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Adsorbent capacity of Onion Peel Carbon on dibasic acids.

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Abstract

In this study, adsorption of different dibasic acids was performed on Onion peel carbon, Onion peel as an adsorbent, is low cost, we have simply used the criteria of low cost as well as eco-friendly adsorbents. It has proven to be significantly effective with the provision of satisfactory adsorption capacities for the removal of pollutants from waste water. We have studied adsorption on different monobasic and dibasic acid by taking onion peel as an adsorbent. the dibasic acids under study were oxalic acid, Malonic acid, Succinic acid and Glutaric acid. n. The results obtained when compared with different acids the conclusion obtained was Comparison of difference between dibasic acids (oxalic acid, malonic acid, succinic acid, glutaric acid).From the readings obtained it is observed that extent of glutaric acid is greater than succinic acid, succinic acid is greater than malonic acid, and malonic acid is greater than oxalic acid.i.e., glutaric acid > succinic acid > malonic acid > oxalic acid.The reason behind the above conclusion must be the presence of 3 CH_2 group in glutaric acid, and absence of 1 CH_2 group in succinic acid, or 2 CH_2 group in malonic acids, or 3 CH_2 group in oxalic acid.

Introduction:

Adsorption is the adhesion of atoms, ions or molecules from a gas liquid or dissolved solid to a surface. This process creates a film of the adsorbate on the surface of the adsorbent. Adsorption is present in many natural, physical, biological and chemical system and is widely used in industrial applications such as heterogeneous catalysts, onion peel Carbon, capturing and using waste heat to provide cold water for air conditioning and other process requirements. Onion processing by-products include skins, outer leaves, tops, and bottoms. Currently, these materials are disposed of in landfills or used as soil amendments, which result in negative environmental impacts and phytotoxicity to plants, respectively. These materials need to be economically and environmentally managed. The adsorption process efficiency is closely related to the surface area and number of sorption sites in the adsorbent, which makes activated carbon an ideal adsorbent (Johnson et al., 2002; S. V. H. Madiraju et al., 2020). Adsorption as a treatment process is effective compared to all the other treatment processes. Still, the major disadvantage is the high investment involved in using virgin carbon and recycling cost in spent carbon usage (Alhashimi and Aktas, 2017)and its applications diversifying from its early uses as soil amendment, The world literature provides information about the use of by-products of processing vegetables such as cabbage, carrots, tomatoes, eggplants, turnips, cucurbits, and other as adsorption materials. The largest producer of onion peel is china were grown in 2016. Also, India and Bangladesh are among the three countries leading in onion production. Onion Peel, a very common and easily available material is usually thrown away as an agricultural bio waste. In India, huge amount of onion is consumed every year, and lots of peel is disposed, causing severe problem in the community, for example decomposing in the open air and giving off special bad smell. Up to date the research work on the effective development of onion peel is really rarely reported, so for the environmental interest and reusing of this biowaste, we attempted to use it as the carbon to prepare the adsorbent and check the adsorption capacity of it for different dibasic acids.

ADSORBENT USED

Fig.1 Onion peel

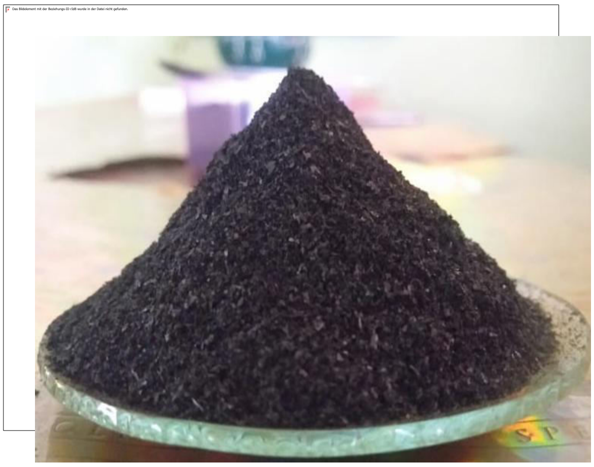

Fig.2 Onion peel carbon

Onion peel Carbon referred to a wide range of carbonaceous materials with a high degree of porosity and an extended inter particulate surface area and widely used adsorbent in waste water treatment throughout the world.

Materials Used: Onion peel Carbon, Dibasic acids (Oxalic acid, Malonic acid, Succinic acid and Glutaric acid, NaOH, Phenolphthalein, Stoppered bottle, Burette, Pipette, Funnel, Conical flask.

