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Studies on chloride and sulphate removal from textile effluent by activated carbon derived form *zea maize* Linn. (corn)

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ABSTRACT

An attempt has been made in the present work to estimate the concentration of chloride and sulphate ions present in the textile effluent and to remove the chloride and sulphate ions by activated carbon obtained from *Zea maize Linn*. The activated carbon is processed and collected from the waste material and extensively studied using standard methods. Having established the characteristics of this activated carbon. It is subjected to the removal of chloride and sulphate ions form textile effluent. This process of removal of chloride and sulphate ions by the activated carbon derived from *Zea Maize Linn* is an economical and environmental friendly one.

Key words: Zea maize linn waste, activated carbon, Textile effluent, chloride ion and sulphateion concentration.

INTRODUCTION

The quality of water is of vital role for mankind since it is directly linked with human welfare. It is a matter of history that faeucal polltution of drinking water caused water-borne diseases which wiped out entire populations of cites. At present, the menace of water-borne diseases and epidemics still 100 ms large on the horizones of developing countries. The major sources of water pollutions are domestic waster form urban and rural areas and industrial waste which are discharged into natural water bodies. Textile industry is one of the largest industrial sectors in India and particularly in Tamil Nadu. Industrial effluent form textile industry pollute both water sources and land[1-3]. Textile effluents contains suspended solids high biogical oxygen demand (BOD), variable P^H and highly dissolved carbonaceous matter. Chloride and sulphate are the constituent of industrial effluent chloride and sulphate are harmless if it is present within the permissible limit (250 ppm). Where there is a high concentration of chloride and sulphate then it becomes a harmful pollutant[4].

EXPERIMENTAL

Preparation and characterization of zea maize Linn waste carbon

Many methods have been reported for the carbonization and activation of waster organic material and these are adequately presented in recent reports[5] described in various authors for the preparation of carbon includes pyrolysis[6], Chloride[7], Sulphate[8], Carbonate[9], and acid[10,11] process. The carbons obtained in the above five process were subjected to a series of standard test and their characteristics were determined (Table 1).

Table 1 : Zea maize Linn carbon characteristics

S.no	Tests	Pyrolysis	Chloride	Sulphate	Carbonate	Acid
1.	Bulk density (g/ml)	0.4021	0.5123	0.6217	0.5721	0.4926
2.	Moisture (%)	9.70	5.73	6.18	4.25	8.27
3.	Matter soluble in Water %	3.576	6.182	7.193	14.167	4.712
4.	Matter soluble in acid %	21.67	10.67	15.63	4.17	18.18
5.	Ion exchange capacity mg/g	0.030	0.167	0.090	0.628	0.140
6	Decolorizing Powder mg/g	4.167	5.678	7.237	13.6	13.6
7	P^H	8.5	7.9	6.75	7.3	0.0
8	Suface area sqm/g	210.121	587.678	667.276	556.3178	136.176
9	Phenol Number mg/1	53	72	75	78	67

Characteristics of Textile Effluent[12]

The textile effluent obtained form Bhavani Textile Limited, Erode. It was dark green in colour. It was properly diluted to suitable concentration and its characteristics were studied employing standard analytical methods. The results indicating the quality of textile effluent are presented in Table 2.

Analytical procedure for the determination of chloride [13,14]

Exactly 100 ml sample of the effluent was taken in a clean concial flask 1ml of potassium chromate indicator was added and titrated against 0.02 N silver nitrate solution taken in the burette till the colour changed from yellow to a permanent brick red.

Table 2 : Chemical composition of Textile effluent

S.No	Chemical components	Values
1.	Total Dissolved Solids	5.100 ppm
2.	Alkalinity	
	a) Phenolphthalein	500 mg/l
3.	P^H	11.0
4.	Hardness	230mg/l
5.	Chloride	490 ppm
6.	Sulphate	400 ppm

Analytical procedure for the determination of sulphate[12,13]

Exactly 50 ml of the sample was taken in a clean cocial flask and few drops of methyl orange indicator are added and followed by slight excess of HNO_3. The mixture is boiled to remove dissolved CO_2. About 5ml of std $BaCl_2$ is added into the boiling solution. The volume is made up to 150 ml. Exactly 1ml of buffer solution and one gram of Eriochrome Black – T indicator are added to it. The contents are titratad with standard EDTA. solution until a permanent blue colour is produced indicating the end point.

RESULTS AND DISCUSSION

The present study reveals that all five varieties of carban retained their particle size. Without undergoing any disintegration during equilibrium process showing high mechanical strength and abrasion strength. The experiment conducted on characteristics of textile effluents showed that it had high total solid content and highly acidic. The anionic coneentration of chloride and sulphate were higher than limiting values prescribed by B.I.C and U.S.P.H. It is therefore decided to remove excess chloride and sulphate ions form the effluent using activated carbon derived form zea maize linn waste. From the experiments conducted the chloride and sulphate removal capacity of zea maize linn carbon which was derived form pyrolysis process showed 80% chloride and 83% sulphate

Table 3: Removal of chloride and sulphate by different varieties of Carbon

S.no	Carbon variety	Chloride removed(%)	Sulphate removed(%)
1.	Pyrolysis	80.5	83.17
2.	Chloride	26.8	30.4
3.	Sulphate	40.2	42.7
4.	Acid	73.8	79.5
5.	Carbonate	20.1	23.7

removal in an hour equilibrium process (Table 3). The initial concentration of chloride ion (490 ppm) was reduced to 196 ppm and sulphate ion (400 ppm) was reduced to 136 ppm when treated with the derived carbon. Thus it may concluded that zea maize linn carbon derived form pyrolysis process could be utilized as a cheap alternative material for the commercially.

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