NAVY BLUE DYE REMOVAL BY SQUID SHELL POWDER AS ADSORBENT

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Abstract

In our daily life we are facing pollutions like air and water pollution. Water plays the major role in our daily life, but water was more polluted by the waste water (sewage) mixed with fresh water. Water gets polluted mainly by industries like Paper industries, Leather industries and textiles, etc., Textile wastes (DYE) plays an important role in polluting water sources. Dying mills use many kinds of artificial composite dye & discharge large amounts of highly coloured waste water. Different colouring agents like dyes, inorganic pigments, tannins, lighingetc, usually impart colour. Dye wastes are predominant. There are some methods used for the treatment of dye containing waste water, coagulation, rapid sand filter method and oxidation method etc., These methods are not economical. So we choose adsorption method which is economical. The results show higher efficiency of removal was 94% at the pH level 4 under the dosage level 8mg/l.

Introduction

Dyes have long been used in dyeing, paper and pulp, textiles, plastics, leather, cosmetics and food industries. Color stuff discharged from these industries poses certain hazards and environmental problems. These coloured compounds are not only aesthetically displeasing but also inhibiting sunlight penetration into the stream and affecting aquatic ecosystem. Dyes usually have complex aromatic molecular structures which make them more stable and difficult to biodegrade. Furthermore, many dyes are toxic to some microorganisms and may cause direct destruction or inhibition of their catalytic capabilities. Textile industry use dyes and pigments to colour their product There are more than 1,00,000 commercially available yes with over 7x105 tones of dye stuff are produced annually.

Many types of dye are used in textile industries such as direct, reactive, acid and basic dyes. Most of these dyes represent acute problems to the ecological system as they considered toxic and have carcinogenic properties. Which make the water inhibitory to aquatic life. Due to their chemical structure. Dyes possess a high potential to resist fading on exposure to light and water. The main sources of wastewater generated by the textile industry originate from the washing and bleaching of natural fibres and from the dyeing and finishing steps Given the great variety of fibres, dyes and process aids, these processes generate wastewater of great chemical complexity and diversity, which are not adequately treated in conventional wastewater treatment plant.

Objective

Dyes have long been used in dying paper and pulp textiles plastics leather cosmetics and food industries. Green house effect ozone layer depreciation water pollution. 10 to 15% days or real eased into the environment during process squid shell powder washing and filtering. A dyes is color substance aqueous solution and smartened to improve the dye on the fiber.

Process Adopted

There are various conventional methods of removing dyes including coagulation. At its most basic level, oxidation is the loss of electrons. It happens when an atom or compound loses one or more electrons. Some elements lose electrons more easily than others. These elements are said to be easily oxidized Generally speaking, metals including sodium, magnesium, and iron are easily oxidized.

Coagulation

In water treatment, coagulation is a process that occurs when a coagulant is added to water to "destabilize" colloidal suspensions. Conversely flocculation involves the addition of polymers that clump the small, destabilized particles Together into larger aggregates so that they can be more easily separated from the water.

Flocculation

Flocculation refers to the process by which fine particulates are caused to clump together into a floc. The floc may then float to the top of the liquid (creaming), settle to the bottom of the liquid (sedimentation), or be readily filtered from the liquid.

Oxidation

If you are a fan of oxygen-based cleaners or grateful for the sterilizing powers of hydrogen peroxide, then you have oxidation to thank. On the other hand, if you've ever had to deal with a rusty car or toss out browned fruit, then you have oxidation to blame. Oxidation may be a spontaneous process or it may be started artificially. Sometimes it is helpful, and sometimes it is very destructive.

Materials Required for the Experiment

Squid Shells are generally available near all the Seashore areas. They were collected and crushed to the extreme by using the ball mills and sieved to 25µm. These collected samples are then washed with the distilled water for the number of times until the dust particles in the squid shell material is completely removed. The powder is then filtered by using the filter paper. The wetted squid shell materials are dried by oven or by sun dried. These dried sample are used as adsorbent.

Experimental Procedures

The dye solution is prepared using 1litre of distilled water mixed with dye concentration of 35 mg at pH of 4. The initial concentration is measured with UV spectrometer by setting the wavelength of 520nm. The dye solution is then separated in conical flasks of about 200 ml and the adsorbent of 2g, 4g, 6g, 8g were added to the various conical flask and kept at shaker at 120rpm for 30 minutes then 20 mL of solution is taken from conical flask without disturbing the actual dye solution and measured for the first concentration similarly the concentration of solution is measured at the regular interval of 30 mins, 60 mins, 90 mins, 120 mins.

