Invention Unit to Treatment of Waste Water via Solar Energy and Adsorbent Compound

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Abstract: *Adopt the idea of innovation on design of glass sealed inside heavy layer of ceramic and placed inside it small unit of glass also the valve connected to the output unit and outside unit to push water into unit-clean glass for interior and then closes the valve after filling the unit. There is a thin cover of glass sealed unit and left in the Sun. Water samples are analyzed after each period of exposure to sunlight has experience of two types of polluted water type I water contaminated with organic material such as carcinogenic dyes containing azo groups and left inside the filter unit it note after 24 hours was the final disposal of the dye inside the unit through the ceramic adsorbed through the layer second sample contains some harmful and heavy elements such as mercury, lead and sample analysis post processed through the unit, the disappearance of the color of dye this guide also adsorbed on the surface of the ceramic one of the most important features of this unit are used in poor villages that suffer from polluted water.*

1. INTRODUCTION

More azo dyes are toxic and carcinogenic as sudan II (Bouberka,. Et al, 2006). Most industries are released their waste water into rivers without any treatment because methods of treatment are cost. photo degradation method has attracted more attention as cleaner removal of toxic organic and inorganic pollutants wastewater (Lian, L. Guo,2009) and (Mehment, D.2006). The end of degradation is completely mineralized into water and CO_2 without generating any harmful. Back ground of the invention lies in (S.S. Narayanan, S.K. Pal, (2008)) and (P.R Murray, K.S Rosenthal(2002)). That the best absorbent for Pb^{+2} is ceramic (sawsan M. Abu. Hassan.(2014)). The best absorbent for Hg^{+2} is activated carbon, the best absorbent for Zn^{+2} and Ca^{+2} is silica (sawsan M. Abu. Hassan.(2014)) and (AL-Imarah, F.J, and Sahil, M.K (2006)). and the best absorbent for Mg^{+2} is silica and activated carbon. the best absorbent for Pb^{+2} and Hg^{+2} is activated carbon with silica and ceramic with activated carbon, the best absorbent for Zn^{+2} and Mg^{+2} is silica with ceramic and activated carbon ceramic the best absorbent for Ca^{+2} is silica with activated carbon (Bae, J. Y.; Choi, S. H.; Bae, B. S .and Bull. Kor, Chem. Soc. (2006)). The best filter for removal heavy metals is contain three layers of activated carbon with silica and ceramic where obtain 100% of absorbance for ions (Cho, S. Y.; Kim, N.-R.; Cao, G.; Kim, J.-G.; Chung, C. M. and Bull. Kor. (2006)).

2. EXPERIMENT

a. Instruments and Reagents Spectrophotometer, Model U-2900 UV-VIS spectrophotometer.

Experimental Procedure

- Preparation of ceramic Weight 500g
- Preparation of body of glass
- Formation body of dough ceramic and late it to dry in room temperature.
- put this body of ceramic inside the body of glass
- Put cup of glass inside the body of ceramic where it have two gates to inside and outside water.
- put the water contain dyes after study its spectra
- Left the unit in sun light for 24 hour.
- then study the spectra after irradiant by sun light

The percentage removal of elements and the amount of element adsorbed on adsorbent (qe) were: Calculated, respectively, as follows (Raman, N. K.; Anderson, M. T. and Brinker, C. (1996)).

$$\%Removal = (C_0 - Ce/C_0) \times 100$$

$$qe = (C_0 - Ce/M)V$$

Where qe is the amount of ion adsorbed on adsorbent at equilibrium, 0 and are the initial and equilibrium of element concentration in solution, respectively, is the volume of solution (l), and is the weight of adsorbent(g).
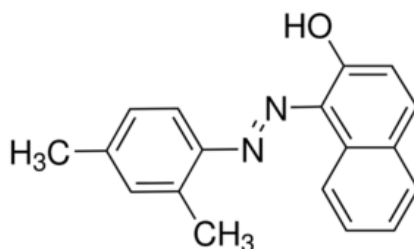

Fig1. *Structure of Sudan II*

All experiments of photo degradation were conducted in a sun light. for degradation, 0.047molar solution sudan II in 25 mL of dye solution concentration was added and irradiated with sun light at different time.

c-All Chemicals Analytical grad: EDTA, ZnSO4, $Mg(NO_3)_2$, $Ca(NO_3)_2$ $Hg(NO_3)_2$, $Pb(NO_3)_2$, NH_4Cl, NH_4OH, Murexide, and EBT. Adsorbent:, ceramic powder. In this study, the adsorption of Zn^{2+}, Mg^{2+}, Ca^{2+}, Pb^{2+} and Hg^{2+} on commercial ceramic were investigated. One gram of adsorbents with 5 ml of initial concentrations (C 0) of 0.01 Molar of heavy metals. Amounts of sample were taken from solutions containing adsorbent. The solution was diluted and titration with EDTA Solution. The equilibrium concentrations of heavy metals were determined after taking amount of samples from clear parts of solutions containing adsorbent and doing proper dilutions. The amount adsorbed (C_0) was calculated from the difference between initial and equilibrium concentrations. Which adsorbent does more adsorption at 24 hours was determined without looking at the equilibrium contact times. For this, 1g of adsorbents with 5 ml of initial concentrations of 0.01 Molar of these ions for determination of the percent of removal by adsorbents of heavy metals were shaken separately for 15 mints at 30C°. At the end of this period, the residual concentrations of heavy metals which were not adsorbed were determined with titration of EDTA.

