Abstract

Introduction:

Hydrogels are three-dimensional cross-linked polymer networks that have attracted lots of attentions because of their properties such as high porosity, biocompatibility, biodegradability, and high water absorption. they can be used to load antibiotic drugs to control their release and reduce microbial resistance for targeted drug delivery. They are also used in tissue engineering and cartilage and joint replacement. The properties of hydrogels can be changed by adding various polymers and changing the cross-links. Improving the properties of hydrogels by adding a two-dimensional triazine polymer containing metal organic frameworks (MOF) is one of the goals of this study to see its more effectiveness and efficient use.

Materials and Methods:

First, the two-dimensional triazine polymer containing MOF was synthesized and then four types of hydrogels with different concentrations were prepared from this polymer and in terms of gelation time, initial water content, swelling percentage, water retention capacity, and biodegradability percentage, the porosity and morphology of the holes were evaluated. The optimal concentration was selected and transmission infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and X-ray diffraction (XRD) tests were performed for the resulting hydrogels and their raw materials. The antibacterial effects of selected concentration were also investigated.

Results:

The results of FTIR, TGA and XRD tests confirmed the formation of hydrogel and the loading of two-dimensional polymer containing MOF in the hydrogel. Different concentrations of two-dimensional triazine polymer containing MOF caused different physicochemical properties in the final hydrogel and generally improved the studied properties. The final hydrogel also showed antibacterial properties.

Discussion and Conclusions:

The results of this study show that loading two-dimensional polymer containing MOF in PVA hydrogel improves its properties.

Key words: Hydrogel , Metal organic frameworks , Poly vinyl alchohol , Tow dimentional polymer