PROCEDURE:

Prepared aqueous solution of acids into numbered flask as labelled, the total volume of each solution is 50ml taken in Stoppard bottles. Transfer 10ml of the solution from each bottle into the conical flask. Add 2-3 drops of Phenolphthalein indicator and titrate against NaOH. Once the end point is reached, read the burette reading. The volume of baseV_1. Calculate the actual concentration of oxalic acid C_1 in the flask number 1 to 5 respectively, and write it down in the table. Using practical balance weigh 5 portions of onion peel Carbon, each portion1 gram.. Put onion peel Carbon into number flask into stoppers and shake them, wait for 20 minutes, the process of adsorption is in progress. Mix the mixtures for several times by shaking the flask. (The process of adsorption is a function of times it is important to put onion feel into flask at the same time to provide adsorption for the same period in each flask). Filter the mixtures into clean and dry flask to avoid disturbing effect of adsorption of oxalic acid into filtering paper, remove away the first portion of filtration approximate of 5ml. Determine the final concentration of oxalic acid C, in each of the flask after adsorption from each solution, pipette out 10ml of oxalic acid solution and transfer it

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tothe clean and dry conical flask. To this conical flask containing oxalic acid solution at 2 to 3drops ofPhenolphthalein indicator. Now, titrate this solution against NaOH in the burette, note down the burettereading. The volume of base V_2

PROCEDURE TABULAR COLUMN: Dilution of Dibasic acids

Bottle No.	Vol. of oxalic /Malonic /Succinic/Glutaric acid added (0.5N acid)	Volume of water added in ml	Amount of onion peel carbon added in gm
1	50	00	1
2	40	10	1
3	30	20	1
4	20	30	1
5	10	40	1

Oxalic acid TABULAR COLUMN:

SI NO.	**Initial concentration of oxalic acid(C_0)**	**Vol. of titrant taken in ml**	**Amt. of onion peel carbon added in gm**	**Burette reading**	**C_e=B.Rx0.5/10 Eq. conc. of acid in mol/dm^3**	**X=C_0-C_e/20 amount adsorbed in moles**	**x/m**	**Log(x/m)**	**Log(x/m)**	**Log C_e**	**$C_{e\ (x/m)}$**
1	0.5	10	1	8.5	0.425	0.00375	0.0037	-0.346	-0.346	-1.070	0.00159
2	0.4	10	1	07	0.35	0.0025	0.0025	-1.017	-1.017	-1.154	0.00087
3	0.3	10	1	4.6	0.23	0.0035	0.0035	-0.832	-0.832	-1.337	0.00080
4	0.2	10	1	2.5	0.125	0.00375	0.0037	-0.703	-0.703	-1.602	0.00046
5	0.1	10	1	0.7	0.035	0.00485	0.0048	-0.609	-0.609	-2.154	0.00016

Malonic acid TABULAR COLUMN:

SI NO.	Initial concentration of malonic acid(C_0)	Vol. of titrant taken in ml	Amt. of onion peel carbon added in gm	Burette reading	C_e=B.Rx0.5/10 Eq. conc. of acid in mol/dm^3	X=C_0-C_e/20 amount adsorbed in moles	x/m	Log(x/m)	Log C_e	C_e (x/m)
1	0.5	10	1	6.3	0.315	0.0092	0.0092	-2.003	-0.501	0.00291
2	0.4	10	1	4.8	0.24	0.008	0.008	-2.096	-0.619	0.00192
3	0.3	10	1	03	0.15	0.0075	0.0075	-2.124	-0.823	0.00112
4	0.2	10	1	02	0.1	0.005	0.005	-2.301	-1	0.0005
5	0.1	10	1	0.2	0.01	0.0045	0.0045	-2.346	-2	0.00004

Succinic acid **TABULAR COLUMN:**

SI NO.	Initial concentration of succinic acid(C_0)	Vol. of titrant taken in ml	Amt. of onion peel carbon added in gm	Burette reading	C_e=B.Rx0.5/10 Eq. conc. of acid in mol/dm^3	X=C_0-C_e/20 amount adsorbed in moles	x/m	Log(x/m)	Log C_e	$C_{e(x/m)}$
1	0.5	10	1	12	0.6	0.0025	0.0025	-2.602	-0.221	0.0011
2	0.4	10	1	7	0.35	0.0025	0.0025	-2.602	-0.397	0.00087
3	0.3	10	1	5	0.25	0.0025	0.0025	-2.602	-.0602	0.00062
4	0.2	10	1	2.2	0.11	0.0045	0.0045	-2.346	-0.958	0.00049
5	0.1	10	1	0.3	0.015	0.0042	0.0042	-2.371	-1.823	0.00006

