CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

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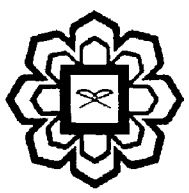

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CHAPTER 20

APPLICATION OF CARBON NANOTUBES IMPREGNATED ON ACTIVATED CARBON FOR CADMIUM REMOVAL FROM AQUEOUS SOLUTION

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ABSTRACT

In this study, the ability of the Carbon Nanotubes impregnated on Activated Carbons to remove cadmium from aqueous solution was evaluated. The adsorption of cadmium onto the impregnated Activated Carbons was evaluated by varying cadmium concentration (0.2, 0.6, 1 mg/L), adsorbent dosage (10, 30, 50 mg), pH (4, 6, 8) and contact time (40, 60, 80 minutes). Optimization of the process parameter was conducted by Central Composite Design (CCD). Batch mode adsorption study has shown that the removal of cadmium was maximum at pH 6, when the initial cadmium concentration is 0.6 mg/L within 60 minutes using 30 mg of the adsorbents. The percentage removal resulted from this condition was 99.7%.

Keywords: carbon nanotubes, adsorption, cadmium,

INTRODUCTION

The quality of water is determined by its physical, chemical and biological characteristics. It is important to know the water quality before it can be consumed safely not only for the humans but also for the health of ecosystems. Nowadays, as a result of development in industrialization, various kinds of pollutants have been released into the environment. The accumulation of the pollutants in the environment has contributed to the pollution.

According to Omar (2003), one of the most important environmental problems in the world is water pollution. As a result, drinking water, including bottled water may contain at least small amount of some contaminants. The maximum allowed cadmium for raw drinking water is 0.003 mg/L (National Guidelines for Raw Drinking Water, 2000). Moreover, industrialization and technological development processes have led to the introduction of hazardous chemicals into the environment; this has increased the level of dangerous chemicals such as environmental pollutants (heavy metals), agrochemicals (herbicides, pesticides, halogenated polycyclic hydrocarbons), sewage, and allied contaminants.

The presence of these heavy metals in the environment is a major concern due to their toxicity to life forms. Unlike organic pollutants, the majority of which are susceptible to biological degradation, heavy metals brought about harmful end products. Therefore, the elimination of heavy metals from water and waste water is important to protect public health. Thus, treatment of aqueous wastes containing soluble heavy metals requires concentration of the metals into a smaller volume followed by recovery for secure disposal (Teker et al., 1999).