

Optimization of Adsorptive Removal of Common Used Pesticides Water Wastewater Using Golden Activated Charcoal

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Abstract : One of the reasons for the intensive use of pesticides is to protect agricultural crops and orchards from pests or agricultural worms. The period of time that pesticides stay inside the soil is estimated at about (2) to (12) weeks. Perhaps the most important reason that led to groundwater pollution is the easy leakage of these harmful pesticides from the soil into the aquifers. This research aims to find the best ways to use traded activated charcoal with gold nitrate solution; for removing the deadly pesticides from the aqueous solution by adsorption phenomenon. The most used pesticides in Egypt were selected, such as Malathion, Methomyl Abamectin and, Thiamethoxam. Activated charcoal doped with gold ions was prepared by applying chemical and thermal treatments to activated charcoal using gold nitrate solution. Adsorption of studied pesticide onto activated carbon /Au was mainly by chemical adsorption, forming a complex with the gold metal immobilized on activated carbon surfaces. In addition, the gold atom was considered as a catalyst to cracking the pesticide molecule. Gold activated charcoal is a low cost material due to the use of very low concentrations of gold nitrate solution. its notice the great ability of activated charcoal in removing selected pesticides due to the presence of the positive charge of the gold ion, in addition to other active groups such as functional oxygen and lignin cellulose. The presence of pores of different sizes on the surface of activated charcoal is the driving force for the good adsorption efficiency for the removal of the pesticides under study The surface area of the prepared char as well as the active groups, were determined using infrared spectroscopy and scanning electron microscopy. Some factors affecting the ability of activated charcoal were applied in order to reach the highest adsorption capacity of activated charcoal, such as the weight of the charcoal, the concentration of the pesticide solution, the time of the experiment, and the pH. Experiments showed that the maximum limit revealed by the batch adsorption study for the adsorption of selected insecticides was in contact time (80) minutes at pH (7.70). These promising results were confirmed, and by establishing the practical application of the developed system, the effect of various operating factors with equilibrium, kinetic and thermodynamic studies is evident, using the Langmuir application on the effectiveness of the absorbent material with absorption capacities higher than most other adsorbents.

Keywords : waste water, pesticides pollution, adsorption, activated carbon

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