3. RESULT

The effect of ceramic highest maximum decoloration was about 100% Fig.(1-2) explain that, the percentage of degradation was calculated from the following equation: Degradation% = [1-At/A0] ×100 Where A0 initial absorbance and at finial absorbance [Rashed et al., 2007] The results were shown in Fig.(1-2)the photo decolorization percent of sudan II increased significantly with time of irradiation increase as result the more photogene rated electron (e−)/hole (h+$_{VB}$) pairs will be generated (Sawsan, M. Mosa.(2013)).
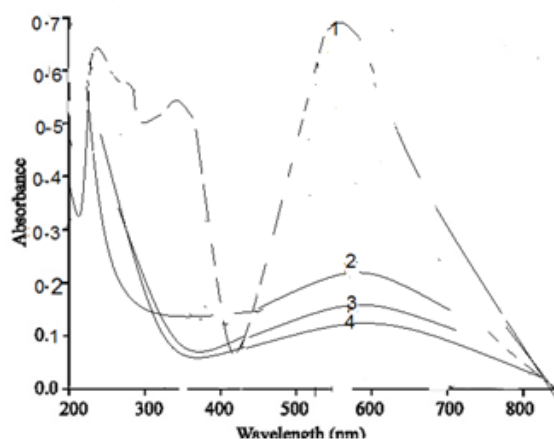

Fig2. *Effect of ceramic on the percentage removal of dye at different time of irradiation where curve 1 dye only curve 2 after 5 hour, curve 3 after 7hour,curve 4 after 15 hour.*
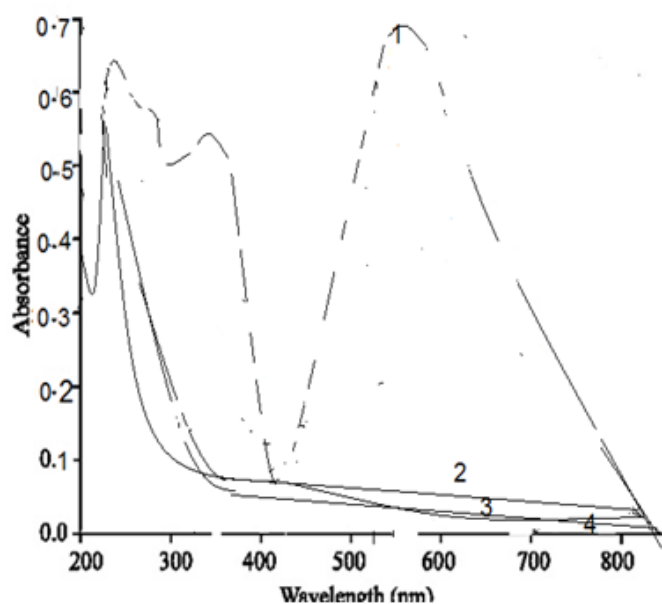
Fig3. *Effect of ceramic on the percentage removal of dye at different time of irradiation where curve 1 dye only curve 2 after 20 hour, curve 3 after 22hour,curve 4 after 24 hour.*

Table (1) displays that the best absorbent for Pb $^{+2}$,Mg^{+2} is ceramic, that the best filter for removal heavy metals as lead which very harmful element and removal the   in water is ceramic (Sawsan Mohemed Abu El Hassan (2014)) where obtain 100% of absorbance for ions

Table1. *Effect of ceramic on the percentage removal of elements and the amount of element adsorbed on adsorbent.*

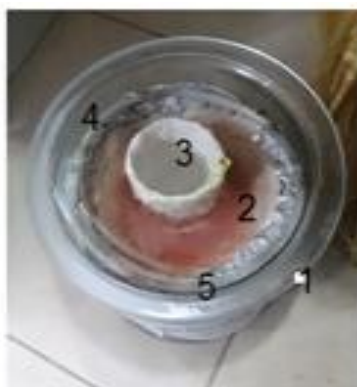| Element	Pb^{+2}	Hg^{+2}	Zn^{+2}	Ca^{+2}	Mg^{+2}
%removal	100%	20%	64%	20%	80%
qe	0.05	0.01	0.032	0.01	0.04

Fig4. *Unite of treatment from inside*

1. Body of glass, 2. Waste water, 3. Pure water, 4. Tube to out pure water, 5. Cover of ceramic

Fig5. *Unite of treatment from outside*

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