

Treatment of hazardous waste incineration plant effluent by novel hydrogels

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Hazardous waste disposal is one of the biggest environmental issues of last decades. Incineration is a way to disposal of hazardous wastes and has many advantages beside disadvantages. One of the most important disadvantages is effluents which contain heavy metal ions as pollutants. Unlike some other organic pollutants, heavy metals are nonbiodegradable, highly toxic and carcinogenic. In addition, due to their high solubility in water, even very low concentration results in ecological problems, so it is necessary to remove these ions. Different methods or materials have been used, new techniques and materials have been tried to develop or improve to find more effective ways to remove such ions from wastewater. Hydrogels are crosslinked hydrophilic polymers that are widely used in the purification of wastewater. Due to their high swelling in water, ability to control the diffusion process, swelling response to changes in ionic strength, pH and temperature and also the capability to bind heavy metal ions through the polar functional groups which interact selectively and strongly with heavy metal ions, moreover easy handling and reusability make hydrogels promising materials for water purification. Macroinimer which has the properties of macromonomers, macrocrosslinkers and macroinitiator in a macrostructure, was used to prepare novel hydrogels with higher metal binding capacity than present hydrogels. Novel hydrogels were prepared by oil-in-water high internal phase emulsion copolymerization of 2-hydroxy ethylmethacrylate, N-isopropylacrylamide and N,N'-methylenebis(acrylamide) as crosslinker at room temperature. Macroinimer was used as co-surfactant and co-crosslinker. Varying amounts of N-isopropylacrylamide and macroinimer were used to prepare hydrogels. Swelling properties of all hydrogels was investigated at different temperatures. Also hydrogels were used as binding materials for different heavy metals such as Pb, Cr and Hg from hazardous waste incineration plant effluent to identify the best fitting hydrogel composition for heavy metal ion binding capability.

Biography

Ömer F Kemik is a Chemist from Kocaeli, Turkey. He graduated from Kocaeli University with MSc degree in Chemistry in 2009. He is currently PhD student at Kocaeli University and also works for İZAYDAŞ which is the only hazardous waste incineration plant of Turkey. He has expertise especially in hydrogels for environmental purposes and proficiency testing in wide scope.

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