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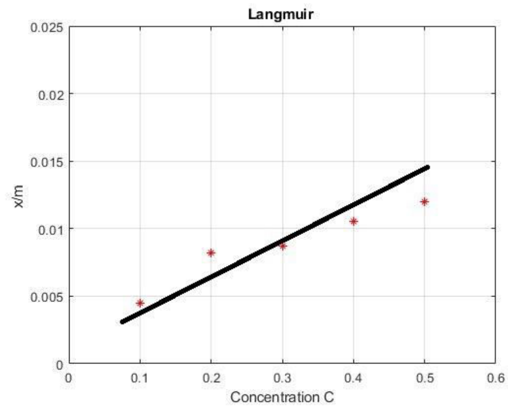
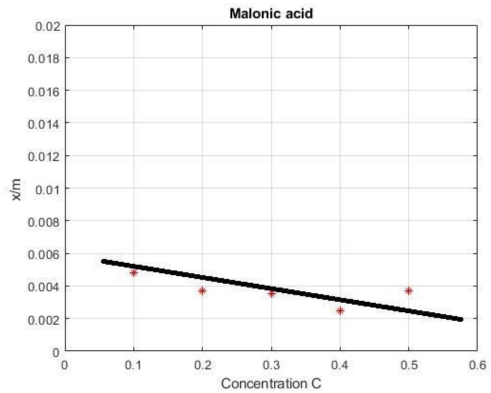
Glutaric acid **TABULAR COLUMN:**

Langmuir adsorption isotherms

SI NO.	Initial concentration of malonic acid(C_0)	Vol. of titrant taken in ml	Amt. of onion peel carbon added in gm	Burette reading	C_e=B.Rx0.1/10 Eq. conc. of acid in mol/dm^3	X=C_0-C_e/20 amount adsorbed in moles	x/m	Log(x/m)	Log C_e	$C_{e(x/m)}$
1	0.5	10	1	5.2	0.26	0.012	0.012	-1.920	-0.585	0.00312
2	0.4	10	1	3.8	0.19	0.0105	0.0105	-1.978	-0.721	0.00199
3	0.3	10	1	2.5	0.125	0.0087	0.0087	-2.060	-0.903	0.00100
4	0.2	10	1	0.7	0.035	0.0082	0.0082	-2.086	-1.455	0.00287
5	0.1	10	1	0.2	0.01	0.0045	0.0045	-2.346	-2	0.0045





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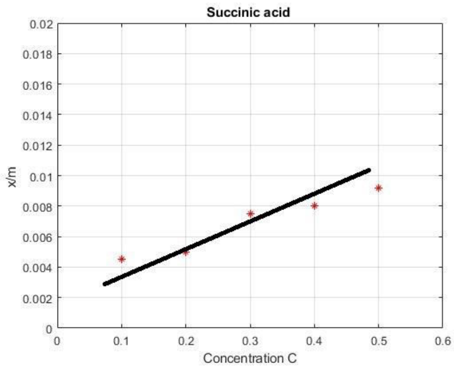

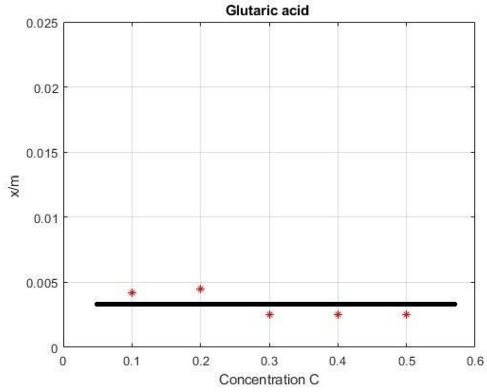

CONCLUSION

Comparision of difference between dibasic acids (oxalic acid, malonic acid, succinic acid, glutaric acid)

From the readings obtained we absorbed that extent of glutaric acid is greater than succinic acid, succinic acid is greater than malonic acid, and malonic acid is greater than oxalic acid.

Dibasic acids	Oxalic acid	Malonic acid	Succinic acid	Glutaric acid
Extent of adsorption	0.0036	0.0068	0.0072	0.0087

The reason behind the above conclusion is the presence of 3 CH2 group in glutaric acid, and absence of 1 CH2 group in succinic acid, or 2 CH2 group in malonic acids, or 3 CH2 group in oxalic acid.

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