

USE OF COMPLEXONES SOLUTIONS IN LIQUID CARBON DIOXIDE FOR CLEANING OF MATERIALS CONTAMINATED WITH HEAVY AND RADIOACTIVE METALS

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Purification of different surfaces from organic contaminants in medium of supercritical carbon dioxide (SC-CO₂) is an extensively studied and widely used process. In the last five years the technologies for radionuclide removal from surfaces of different materials by complexone solutions in SC-CO₂ have been developed. However, the wide application of SC-CO₂ is hindered by high process pressure (about 200 atm) and correspondingly the rigid requirements imposed on the process safety. From this standpoint, the use of liquid CO₂ (pressure 50-70 atm) is preferred. The performed experiments on removal of cobalt, nickel, uranium and americium nitrates and carbonates by different solutions have shown that the solutions of such complexing agents as hexafluoroacetylacetone (HFA), tributylphosphate (TBP), di-2-ethylhexylphosphoric acid (D2EHPA) in liquid CO₂ can be used for purification of pulps, metals, paper and fabrics.

One of the main drawbacks of liquid CO₂, as compared with SC-CO₂, is high viscosity of the medium and hence low diffusion coefficients and long duration of the processes. It is known that 20 minutes are sufficient to attain equilibrium in SC-CO₂ medium on metal removal by HFA solutions. During the experiments it was established that with the use of liquid CO₂ the keeping time should be increased to 40 min, which is acceptable from the standpoint of technical feasibility of decontamination processes in these solutions.

Experiments on really contaminated samples of pulps, metals and fabrics have confirmed that the decontamination coefficients of 30-100 can be easily obtained by 2-3 fold material treatment operations. The secondary waste volume therewith is less by a factor of 20-200 than that of traditional techniques.

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