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Preparation 0f Activated Carbon from Coconut shells Use the Kim-al-Ali as abond material And use it to adsorb the pigment of the methylene blue

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Abstract

The study included the study of the preparation of activated carbon from coconut shell with different bitumen's material by adding salicylic acid at constant ratio's with Potassium hydroxide. The ratios of reactive substances, The amount of reactants carbonated material and bitumen's material were verified using different ratio's to obtain a better Production which is not less efficient than some other types.to obtain a better result of iodine number adsorption and methylene blue pigment adsorption,It had to be done the physical and chemical tests of the prepared models, including determination of the density, ash, iodine (IN),measure mentexternal surface area by the method of adsorption of the Methylene Blue aqueous, measurement Humidity content.

Introduction

Activated carbon are widely used as adsorbents in gasand liquid-phase separation processes, purification of products and water cleaning operations[1-3]The material of different raw materials under different conditions, Activated carbons were prepared by impregnation of crushed clean date zinc chloride followed by carbonization in absence of air at 600ºC. Steam-activated carbon was prepared by asifying 600ºC carbonization product at 950ºC to a burn-off = 50%. KOH- activated carbon was prepared by impregnating date pitscarbonization product obtained at 450ºC in concentrated KOH solution followed by

carbonization at 840ºC [4]. Asphalt was modified through catalyzed treatments with Sulphur and recycled polymers separately. Different asphalt samples (57 samples) of various chemical compositions were prepared utilizing different reaction parameters and conditions. These asphalt samples were carbonized by thermal treatments with sulphur or sulphuric acid[5]. the activated carbon has been prepared from sawdust and this was done by carbonization of sawdust at temperature of 350º C for 3 hours, after that treated with KOH at various ratios ranging from (0.5:1), (1:1), (1:2), (KOH: Carbonized materials) using microwave radiation at power of (90, 180, 270, 360, 450, 540, 630, 720) watt and at period of (6, 8, 10, 12, 14, 16, 18, 20) minutes, many tests have been conducted on of prepared activated carbon samples such as determining the activity of the samples through adsorption of iodine and [6]. the activated carbon has been prepared from the spent lubricant oils in the presence of additives which include polymers. Spent lubricant oils and polymers waste products are pollutant materials, it is possible to use these wastes to prepare activated carbon[7]. preparation activated carbon from waste tires. The produced carbon from the primary carbonization is activated by using excess amount of mineral hydroxides (LiOH, NaOH and KOH) number and ability to adsorb the methylene blue .The density and ash content of the prepared carbon were also evaluated [8]. Activated carbon prepared from Balsamodendron caudatum wood waste by various chemical processes[9] . Researchers in the recent past have mainly focused on the preparation of the activated from agricultural waste materials as an alternative for the commercial activated carbon[10]. Consequently, numerous low cost alternatives have been proposed including sago waste[11], Lapsi seed stone by chemical activation with phosphoric acid [12]. rice husk [13], wheat husk[14], harmful aquatic plant for high stable super capacitors [15], The Pistachio Shells [16], the spent lubricant oils in the presence of additives which include polymers. Spent [17], Waste Tires[18].

Experimental

Preparation of activated carbon

Coconut husks were taken with their dry natural form and well tested to powder to be the reaction with the best carbonated material and get good results

Carbonization process [19]

Carbonization has two steps

First step: The raw material (coconut husks) was mixed with a fixed weight of 10 g with different weight ratios of erythrocyte (10, 5, 2.5, 1 g) and then add (40, 30, 25, 22, 21) (NaOH) and then add 1 ml Salicylic acid After mixing the materials with each other, add 10 ml of petroleum ether with heating (40-60) M at the beginning and then raise the temperature to 550 m with continuous shaking until the end of the release of gases and then spare the extra hour To ensure that they are free of gases

The second step is similar to the first step, but change the weight ratios where the ratio of the substance of the water bath was fixed by a fixed weight (10) g with different weight ratios of the raw material coconut husks and changing the weight ratios of the erythrocytes (5, 2.5, 1, And then add (30, 25, 22, 21) g NaOH and then add 1 ml Salicylic acid and after mixing the materials with each other, add 10 ml of petroleum ether with heating (40-60) M at first and then raise the temperature To 550 MHz with continuous shaking until the end of the release of gases and then spare an hour to make sure that they are free of gases

Activated Carbon Purification[19]

After finishing the previous two steps, the mixture is cooled down. Then add the free distilled water to the ions. Then rinse with distilled water several times until the washing water is equal to the base form. Add 100 ml of concentrated HCl solution with 2 hours of heat to remove any After it is washed with distilled water until it has been confirmed to be free from acidic effects and then dried at 130 ° C for 6 hours and kept in isolation from air and humidity for measurements.

