Development of New Separation and Recovery Process of Platinum Group Metals

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Introduction

- Demand in the world 2008
- Typical recovery process
- Concept of this study
- Flowchart of the new process

Thermodynamic analysis

- Ellingham diagram
- E-pCl2 diagram

Experimental

- Synthesis of PGMs-Mg
- Chlorination of PGMs-Mg
- Dissolution experiment

Results and Discussion

- Results of dissolution experiment
- Investigation of samples by XRD after leaching

Conclusion

- New process for separation and recovery of PGMs by alloy formation and chlorination was investigated.
- Dissolution efficiencies of PGMs in HCl aq. or NaCl aq. were significantly enhanced by alloy formation with Mg and chlorination using CuCl2. Formation of PGMs chlorides or complex chlorides probably enhanced the dissolution efficiencies.
- Chlorinated Rh-Mg, Ru-Mg, and Ir-Mg compounds were dissolved in HCl aq. or NaCl aq. at this stage. Dissolution ratios, Rf of compounds were low compared to that of chlorinated Pt-Mg.
- Solid residues (e.g. RhCl3, RuCl3, and IrCl3) were obtained after leaching of chlorinated Rh-Mg, Ru-Mg and Ir-Mg compounds after leaching.

Future works

- Currently, various chlorination agents and conditions for dissolving PGMs by solutions without strong oxidants are under investigation with the aim of developing a new environment-friendly separation and recovery process.
- The future works are as follows:
  - Select the optimum temperature and chlorination / oxidation agents to synthesize the easily soluble PGMs compounds.
  - Find the effective solution and condition for a successful dissolution of PGMs compounds.