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Leachate management by natural coagulant

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Abstract — *Leachate will be treated by using coagulation-flocculation. Coagulation and flocculation are essential processes in a number of diverse disciplines, including biochemistry, cheese manufacturing, rubber manufacturing, and in water and waste water treatment. It is effective for removing high concentration organic pollutant and heavy metals in wastewater. However, coagulation-flocculation examined the effectiveness of alum, ferric chloride and polyaluminum chloride (PAC1) as well as the use of synthetic polymers on the removal of suspended solid (SS), color, COD and ammoniacal nitrogen (NH 3 N) from leachate. The coagulant dosage has typically been determined through jar test, which requires a long experiment time in a field water treatment plant.*

Keywords- *Leachates, organisms*

I. INTRODUCTION

Leachates are defined as the aqueous effluent generated as a consequence of rainwater percolation through wastes, biochemical processes in waste's cells and the inherent water content of wastes themselves. Leachate usually contain large amounts of organic matter, ammonia nitrogen, heavy metals, chlorinated organic and inorganic salts, which are toxic to living organisms and ecosystem (Zouboulis et al., 2008). Leachate composition depends on many factors such as the waste composition, site hydrology, the availability of moisture and oxygen, design and operation of the landfill and its age. Landfill leachate is generally characterized by a high strength of pollutants (Chen., 1996).

II. CHARACTERIZATION OF THE LEACHATES

The leachates were collected from Pasir Gudang sanitary landfill that located at Johor, Malaysia. The Pasir Gudang sanitary landfill with largeness of 50 acres and average 350 tonnes of waste per day. The types of solid waste at Pasir Gudang sanitary landfill were housing, domestic, commercial, industry, institutions, market and construction. Pasir Gudang landfill leachate has very high ammoniacal nitrogen in the range 1350 mg/L to 2150 mg/L. The average values of BOD5 and COD were 1930 | P a g e 131.5 mg/L and 2305 mg/L respectively, and the ratio of BOD5 /COD of raw leachate was about 0.05. Old or stabilized leachate are usually high in pH (>7.5) and NH4 -N (>400 mg/L) and low in COD (or a similar sans-serif font). Callouts should be 9-point non-boldface Helvetica.

III. MATERIALS AND METHODOLOGY

Adsorbent

3.1 Peat:- Peat is a heterogeneous mixture of more or less decomposed plant (humus) material that has accumulated in a water-saturated environment and in the absence of oxygen. Peat can be used for adsorption

Figure 3.1: Natural absorbent peat

3.2 Preparation of Adsorbent

The Preparation of the adsorbent is as follows:

natural coagulant can be manufactured from a no. of carbonaceous raw materials including coke, peat, wood and nutshells. The manufacturing process involved

i) Dehydration of the raw materials

ii) Carbonization or conversion of the material to a mixture of amorphous and crystalline carbon, tars and ash,

IV. RESULTS AND DISCUSSION

This chapter deals with the discussion on results obtained after application of proposed methodology, its effectiveness and use of results to understand the process kinetics by developing the model proposed in the previous chapter.

4.1 Natural coagulant Column:

GAC Column is a cylindrical glass tube with conical bottom and open at the top. The inlet is at the bottom end and outlet is at a height of 20.32 cm (8") from bottom. The details of the column is given in Table 4.5

Table 4.1: Details of natural coagulant Column

1.	No. of units	1
2.	Material	Glass
3.	Shape	Cylindrical column
4.	Height of bed	15.24 cm,
5.	Diameter of column	3.81 cm
6	Aspect ratio (L:D)	1:4
7.	Vol. occupied by media	1.737 x 10-4m3
8.	Volume of voids	6.7 x 10-5m3
9.	Flow pattern	Up flow fixed bed
10.	Flow rate (Hydraulic loading rate)	30 ml / min
11.	Head available	25.4 cm

V. CONCLUSIONS AND FUTURE SCOPE

5.1 General

Treatment of leachate with Granular Activated carbon is a promising method of colour removal, BOD5, COD, Alkalinity, Ca Hardness, Mg Hardness, Total Solids, pH due to its lower cost (in comparison to other treatment) & simplicity in operation. Also among the various available methods of colour removal, adsorption currently appears to offers good potential (22).

The total process of adsorption is controlled by the parameters which define the interaction between the adsorption & adsorbent. These are:-

i) Effective area of absorbent
ii) Solubility of solute
iii) Chain length of solute molecules
iv) Molecular size of solute
v) Geometry of solute molecule
vi) Degree of ionization
vii) pH
viii) Temperature
ix) Solute concentration
x) Time of contact
xi) Nature of contacting system

In the present work effect of last three parameters on adsorption were studied (i.e. solute concentration, time of contact & nature of contacting system) by using jar tests apparatus & column tests.

5.2 Future scope

Following are th some important points and research areas which are found critical during the investigation work and need to be rectified. Future study may emphasize on the following key issues related to the effective application of adsorbents:

1) The effect of sizes of adsorbents on the adsorption process can be investigated.
2) The effect of temperature on the adsorption process can be investigated.
3) The performance of adsorbent should be checked by adopting colume study instead of the batch study.
4) A cost-effective and user-friendly process, needs the regeneration of the adsorbents, hence desorption study is suggested.
5) The regeneration procedure should be optimize and safe disposal methods of adsorbents should be identified.

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