

Selective Scandium recovery from complex wastes by nanofiltration

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Critical raw materials (CRM) are a group of elements / materials of exceptional economic importance associated with supply risk. Economic prosperity depends on ensuring a sufficient future supply and resource recovery from industrial wastes is a critical strategy. To date, an estimated 1.4 Mt/a of complex (multi metal containing) wastes, containing considerable amounts of CRM including scandium (Sc) from the white pigment (TiO₂) industry are landfilled in Europe alone.^[1,2] Sc is prerequisite to many high-tech applications, such as solid oxide fuel cells and 3D printable alloys. Currently, TiO₂ production wastes are not exploited as sources for CRM, and Sc supply remains insecure. Here, acid resistant nanofiltration (NF) was demonstrated to allow selective Sc recovery from such complex wastes. The developed process includes a pretreatment for the removal of undesired elements (e.g. Ti, Th, U), followed by NF for selective concentration of Sc.^[1,2] Sc concentrations were increased 2.5 times, while more than 55% (w/w) of the total dissolved metals were removed within one filtration step (60 % permeate recovery). The process studied here can be easily integrated into current TiO₂ production, demonstrating NF technology as key to tap so far unexplored sources of CRM.

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References

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