شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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Treatment of radioactive waste using some phosphate compounds

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ABSTRACT

The immobilization and solidification of the hazardous liquid radioactive waste has drawn countless efforts by many researchers in order to ensure public and environmental safety. The aim of this work was to develop some phosphate based ion exchange materials (Hydroxyapatite) that can sequester these cations from aqueous environments and keep them safely stored over long time periods.

Hydroxyapatite was synthesized from two low cost sources (eggshell and fishbone), and surface has been modified by gamma induced copolymerization with Acrylic acid and Acrylonitrile. The composite material was characterized by X-Ray diffraction (XRD), X-Ray fluorescence (XRF), Fourier Transform Infra Red (FT-IR) analysis, Surface area, and Scanning Electron Microscope (SEM).

The prepared materials were used for removal of Co^{2+}, Sr^{2+}, and Eu^{3+} metal ions from aqueous media through batch technique as a function of solution pH, temperature, shaking time, initial concentration, temperature, and existence of interfering ions. Langmuir, Freundlich, Dubinin-radushkevich (D-R), and Temkin sorption models have been applied, and the experimental data showed good fitting to Freundlich isotherm for both Co^{2+} and Sr^{2+} while for Eu^{3+} the Langmuir and D-R isotherms were the applicable models. The kinetic data of the investigated metal ions was better described by pseudo-second order equation. The prepared sorbents were easily regenerated by using mineral acids.

- Keywords

Eggshell; Fishbone; Hydroxyapatite; Copolymerization; Acrylic Acid; Acrylonitrile; Adsorption of strontium and cobalt ions

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- List of Abbreviations

AA	Acrylic Acid
AAS	Atomic Absorption Spectrophotometer
AC	Activated Carbon
ADC	Analogue to Digital Converter
AN	Acrylonitrile
BET	Brunauer-Emmett-Teller
DAM	N,N- methylene Diacrylamaide
D-R	Dubinin Radushkevich
EW	Exempt waste
FB	Fishbone Hydroxyapatite
FDNPP	Fukushima Dai-ichi Nuclear Power Plant
FT-IR	Fourier Transforms Infrared
HA	Hydroxyapatite modified with Acrylic acid
HAN(1)	Hydroxyapatite modified with 20% (1:1) Acrylic/ Acrylonitrile.
HAN(2)	Hydroxyapatite modified with 20% (3:2) Acrylic/ Acrylonitrile.
HAP	Eggshell Hydroxyapatite
HLW	High Level Waste
HN	Hydroxyapatite modified with Acrylonitrile
IAEA	International Atomic Energy Agency
IAEA	Energy International Atomic Agency
ILW	Intermediate Level Waste
LLW	Low Level Waste
LSC	Liquid scintillation counter
MCA	Multi Channel Analyzer
MFB	Modified Fishbone Hydroxyapatite

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MHAP	Modified Eggshell Hydroxyapatite
NORM	Naturally Occurring Radioactive Material
NPP	Nuclear Power Plant
PE	Poly Ethylene
PSOE	Pseudo Second Order Equation
SEM	Scanning Electron Microscope
TGA	Thermo Gravimetric Analysis
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
VLLW	Very Low Level Waste
VSLW	Very Short Lived Waste
XRD	X-ray Diffraction
XRF	X-ray Fluorescence

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CHAPTER (2) EXPERIMENTAL