Short Communication

Study on the Electrochemical Mechanism of the Comprehensive Recovery of Valuable Components from Spent Cemented Carbide

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Spent cemented carbide contains a large number of valuable metals including tungsten and cobalt. To reasonably and effectively utilize the secondary resources of spent cemented carbide, Co and WO_3 were recovered from spent cemented carbide by a combination of low-temperature electrochemical separation and high-temperature calcination. In a low-temperature (298 K) aqueous acid solution, a three-electrode system was used for electrochemical testing. The results show that on stainless steel cathodes, the deposition potential of Co(II) was between -0.6 and -0.5 V (vs SCE). Electrodeposition was controlled by diffusion and was irreversible. The diffusion coefficient of Co(II) was $7.12 \times 10^{-7} \text{ cm}^2 \text{ S}^{-1}$. The electrodeposition products were characterized by XRD and SEM, and the results showed that anode mud H_2WO_4 formed an orthorhombic crystal system. This H_2WO_4 was decomposed into WO_3 by high-temperature calcination. The combination of low-temperature electrochemical separation and high-temperature calcination thus serves as an effective way to recover and separate valuable metals from spent alloys.

Keywords: Spent cemented carbides; Recovery; WO_3 ; Cyclic voltammetry; Number of transferred electrons

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