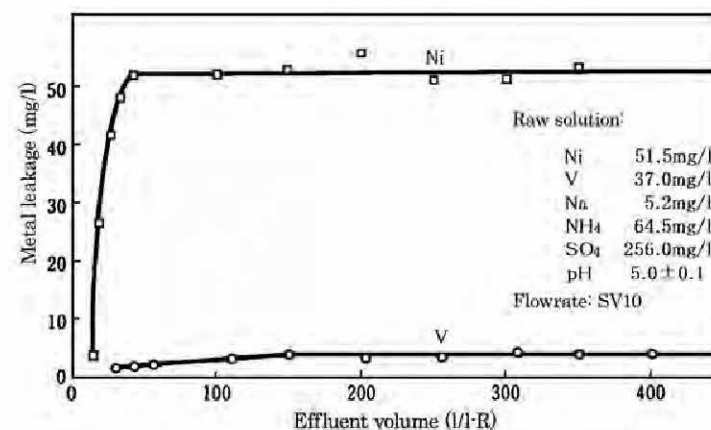


Nickel and Vanadium Removal

(Extracted from the Diaion Manuals pages 219 to 220)

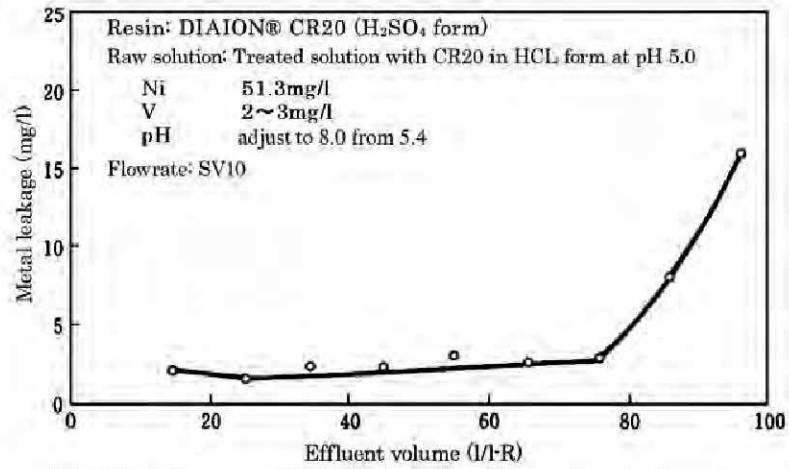
11. Recovery of Ni and V from effluent in heavy oil combustion ash treatment process ⁽⁹⁸⁾⁽⁹⁹⁾

The ashes from heavy oils hold S, C, V, Ni, Fe and Mg. The metals in the ashes dissolved in water at about 2.5 of pH, and nickel and vanadium can be collected from the filtrates. Vanadium precipitates as NH_4VO_3 and can be filtrated, with the addition of NH_4OH . The filtrate contains several tens mg/l of nickel and vanadium and 2~4 mg/l of iron. The vanadium, at pH of 5, in it is adsorbed by DIAION® CR20 in H_2SO_4 -form, polyamine-type chelate resin, but the nickel is not. Since vanadium exists not as cations but as vanadic acids at pH of 5, this adsorption seems caused by ion-exchanging of H_2SO_4 with H_3VO_4 , not by chelating.



[Fig.VI-11-1] Recovery of V from Waste waters of Heavy oil combustion ash

Fig.VI-11-1 demonstrates a treatment example. The adsorbed vanadium elutions with the addition of NH_4OH and the eluted solution return to the forwarding NH_4VO_3 sedimentation vessel. The IERs are regenerated with H_2SO_4 solutions and reused at the next operation. Nickel in the treated water can be removed with another chelate resin, CR20 in H_2SO_4 -form, at pH of 8 with the addition of NH_4OH . This result is illustrated in Fig.VI-11-2. Nickel and vanadium are collected form waste waters of heavy metal ashes in this way. Please note that at both nickel and vanadium are absorbed by CR20 and thus cannot be separated from each other at pH of 8.



[Fig.VI-11-2] Recovery of Ni from Waste waters of Heavy oil combustion ash