# Ion Exchange Recovery of Cyanide Containing Gold Complexes

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Assuming the dominance of polarized interaction between anion sorbed and fixed ion of anion exchanger, the selectivity of sorption of monovalent and polyvalent anions was investigated using model anion exchangers with decreased capacity [1]. The bounding force of polyvalent anions is decreasing with the decrease in resin capacity.

The critical analysis covered strong-base (SBR) and weak-base (WBR) anion exchange resins in the process of gold recovery from cyanide solutions [2]. Strong sorption of cyanide containing gold complexes with strong-base resins implies the necessity to use acidic solutions of complexing agents for desorption of gold and further regeneration of sorbent. That, in turn, leads to the formation of cyanic acid – a severe poison, precipitates in ion exchanger grains with their further destruction [4].

Weak-base anion exchange resins with low pKa values (less than 8) are not appropriate for solutions with pH>10. According to the following relation between pKa and pH of solution:

$$\overline{pH} = pK_a + \lg\frac{[-N^0]}{[-NH^+]},$$

where $[-N^0]$ and $[-NH^+]$ are free and proton-accepted forms of amine groups of ion exchanger, the anion exchange function of amine (-$NH^+$-form) is defined.

The above equation allows to calculate the pKa value necessary for anion exchanger, able to operate in solutions with pH>10. The complete anion exchange function is described as $[-N^0] : [-NH^+] = 1 : 100$. The reverse relation, consequently, is the desorption constraint.

Weak-base resins with pKa values higher than 11-12 are perspective for hydrometallurgy of gold. The desorption of gold from WBR is possible using basic solutions [5,6,7].

References

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