In case of dequalinium chloride daily dose for adults is significantly less (1.5-3.0 mg of dequalinium chloride) than daily doses of amoxicillin (750-3000 mg, 6000 mg in very difficult cases) or ibuprofen (600-1200 mg). That's why for germination experiment solution of dequalinium chloride had significantly lower concentration than solutions of amoxicillin or ibuprofen. Solutions of dequalinium chloride didn't have effect at concentration 1 mg/l, but this component also could have phytotoxic properties at higher concentrations. According to the Table 1 other substances was very phytotoxic. Mold grew in sections with the solution of Bronho-plus due to presence of the sugar and other nutritious components in this syrup.

Thus, at high dosages main part of studied organic substances demonstrated significant phytotoxicity.

But experiments with different concentration of pollutants would be very important and could help to determine non-phytotoxic concentration of these POPs.

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ADSORPTION PROPERTIES OF SOME FERRIC-BASED MATERIALS IN THE CONTEXT OF POTENTIOMETRIC TITRATION

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Iron(III)-based absorbents are effective in context of dissolved phosphates and arsenates removable to formation of insoluble iron(III) phosphate (Zeng, Li and Liu, 2004) or iron(III) arsenate (Siddiqui and Chaudhry, 2017). Also iron(III)-based adsorbents also can remove different other pollutants, especially selenates (Peak and Sparks, 2002), organic matter (Gao et al., 2017) etc.

Iron(III)-based absorbents may be used in different forms, especially nanoparticles (Cao et al., 2016), different composite and polycomponent materials (Mezenner and Bensmaili, 2009) etc.

Potentiometric titration gives information about amount of ion exchange groups on the surface of adsorbents. It is very important in adsorption studies. Thus, this titration is very simple and cheap method of determination of adsorbent properties.

We placed 0,25 g of adsorbent sample (iron(III) oxide or iron(III) hydroxide) and 200 ml of KCl solution with concentration 0,01 M in glass beaker. For potentiometric titration we used solutions of

HCl (0,01 M) and NaOH (0,01 M). Titration step was 0,1 ml. Duration of one step was based on equilibrium pH.

Figure 1 demonstrated relations of titrant volumes and mixture pH.

