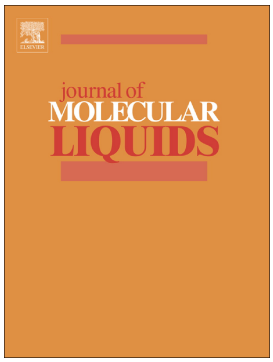


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# Partitioning Performance of Molybdenum in Poly (ethylene glycol) + Sodium Sulfate + Water Aqueous Two-phase Systems

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**Abstract**: Partition performance of molybdenum (VI) by aqueous two-phase systems (ATPSs) composed of poly (ethylene glycol) (PEG1000, PEG2000 and PEG4000) + sodium sulfate + $H_2O$ without any extractant was systematically studied. Response surface optimization method was applied to study the effects of different factors such as, the type and concentration of PEG, sodium sulfate concentration, molybdenum concentration and temperature on the phase volume ratio, partition coefficient and extraction rate of molybdenum. The experimental results showed that the phase volume ratio changes with all four parameters, resulting from hydration of sodium sulfate, dehydration of increasing temperature and replace of molybdenum to water. The partitioning coefficient and extraction rate of molybdenum increases as increasing sodium sulfate concentration being of hydration of sodium sulfate, and also increases with increasing temperature, indicating that the transfer process of molybdenum from the salt-rich phase to the PEG-rich phase is endothermic. With the increase of PEG molecular weight (PEG1000, PEG2000 and PEG4000), the phase volume ratio decreases and partitioning coefficient and extraction rate of molybdenum goes up. The extraction mechanism can be deduced that molybdenum was extracted into PEG-rich phase by electrostatic attraction between polymolybdate anion and protonated C-O-C bond in PEG molecule due to relatively high hydrophobicity of polymolybdate anion under the salting-out effect of phase-forming sodium sulfate by the change of initial and equilibrium pH in aqueous phase, FTIR and Raman spectrum analysis. A better result on extracting and separating molybdenum was achieved by applying the proposed method to the leaching liquor of low-grade molybdenite concentrate.

**Key words:** Aqueous two-phase system; partitioning coefficient; extraction rate; partition mechanism; polyethylene glycol; sodium sulfate; molybdenum

## 1 Introduction

At present, the main method of separating molybdenum in industry is organic solvent extraction [1-3]. It is worth noting that volatile organic solvents are flammable and have a carcinogenic potential. Therefore, the exploration of environmentally friendly extraction methods has become a hot topic for many studies. The aqueous two-phase system is an efficient method being of