Treatment of industrial wastewater produed by some factories in el-qulayoubla governorate

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The river Nile is the major source of the fresh water in Egypt. Its protection against the pollution is a National aim El-Qulayoubia, Governorate was selected because it variety industry active (e.g. dying and textile, chemicals, foods and fertilizer industry.Industrial wastewater are deposed into the River Nile without treatment. High concentrations of some heavy metals i.e. lead, manganese, cadmium, zinc and copper, promote the growth of gelatinous masses and hence cause industrial and agriculture problems. Polluted water may cause many health problems such as liver and kidneys disease.The current work represents a trial towards treating the industrial wastewater in El-Qulayoubia Govemortae using activated carbons prepared from agro-residues eg. date pits, cotton stalk, rice straw and olive stone.The conducted research work involved a survey study in which the initial concentrations of some heavy metals i.e. Zn2+, Cu24, Mn2+, Pb2+ and Cd2f were determined in the wastewaters taken from Kaha Factory of the Chemical Industries and the Egyptian Company of Dying and Textile. Results showed that concentrations of the above mentioned heavy metals in Kaha Factory of the Chemical Industries were 19.11, 4.41, 1.00, 0.85 and 0.16mg/1, respectively. The corresponding concentrations of these metal ions were 1.00, 0.80, 1.10, 0.16 and 0.06 mg/I, respectively in the wastewater sample taken from the Egyptian Company of Dying and Textile.Also, the research work involved preparation of activated carbons from different agro-residues i.e. date pits, cotton stalk, rice straw and olive stone. The physicochemical properties of the prepared activated carbons were determined and results of determination are summarized in the following:(1)The physicochemical properties of the activated carbon prepared from rice straw (RS2): specific surface area (SBET) = 76.2m2/g, total pore volume (VP) = 0.08m1/g, average pore radius (R) =21A, apparent density=0.23g/cm3, packed density = 0.32 g/cm3, pH=9.3 and ash content 44%.(2)The physicochemical properties of the activated carbon prepared from rice straw (RS3): specific surface area (SBET) = 63.0m2/g, total pore volume (VP) = 0.09m1/g, average pore radius (R)=28.57A, apparent density=0.21 g/cm3, packed density = 0.28 g/cm3, pH=9.07 and ash content 40%.(3)The physicochemical properties of the activated carbon prepared from cotton stalk (CSSA-71): specific surface area (SRO 338.0 m2/g, total pore volume (VP)=0.29m1/g, average pore radius (R)=17.16A, apparent density =0.34 g/cm3, packed density = 0.51 g/cm3, pH=9.02 and ash content 7.86%.(4)The physicochemical properties of the activated carbon prepared from date pits (DPS 71-Fe): specific surface area (SBET)=154.0m2/g, total pore volume (VP)= 0.47 ml/g, average pore radius (R)= 61.04A, apparent density=0.65g/cm3, packed density = 0.88 g/cm3, pH=2.45 and ash content 5.56%.(5)The physicochemical properties of the activated carbon prepared from olive stone (OS3): specific surface area (SBET) = 848m2/g, total pore volume (VP)= 0.47 ml/g, average pore radius (R)=11.08A, apparent density=0.67g/cm3, packed density = 0.80 g/cm3 and pH=7.2(6)The physicochemical properties of the activated carbon prepared from olive stone (OS5): specific surface area (SBET)= 457m2/g, total pore volume (VP)= 0.24 ml/g, average pore radius (R)=10.50A, apparent density=0.77g/cm3, packed density = 0.93 g/cm3 and pH=9.6.A preliminary experiments was inducted on the six prepared activated carbons i.e. date pits (DPS 71-Fe), cotton stalk (CSSA-71), rice straw (RS2 and RS3) and olive stone (OS3 and OS5) to chose the most suitable one for treating the wastewater under study. Results of these experiments showed that the activated carbon prepared from the date pits (DPS 71-Fe) was the most suitable activated carbon

for removal of the studied heavy metals from the wastewater sample taken from Kaha Factory of the Chemical Industries whereas the activated carbon prepared from the cotton stalk (CSSA-71) was most efficient one for removing heavy metals from the wastewater sample taken from the Egyptian Company of Dying and Textile .A series of experiments were carried out to determine the suitable values of the factors which cause adsorption (removal from the wastewater) by the chosen activated carbons. Results of these experiments showed that maximum adsorption values forthe studied metal ions occurred on surface of the activated carbon prepared from the date pits (DPS 71-Fe) were associated with weight of 0.1 g for the adsorbent, pH value of 8.3 and time of contact of about 3h for Zn2+, Cu2+ Mn2+ and Cd2+ and only half an hour for Pb2+. The corresponding suitable weight of adsorbent; pH and time of contact upon utilization of the activated carbon prepared from cotton stalk (CSSA-71) were 0.02 g for weight of adsorbent, 8.3 for pH and 4h for time ofcontact in case Mn2+, Zn2+ and Cd2÷ and only half an hour for both Cu2+ and Pb2+.Further two adsorption experiments were conducted under the most suitable conditions of weight of adsorbent, pHvalue and time of contact that have been attained from the previous experiments.The linear form, Langmuir and Freundlich could succeed in description of the adsorption process on both the activated carbons (DPS71 -Fe and CSSA-71).However, value of correlation coefficients between the two variables in Langmuir isotherm were always higher than thecorresponding ones in Feundlich isotherm. This finding was true upon application on the wastewaters taken from Kaha Factory ofthe Chemical Industries and the Egyptian Company of Dying and Textile and as well.In case of the wastewater taken from Kaha Factory of the Chemical Industries the adsorptive capacities (q°) calculated from Lungmuir isoterm for Zn2+, cu2+, mn2+, Pb2+ and Cd2+ ionsSummary and Conclusions -78-were 34.6, 32.35, 0.53, 26.74 and 33.3mg/I, respectively. The corresponding q° values for the same respective metal ions of the Egyptian Company of Dying and Textile were 30.3, 9.61, 208.3, 1000 and 0.27mg/1, respectively.In case of the wastewater taken from Kaha Factory of the Chemical Industries with the activated carbon prepared from date pits (DPS71-Fe) the removal percentages (%) for Zn2+,cu2+, mn2+, Pb Z+and Cd2+ ions were 98.74, 98.18, 99, 100 and 100% respectively.In case of the wastewater taken from the Egyptian Company of Dying and Textile with the activated carbon prepared from cotton stalk (CSSA-71) the removal percentages (%) for Zn2t, cu2+, mn2+Pb2+ and Cd2+ ions were 90,95.45, 100 and 85%, respectively.The aforementioned results indicate that both the activated carbons prepared from date pits (DPS71-Fe) and cotton stalk (CSSA-71) could succeed in reducing concentrations of the studied metal ions to values accepted according to the Egyptian Environmental Affairs Agency Law # 4,1995.