

## 1B3b

### Sorption processes of Cu(II) and Ge(IV) ions on the anion-exchange resin AN-31

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Anionit AN-31 is the low-basic aminofunctional anion-exchange resin that defines high affinity of *d*-metals ions. At the same time, due to existence of alcoholic hydroxyl groups, AN-31 shows selectivity to germanat-ions that allows to apply a sorbent in technologies of passing germanium extraction from copper solutions. Concurrent sorption of germanium and copper ions leads to receiving sorbates of difficult structure that doesn't allow to carry out full division of metals during desorption stage. Thus, the possibility of germanium, copper-containing sorbent usage is actual for optimisation of production schemes. In particular, cupriferous sorbents can be applied as catalysts of low-temperature processes. Our work is devoted to study the influence of solution composition on the way of copper ions stabilization in sorbent to indicate the catalytically active forms.

Sorption was carried out at static conditions for various metals concentration, pH and ionic force of solution. The content of metals in solution was determined by the titrimetry and photometry methods. The phase of a sorbent was investigated by methods of the electronic spin resonance (EPR) and the electronic spectroscopy of diffusion reflection (ESDR).

Increase of pH was shown to lead manifestation a dipole-dipolar interactions in associates of the hydroxocomplexes of copper which are localized in cavities of the polymeric matrix. Introduction of background electrolyte to solution increases hydroxoaminocomplexes association with the exchange-connected copper ions (fig.1). Presence of  $\text{HGeO}_3^-$  ions promotes strengthening of dipole-dipolar interactions of copper ions that is connected probably with concurrent sorption of metals heteronuclear complexes (fig.2). Stabilization of copper ions in the phase of AN-31 is due to covalent connection of hydroxocomplexes of copper with aminogroups, and also to formation of oxidic dimers  $(-\text{Cu}-\text{O}-)_2$ , oxidic oligomers  $\text{Cu}_n(\text{OH})_m$  and the square-planed oxidic clusters. Presence of oxidic clusters implicits catalytic properties of a cupriferous sorbent.

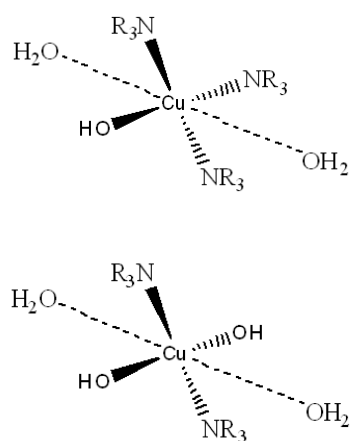


Fig.1 - Hydroxoaminocomplexes of copper ions associated with the anion-exchange resin functional groups

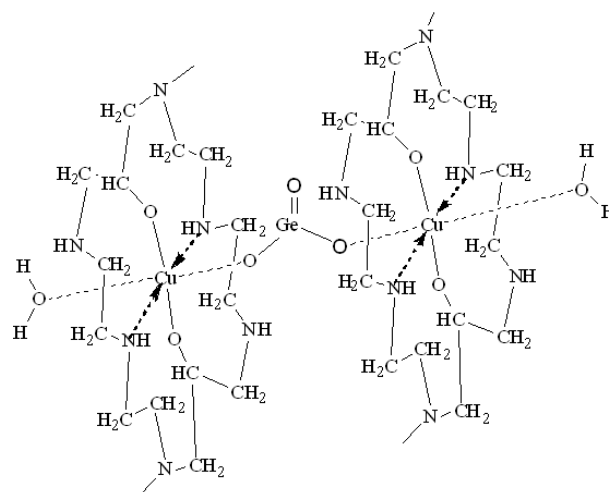


Fig.2 - Heteronuclear complexes of copper and germanium ions in anion-exchange resin flexible matrix