Activated Carbon Properties Measurements:

1- Adsorption Properties:

A- Measurement of internal surface by Iodine Adsorption Method (Iodine Number)

This method is a common method to give information on the internal surface area of activated carbon and is expressed by the number of grams of iodine extracted from the solution by one gram of activated carbon[21] and added to it (10) ml of solution (5%) HCl and then heated to boil for Half an hour after it cooled to laboratory temperature and added to it (100 ml) (0.1N) Of the iodine solution and elicited for half an hour by means of an electric stirrer device. Then filtrate and take (ml50) of the filtrate and dissolve with 0.1 N sodium anosulfate solution with a starch guide

and calculate the volume of sodium thiosulfate from the blacksmith. The Iody number is calculated by the following equations[**21]**:

X = A - [2.2B * mL of Thiosulfate Used] ... .. (1)

A = N1 * 126.93 ..... (2)

B = N2 * 126.93 ..... (3)

X = iodine weight (measured in mg) adsorbed by activated carbon

N1 = Standard concentration of iodine solution (0.1 N)

N2 = Standard concentration of sodium thiosulfate solution (0.1 N)

The iodine number is calculated from the following equation:

$$I.N = \frac{X}{M} D \quad \text{..... (4)}$$

M = The weight of activated carbon model used.

D= Correction Factor (value close to one)

B. Measurement of the outer surface area by the method of adsorption of the Methylene Blue Test from its water solution

This method is a common method and An exact weight of (0.1 gm) of prepared activated carbon sample was added to an aqueous solution of (20 ppm) methylene blue pigment in a conical flask. The solution was shaked by an electrical shaker for (24 hr) at a temperature of (25ºC) till adsorption of methylene blue from its aqueous solution was completed and a state of equilibrium was reached. The absorbance of the solution was determined using (CECIL-3021 Spectrophotometer) at (λmax = 665 nm). The final concentration of methylene blue value was calculated as the number of milligrams of methylene blue adsorbed by one gram of activated carbon using calibration curve, specially performed for this reason [22]. The adsorption of methylene blue allows the determination of the specific surface area of activated carbon directly [23].

2- Physical Properties:

a) Measuring density [24].

A certain amount of activated carbon is placed in a volume vial so that the carbon is occupied with a certain size. Note that the carbons are made at one level by the light mark on the sides of the density vial. The carbon inside is then weighed using a sensitive balance

Density (gm / cm) = mass / volume

b) **Calculation of humidity**[25]

This method involves moisturizing 1 g of activated carbon with a quantity of filtered water. The model is then filtered and weighed and placed in an oven at 150 ° C for 4 hours and left to cool. The percentage of the adsorbed water representing the moisture content

3- Measuring of Total Ash Content [26]

The inorganic material contained in activated carbon is measured as Ash content, generally in the range between 2 and 10%. One gram of activated carbon is taken and placed in a ceramic container. The gel is then placed in an electrical outlet at 1000 ° C for one hour,or until the stability of the weight after it is cooled to the laboratory temperature in a container desiccater and calculates the weight of the remaining form, which represents Ashes and calculated the percentage of it.

4-Determination of acidic function of activated carbon[27]
Take 1 gram of activated carbon and add 10 mL of distilled water and stir for half an hour and then filtrate. The acidic function of the solution is measured.

Results and discussion

First step: The raw material (coconut husks) was mixed with a fixed weight of 10 gram with different weight ratios of erythrocyte (10, 5, 2.5, 1 gram) and then add (40, 30, 25, 22, 21) (NaOH) and then add 1 ml Salicylic acid After mixing the materials with each other, add 10 ml of petroleum ether with heating (40-60) M at the beginning and then raise the temperature to 550 m with continuous shaking until the end of the release of gases and then spare the extra hour To ensure that they are free of gases.

Activated carbon is produced from a wide range of different sources and in different ways. The researchers divided it according to the standard specifications of activated carbon to several types including animal charcoal to carbon black to coal kilns to polymers (2). It was produced from plant sources, Acacia, hardwood, nutshells, etc. In this study, one of the crustaceans was adopted, namely, coconut shells with high calcite content.

In this study, one of the crustaceans was adopted. Coconut husks with high calcination content. Most of the methods adopted in the literature for the preparation and production of activated carbon from raw materials by carbonate with various carbonate factors such as sulfuric acid, perchloric acid, sulfur and others, or bases as sodium hydroxide or by Carbonated salts such as sodium acetate and most carbonation methods were based on the principle of removing hydrogen from carbonic materials in solvent media. In our study, the carbonate of the raw material (coconut husks) It is dry with sodium hydroxide.

