



NUCLEAR WASTE TREATMENT USING IRANIAN NATURAL ZEOLITES

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The zeolite researches in Iran is a relatively new subject which has started about 10 years ago (1). The motivation for this scientific and interesting field was provided after discovery of significant deposits of natural zeolites in different regions of Iran as well as further developments of research institutions and the national concern to environmental protection especially the wastewater clean-up in point of view of recycling of such waste water to compensate some needs to water in other utilizations. This paper intends to review and describes scientific researches which have done on using zeolites in the field of nuclear waste treatment in Iran to introduce the potential resources to the world in more details.

Zeolite tuffs are widely distributed in huge deposits in different regions of Iran(2). So far, the clinoptilolite tuffs are the most abundant natural zeolite which are exist with zeolite content of 65%-95%. Nowadays several different types of Iranian natural zeolites are characterized in point of view of chemical composition, type of structure, chemical, thermal, and radiation resistance using different instrumental and classical methods such as; X-ray diffraction (XRD), X-ray fluorescence(XRF), thermal methods of analysis(TA), scanning electron microscopy(SEM), analytical chemistry and radioanalytical methods as well as different ion-exchange techniques(e.g.3-7). The ability of Iranian natural clinoptilolite for removal some fission products from nuclear wastewaters have been investigated. The selectivity of all investigated zeolites toward radiocesium and radiostrontium have been promising(e.g.8-10). The successful synthesise of P zeolite from Iranian clinoptilolite-rich tuffs under different conditions were performed(11). The compatibility of zeolites with glass and cement matrices, for final disposal of radwaste, as well as their selectivity toward most dangerous heat generating radionuclides (e.g. ^{137}Cs and ^{90}Sr) is very important in using them for nuclear waste treatment. By converting of the loaded zeolite to a borosilicate glass, not only the volume reduction factor will be enhance but also the leach resistance will be increase. Recently, according to a research project in the field of nuclear waste treatment, conversion of spent (radionuclide loaded) natural clinoptilolite and synthetic P zeolites to borosilicate glasses have been successfully performed and the obtained data were promising. This paper intend to present the obtained data concerning to vitrification of Iranian natural zeolites as well as synthetic relevant P zeolites after loading with radionuclides. Different percentage of waste were introduced into these glass matrices and several standard leach experiments were performed. The results showed a remarkable volume reduction as well as leach resistance improvement in all cases.

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