial facies carbonate lake. Its formation, therefore, requires the persistent supply of large quantities of Na-rich carbonate type water which, being actually surface water or ground water circulating through the metamorphic and igneous rocks at the periphery of the basin, constitutes an indispensable factor in the sedimentation of trona by its concentration and evaporation. Besides, the concentration of  $\text{CO}_3^{2-}$  and  $\text{HCO}_3^-$  in the solution is related to the partial pressure of  $\text{CO}_2$ . Only when sufficient  $\text{CO}_2$  is unceasingly supplied can nahcolite and trona be precipitated.  $\text{CO}_2$ , in turn, depends on the presence of large amounts of organism for its formation. These factors are prerequisites for the precipitation of the trona deposit, making it

distinctly different from other saline deposits.

Other formation conditions of the Wucheng trona deposit, such as the existence of a closed basin controlled by tectonics, the alternate arid and semi-arid climates, are quite analogous to those of other saline deposits.

Some controversial problems concerning this kind of deposit are also put forward in this paper for further investigation, including the feasibility of taking the abundance of sulfate minerals as a criterion of distinguishing ancient tronas from recent ones, the influence of material resources and climate conditions upon the variation of ore types, and the origin of the highly-concentrated sodium brine in areas adjacent to the Wucheng deposit.

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