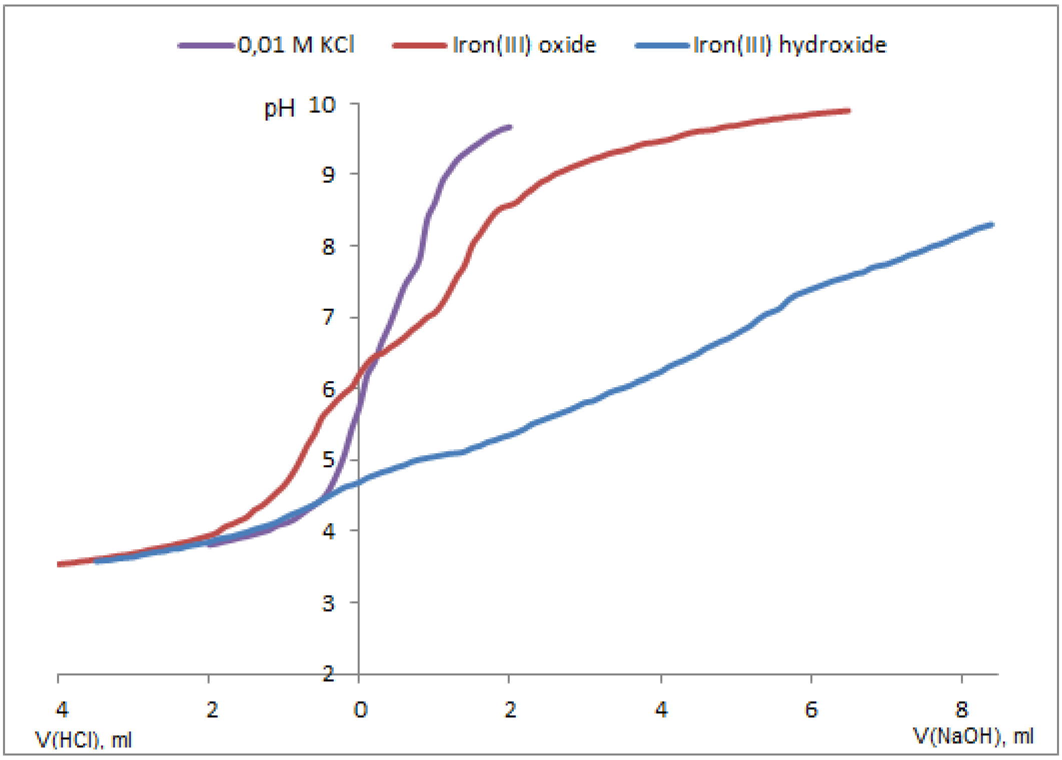

Figure 1 – Potentiometric curves of iron(III) oxide and iron(III) hydroxide in 0,01 solution of KCl.

During potentiometric titration part of H^+ ions or OH^- ions were adsorbed on the sorbent surface and part of these ions were in the solution.

Concentration of adsorbed H^+ and OH^- ions were calculated by the next formulas:

$$a_{H^+ads} = \frac{(10^{-pH_1} - 10^{-pH_2}) \cdot V_{sol}}{m_{ads}};$$

$$a_{OH^+ads} = \frac{(10^{-(14-pH_1)} - 10^{-(14-pH_2)}) \cdot V_{sol}}{m_{ads}},$$

where a_{H^+ads} – concentration of adsorbed H^+ ions mol/g; pH_1 - pH of 0,01 H KCl at the titrant volume V; pH^2 - pH of adsorbent – KCl solution mixture at the titrant volume U; V_{sol} – volume of KCl solution, L; m_{ads} - mass of adsorbent sample, g.

Figure 2 demonstrated concentrations of adsorbent H^+ and OH^- ions, which were calculated by these formulas.

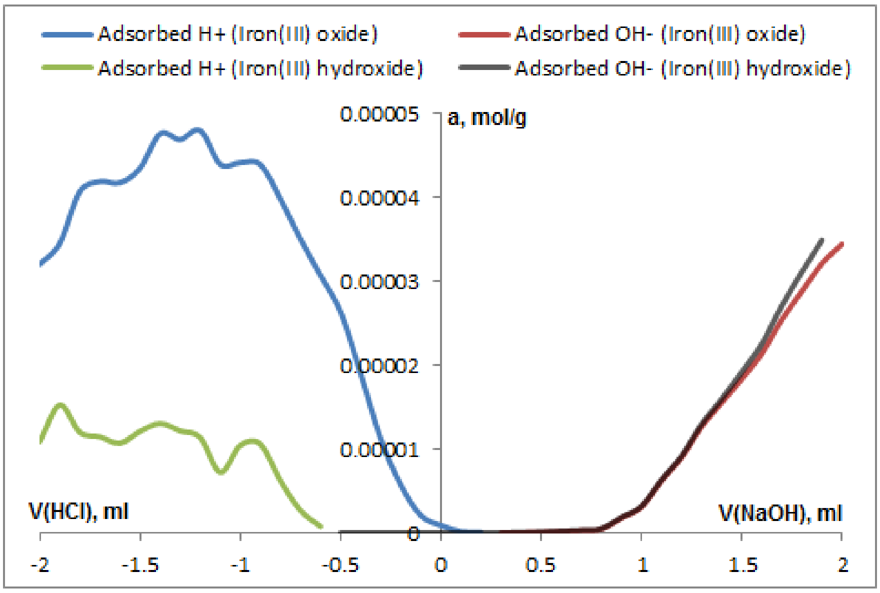

Figure 2 - Concentrations of adsorbent H^+ and OH^- ions.

According to the Figure 2 Iron (III) hydroxide could adsorb significantly less amount of H^+ ions and the similar amount of OH^- ions. Thus, Iron (III) oxide was more effective for cations adsorption and Iron (III) hydroxide was slightly more effective in adsorption of anions.

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