For the purpose of removing the hydrogen in the form of water and thermal disposal, that is the process of carbonization in this case is a fusion fusion process followed by the loss of water and other gases where a black mass has been obtained and washed and activated with metal acids. Table (1) shows the measurements of the activated carbon samples prepared and compared with the commercial models and the attached forms.

It was observed that when studying the adsorption of iodine from its water solution, which expresses the internal surface area of activated carbon. There is a significant increase in iodine adsorption from its hydrolysis with increasing KOH ratio.

The same is true for the adsorption of the Methylene Blue pigment from its hydrolysis, which expresses the outer surface area of the activated carbon **.**

Humidity values are high, generally high, reflecting the activated carbon adsorption potential of water vapor adsorption

As for the density, the values of iodine and Methylene Blue were proportional to the density as the number of iodine and Methylene Blue increased

When comparing the models prepared with commercial activated carbon, the value of the iodine number increased by approximately 1.8 times and the value of the Methylene Blue increased by 1.5. This reflects the role played by KOH in the development of the porous structure of activated

carbon by malfunctioning in the crystalline structure of activated carbon A material that works on the hydrogen halo in a water body, thus causing a defect in the crystalline structure and producing pores with high adsorption potential. The preparation method does not require high temperatures of 900-1000 °C.

The process of carbonization and activation occurs at 550 °C

Table (1): General specifications of activated carbon produced from the residues of coconut husks with the presence of oxidized oxidation bath

Sample	Coconut shells: kim–al–Ali :KOH: Salicylic acid	Iodine Number mg/g	Methylene Blue mg/g	Humidity %	Density g/cm^3	Ash content %
1	10: 10: 40:1	697	117.37	1.236	0.123	0.443
2	10: 5: 30:1	565	98	1.089	0.156	0.314
3	10: 2.5: 25:1	504	94	0.951	0.317	0.256
4	10: 1: 22:1	437	92	0.942	0.356	0.234
5	10: 0.5: 21:1	319	88	0.922	0.412	0.212
6	10: 0.1: 10:1	301	70	0.876	0.511	0.098
7	5: 10: 40:1	432	80	0.943	0.112	0.363
8	2.5:10:30:1	410	72	0.912	0.124	0.223
8	0.1: 10: 25:1	376	68	0.876	0.213	0.198
9	1: 10: 22:1	336	51	0.766	0.276	0.176
10	0.5: 10: 21:1	296	42	0.651	0.345	0.151
11	0.1: 10: 10:1	276	30	0.546	0.456	0.074
12	BDH	445	63.8	0.53	0.3560	1.5

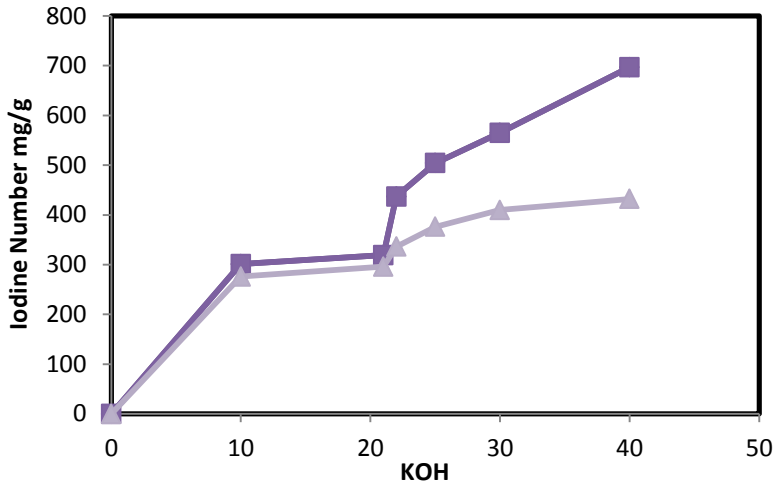

Figure-1. Langmuir linear plots of Iodine Number on the produced carbons.

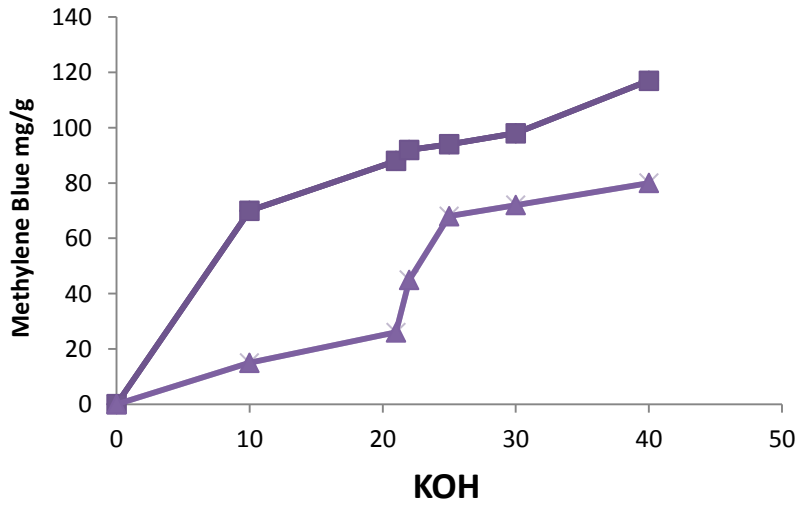

Figure-2. Langmuir linear plots of Methylene Blue on the produced carbons.

