Process Mineralogy of Vanadium-Bearing Stone Coal Ore and mineral analysis of vanadium from guangyuan, Sichuan Province, China

WU Qiang[1,2], PENG Tong-jiang[2*], SUN Hong-juan[1,2], ZHANG Dong[1,2]

(1. *Key Laboratory of Ministry of Education for Solid Waste Treatment and Resource Recycle, Southwest University of Science and Technology, Mianyang* 621010, *China*; 2. *Institute of Mineral Materials and Application, Southwest University of Science and Technology, Mianyang* 621010, *China*)

Abstract: Extraction of V_2O_5 from vanadium-bearing coal mine is an important way to extract vanadium from industry. However, due to the complex composition of different coal mine stone, vanadium occurrence of different conditions, the use of vanadium extraction process are also different. In this paper, the chemical mineralogy analysis, valence analysis, microstructure analysis, vanadium valence and vanadium occurrence analysis of Guangyuan vanadium-bearing coal in Sichuan. The results show that the main chemical compositions are SiO_2, Al_2O_3, Fe_2O_3 and K_2O, followed by MgO, CaO, TiO_2, V_2O_5, MnO and so on. The vanadium element was with the grade of 0.82% in the WDS-3. The raw ore was composed of muscovite, quartz and Acuminite, followed by anatase, calcium zeolite and montmorillonite; polarized microscope muscovite was light brown small flake, small mica pieces were embedded in a strip, filled in carbon and clay minerals, quartz Gray and white, mostly in its shape, filled in mica fissures and clay minerals; V and Al, Si and K elements were positively correlated with Fe, Mg element was negatively correlated; vanadium mainly V (Ⅲ) mainly accounted for 61%, Followed by V (Ⅳ) accounted for 39%, did not detect the presence of pentavalent vanadium V (Ⅴ); stepwise extraction of vanadium in the six occurrence of the state, the silicate mineral binding state and organic binding state is vanadium in the sample In the most important binding state, followed by the adsorption state, calcite -carbonate state, iron oxide and other minerals associated with the existence. It can be seen that the Vanadium mainly distributed in muscovite as isomorphism in the state of V^{3+} and V^{4+}. The first proposal in the two layers of ore were appropriate mixing ratio, by flotation preconcentration of Muscovite minerals, the concentrate roasting leaching process by activated vanadium solution, and then step by step precipitation of aluminum and iron impurities, removing vanadium impurities by chemical precipitation, ion exchange method and extraction method of vanadium enrichment. Vanadium rich liquid precipitation calcination to obtain the V_2O_5 samples.

Keywords: stone coal; process mineralogy; vanadium; occurrence state