



Application of chelating ion-exchangers Amberlite IRC-718 and Duolite ES-346 in removal of Pt(IV) ions from chloride and chloride-nitrate media

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ABSTRACT

The chelating ion exchangers of the functional iminodiacetate (Amberlite IRC-718) and amidoxime (Duolite ES-346) groups have been applied for Pt(IV) removal from the chloride (0.1 ÷ 8.0 M HCl) and chloride-nitrate (0.1 M HCl + 0.9 M HNO₃, 0.5 M HCl + 0.5 M HNO₃, 0.9 M HCl + 0.1 M HNO₃) solutions. The monolayer sorption capacities (Q_0) for Amberlite IRC-718 determined from the Langmuir isotherm model were changed from 1.032 to 0.917 mmol g⁻¹ and from 0.948 to 0.831 mmol g⁻¹ in the chloride and chloride-nitrate solutions, respectively. For Duolite ES-346 Q_0 values were equal to 1.120–0.937 mmol g⁻¹ in the chloride solutions and 0.692–0.806 mmol g⁻¹ in the chloride-nitrate systems. The influence of acid concentrations, phase contact time and macrocomponent addition (AlCl₃, CuCl₂, NiCl₂) on Pt(IV) sorption was also studied. The pseudo second order equation provided the best fitting of experimental values. The working and total ion exchange capacities as well as distribution coefficients of Pt(IV) were determined by the dynamic method. From the breakthrough curves the time required for the formation and moving of the exchange zone was also calculated. Pt(IV) desorption in the amount of 84.3% and 77.6% from IRC-718 and ES-346, respectively, was performed using 6 M HCl.

Keywords: Chelating ion exchanger; Platinum; Precious metals; Recovery; Sorption; Kinetic studies

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