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Research Details :

Research Title : Chemical speciation and recovery of gold(I, III) from wastewater and silver by liquid-liquid extraction with the ion-pair reagent amiloride mono hydrochloride and AAS determination
Chemical speciation and recovery of gold(I, III) from wastewater and silver by liquid-liquid extraction with the ion-pair reagent amiloride mono hydrochloride and AAS determination

Descriptipn : A novel and low cost liquid-liquid extraction procedure for the separation of gold(III) at trace level from aqueous medium of pH 5-9 has been developed. The method has been based upon the formation of a yellow colored ternary complex ion associate of tetrachloro gold(III) complex anion, $AuCl_4^-$ with the ion-pair reagent 1-(3,5-diamino-6-chloropyrazinecarboxyl) guanidine hydrochloride monohydrate, namely amiloride, $DPG(+)\text{center dot } Cl^-$. The effect of various parameters, e.g. pH, organic solvent, shaking time, etc. on the preconcentration of g-old(III) from the aqueous media by the $DPG(+)\text{center dot } Cl^-$ reagent has been investigated. The colored gold species was quantitatively extracted into 4-methyl pentan-2-one. The chemical composition of the ion associate of $DPG(+)\text{center dot } Cl^-$ with $AuCl_4^-$ in the organic solvent has been determined by the Jobs method. The molar absorptivity ($2.19 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$) of the associate $DPG(+)\text{center dot } AuCl_4^-$ at 362 nm enabled a convenient application of the developed extraction procedure for the separation and AAS determination of traces of aurate ions. Mono-valence gold ions after oxidation to gold(III) with bromine water in HCl (1.0 mol L^{-1}) media have been also extracted quantitatively from the aqueous media by the developed procedured. The chemical speciation of mono and/or tri-valence gold species spiked to fresh and industrial wastewater samples has been achieved. The method has been also applied successfully from the separation of gold(I) and gold(III) species from metallic ions and silver. The developed method has also the advantage of freedom from most diverse ions. (C) 2007 Elsevier B.V. All rights reserved.

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