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Spectroscopic, thermal and equilibrium characterization of U(VI) ions sorption on inulin in the presence of phosphates

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Abstract

Sorption of U(VI) ions on inulin as the sorbent was investigated at the U(VI) concentrations ranging 0.0001–0.001 mol/dm³ in the absence and presence of phosphate ions P(V). Multilayer sorption of U(VI) was established based on a the Langmuir–Freundlich sorption isotherm. It was concluded, on the basis of the continuous variation method, that the (UO₂)₃(OH)₅H₂PO₄ and (UO₂)₃(PO₄)₂ complexes were present in the sorbent phase during the simultaneous sorption of U(VI) and P(V) ions. XPS, FT-IR and thermal decomposition spectra of products of U(VI) sorption on inulin showed that U(VI) ions interacted with inulin via the CO and OH groups of the sorbent. With its maximum U(VI) sorption capacity of 78/mg/g and its easy thermal decomposition, i.e. easy utilization, inulin holds a good position among known sorbents.

Keywords: uranium, sorption, inulin, biosorbent

1. INTRODUCTION

The reason for the emergence of uranium in the environment are primarily nuclear power plants, in which uranium is used as fuel but also uranium pigments and nuclear weapons. The natural

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