We also use potassium ethyl carbonate (as a carboxylating agent), synthesized by bubbling carbon dioxide through a solution of potassium hydroxide in ethanol, for the fixation and storage / disposal of carbon dioxide from industrial waste gases. The method for the synthesis of potassium alkyl carbonates from potassium metal is quite convenient for their synthesis in laboratory conditions, it is not suitable for industrial production due to the explosiveness of the mixture of hydrogen released at the stage of production of alcoholates with air. In [21], a method was described for producing potassium ethylate by the interaction of potassium hydroxide with ethanol in simple equipment that almost completely transfers potassium hydroxide to potassium ethylate when using quicklime as a water-removing agent. Based on the improvement of the method for producing potassium ethylate described in [21], we developed a simple and convenient method for the synthesis of potassium and sodium ethylates from ethanol and the corresponding sodium and potassium hydroxides (reaction 2) [22]. This reaction proceeds with the release of water; therefore, quicklime was used as a dewatering agent to shift the equilibrium to the right.

$$MOH + C_2H_5OH \rightleftharpoons C_2H_5OM + H_2O \qquad (2)$$

M = Na, K

Potassium ethylate is synthesized in two vessels interconnected with two tubes (flasks A and B), and potassium ethylate is obtained from caustic potassium and ethanol in vessel A, and alcohol with quicklime is drained in vessel B (Fig. 1). Both vessels are heated to a boil of ethanol. Vapors of alcohol and water liberated during the reaction (azeotropic mixture) from vessel A flows into the refrigerator, condensate from which flows through the alcohol gate to the second vessel B, where the wet alcohol is dried with quicklime, after which the alcohol vapor flows through the other tube into vessel A, continuously bubbling through an alcoholic solution of potassium hydroxide and potassium ethylate. The process is carried out for 3-7 hours at a ratio of reagents [KOH]: [C_2H_5OH] = 1: 8.

The developed simple, industrially applicable method for the production of potassium and sodium ethylates was used by us for the synthesis of potassium ethyl carbonate and sodium ethyl carbonate. The latter are used as carboxylating reagents of hydroxyarenes for the synthesis of hydroxyaromatic acids.

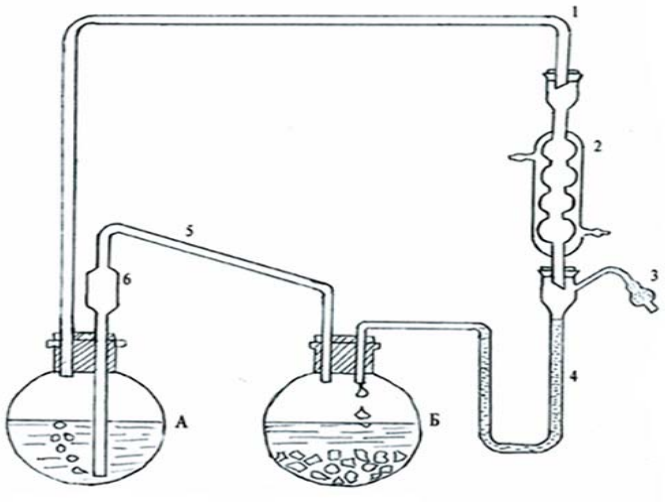

Figure 1 - Installation for the synthesis of sodium ethoxide

A and B - reaction vessels (flasks) 1 - tube for distillation of the azeotropic mixture, 2 - refrigerator, 3 - calcium chloride tube, 4 - alcohol shutter, 5 - tube for distillation of dried alcohol, 6 - anti-expansion

Results and discussion. The effect of phenol carboxylation with potassium ethyl carbonate on the course of the reaction and the yield of products was studied. The pressure of the gaseous medium (carbon dioxide) of the reaction (T = 215^{0}C, τ = 7 h (6 h rise to 215^{0}C + 1 h exposure at this temperature); [phenol]: [potassium ethyl carbonate] = 1: 1,1) has a significant effect the output of p-hydroxybenzoic acid; the optimal pressure of the gaseous medium is 25 atm. Under the same conditions, the influence of