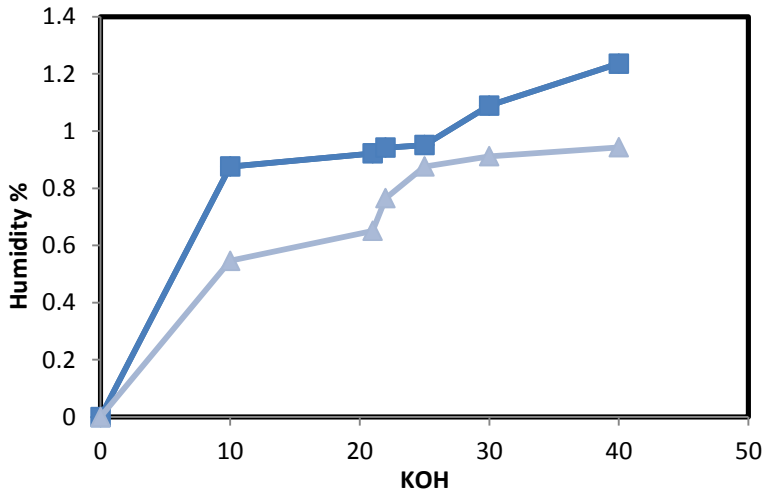

Figure-3. Langmuir linear plots of Humidity % on the produced carbon

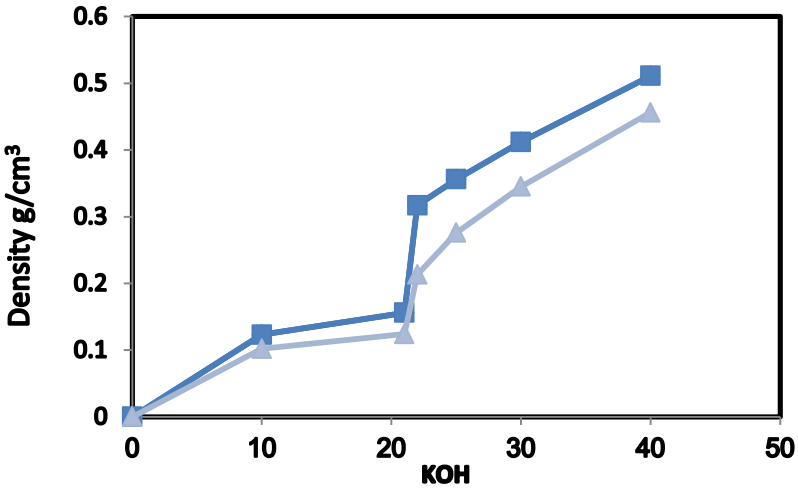

Figure-4. Langmuir linear plots of Density on the produced carbon

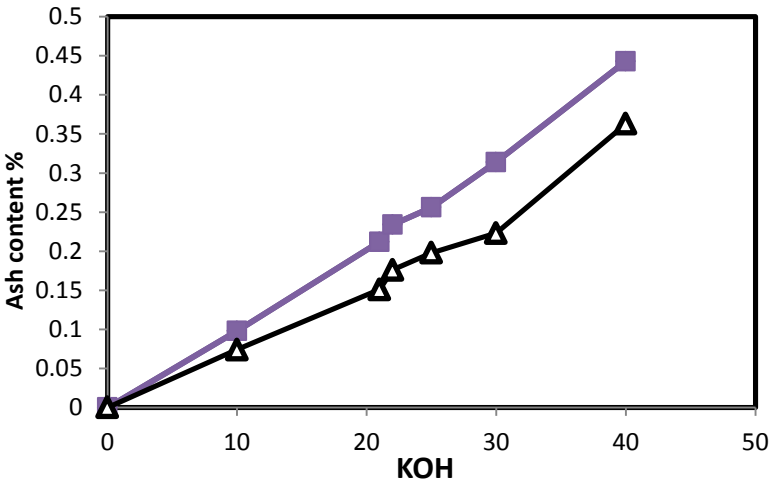

Figure-5. Langmuir linear plots of Ash content on the produced carbons.

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