Varying Dye Concentration

The dye solution is prepared for the various concentration of 25mg/l, 50mg, 75 mg, 100 mg which were mixed per liter and above experiments were carried out .

Varying Adsorbent

The dye solution is prepared for concentration of 25 mg/l at pH of 4 and the adsorbent of 2g, 4g, 6g, 8g were added to the various conical flask and above experiments were carried out .Similarly the adsorbent dosage were varied for the concentration of 50 mg, 75 mg , 100 mg for the different pH of 4 , 7 , 10

Varying Reaction Time

The dye solution is prepared for dye concentration of 25 mg/l at pH of 4 and the adsorbent dosage were added. The concentration of dye solution is measured periodically for every 30 mins by using the uv spectrometer. Similarly the reaction time is varied for the concentration of 25mg/l, 50 mg/l, 75 mg/l, 100 mg/l for the different pH of 4, 7, 9 and for the adsorbent dosage of 2g, 4g, 6g and 8g

Varying pH

The dye solution is prepared for concentration of 25 mg at pH of 4 and the adsorbent of 2g, 4g, 6g, 8g were added to the various conical flask and above experiments were carried out. The pH of dye solution is varied by using the Hcl or NaOH and the experiments were carried out for the different pH of 4, 7 and 9

Experimental Studies Contact Time

The experiments that conducted that clearly reveals the percentage of removal is directly proportion to the contact time (i.e) percentage of removal increase with the increase in contact time and gets equilibrated after 120 minutes

Figure 1 PH meter

Figure 2 Shaker

Figure 3 Dye powder and solution

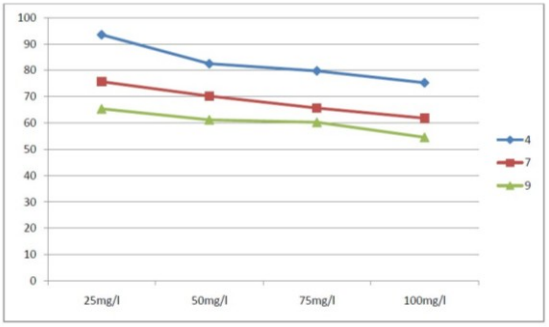

Figure 4 Initial concentration Vs. % of adsorption

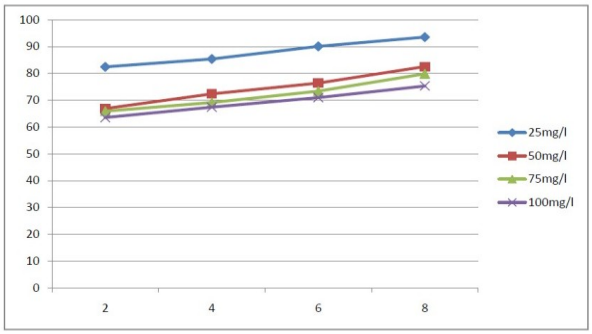

Figure 5 Dosage Vs. % of adsorption for pH4

Figure 6 Spectra photo meter (UV)

Conclusion

This project, natural adsorbent is used which is the powder obtained from the Squid shells. Squid shells are easily available and it is low cost adsorbent. Navy blue is one of the mostly used colours in all kinds of dyeing industries. There are about 55-75% of Navy blue dye is present in each materials coming out from the dyeing industries. They are by varying dye concentration, varying the adsorbent quantity, varying the reaction time. All the observations are noted and plotted as individual graphs. By decreasing the pH the percentage of removal is maximum, by changing the contact time Among the three results and graphs, varying the reaction time gives high efficiency Hence we conclude that varying the reaction time is the best method for the adsorption procedure. There are about 55-75% Navy blue dye is present in each materials coming out from the dyeing industries. They are by varying dye concentration, varying the adsorbent quantity, varying the reaction time. All the observations are noted and plotted as individual graphs. By decreasing the pH the percentage of Adsorption is the easiest and economical method for the removal of dye in textile waste water. In t removal is maximum, by changing the contact time that there is no such difference after the 30 minutes, by increasing the initial concentration the percentage of removal falls. The results show higher efficiency of removal was 94% at the pH level 4 under the dosage level 8 mg/l.

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