# M A R M A R A U N I V E R S I T Y FACULTY OF ENGINEERING

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**REMOVAL OF BPA USING REGENERABLE METAL ORGANIC FRAMEWORKS**

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ABSTRACT

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Endocrine system is a system formed by the glands of internal secretion. It consists of organs that perform hormone synthesis and secretion. Various natural or synthetic substances found in wastewater and drinking water are also considered as Endocrine Disrupting Compund (EDC) due to their estrogenic activity.

Endocrine Disrupting Compounds (EDC) are involved in the natural environment as point and spreading pollutants due to the discharge of insufficiently treated waters after industrial use, domestic wastewater and the transportation of drugs used in agriculture. This situation negatively affects the ecology of the aquatic environment. Endocrine Disrupting Compounds (EDC) can enter the human system due to the fact that the transmission line contains plastic pipes or as a result of interaction with the poly-carbonate which is used for the production of plastic bottles.

Bisphenol-A (BPA) is a basic material used in the production of poly-carbonate, it is included in the class of endocrine disruptors and is a micro-pollutant.

Recently, several studies are conducted to remove Bisphenol-A from water. The adsorption method has an important place in these studies because it provides low cost and ease of application. In this regard, the development of new adsorbent substances is another important issue.

In the studies carried out, it was determined that Metal Organic Frameworks (MOFs) have a high adsorption capacity due to their large pore volume and surface area.

In this study, iron-containing MOF (MIL-100), chromium-containing MOF (MIL-101) and iron and chromium -containing MOF structures were synthesized to use high adsorption capacity for BPA removal, and their adsorption capacities were tested comparatively.

In order to investigate the reuse efficiency of the adsorbent substance, the Fenton Process was applied. Fenton reaction carried out using the oxidant H2O2, the organic pollutants found on the MOF surface were cleaned by oxidation and the MOF structures and adsorption experiments were repeated with the regenerated MOF structures.

The characteristic analyses of the synthesized MOF structures were performed by XRD, XRF, SEM and FTIR analyses.

In the adsorption experiments, iron-chromium including MOF structure which reaches the fastest kinetic equilibrium and shows linear isotherm properties, has shown the best BPA removal property with a rate of 36.54% after the 2nd regeneration.

***Keywords:*** Metal Organic Frameworks, MOF, MIL-100(Fe), MIL-101(Cr), BPA, Fenton Process, Endocrine Disrupting Compounds, Adsorption