

Utilization of Silica Extracted from Soybean Hulls for Chromatographic Studies of Textile Dyes

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Abstract- Cultivation of soybean is extensively done in Madhya Pradesh especially in Malwa region for the extraction of oil in industries. Its seed are dehulled and the hulls being by- product of these industries, therefore a preliminary attempt was made to utilize this waste for extraction of silica from it by sodium carbonate fusion followed by hydrolysis.

The purity and percentage of extracted silica was estimated by conventional HF- method(hydro florid) and characterization is done by various physico-chemical techniques viz. IR, X-ray diffraction, TG pattern SEM, etc. The result shows absence of extraneous impurities in significant amount. The silica so obtained was used as adsorbent for chromatography of textile dyes and show good results. All the results are carried out at pH 7.0 using water as solvent.

Keywords – extraction, IR, X-ray diffraction, TG pattern SEM etc

I. INTRODUCTION

In pre independent India soybean were recognized as valuable food crop material as they contain about **40% HIGH QUALITY PROTEIN** and **20% HIGH POLY UNSATURATED OIL**. Mahatma Gandhi and Maharaja Gaikwad took considerable interest in 1940 and 1970 in popularizing cultivation and uses of soybean in India.

In order to develop methods for waste utilization was to overcome disposal problems of rice husk¹. Efforts have been made by R.R.L. Johrat. “**Central salt marine chemical research institute**” Bhavnagar², Prof. Bose of IIT, Kharagpur has developed “Poly crystalline silicones” from rice husk.

Silica gel is by far the most widely used adsorbent. This was introduced 1951³ for TLC work. This information has inspired and prompted to use the soybean hulls [a waste of soybean based industry] for some useful work.

II. PROPOSED ALGORITHM

- A. Isolation of silica from soybean hull by subjecting them for ashing in muffle furnace at about 1100⁰ C.
- B. Physico- chemical investigation: methods used are **IR, UV, DTA, TGA, X- Ray, Atomic Absorption, and SEM**.
- C. Standardization and activity grades of adsorbent are by using **BROCK MANN** and **SCHODDER**⁴.

D. Exploring practical utility as adsorbent using textile direct dyes.

Results and discussion

Coincidence of IR frequencies of the extracted silica, silica gel H and silica from rice husk indicate fair similarity in between them. Absence of any additional peak other than silica shows absence of impurities, T. G., DTA studies have shown approximately similar behavior as that of silica gel H. similarly X- Ray studies have also shown absence of any type of impurity. Trace metal studies has also shown absence of any extraneous impurities in significant amount which may contaminate it.

To detect presence of organic and inorganic impurity chromatographically as explained, the Rf values obtained coincided with the Rf values on untreated plates. **Results indicated that extracted silica being pure and can be used as an adsorbent like other commercially available adsorbent.**

Textile industries use different kind of dyes for dyeing purpose and thus having substantial problems with both the quality and quantity of its effluents. Effluents from the textile industries find their way in towater ways resulting in aquatic pollution. These dyes are toxic hence it is desirable to remove theses dyes from the textile waste before discharging in to water bodies.

To explore the practical utility of extracted silica as an adsorbent to remove the textile dyes pollutants from textile effluents a preliminary work regarding removal dyes is done by many workers. We have also tired same experiments on extracted silica on textile dyes (direct dyes).

The chromatographic patterns shown by these dyes on the chromatographic plates of extracted silica gel H are identical. Hence extracted can also be used as adsorbent for the chromatographic purpose.

The absorption spectra of the eluant obtained from the column containing individuals dyes were taken and the absorption maxima of pure textile dyes were collected from the factories it is observed that no migration was seen from the spectra of the eluants obtained from column containing either individuals dye or dye mixtures. It is shown that the dyes were absorbed by extracted slurry and were not eluated by the eluants and the eluant were clear.

Figure 1. DTA & TGA studies

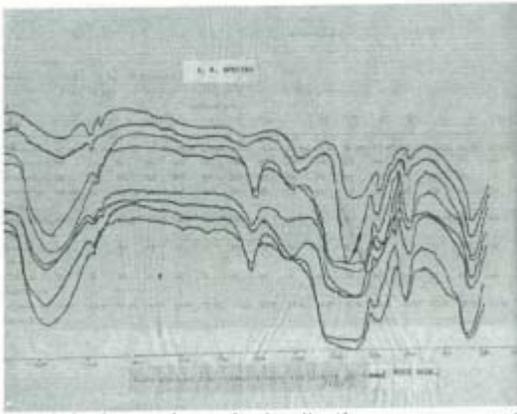
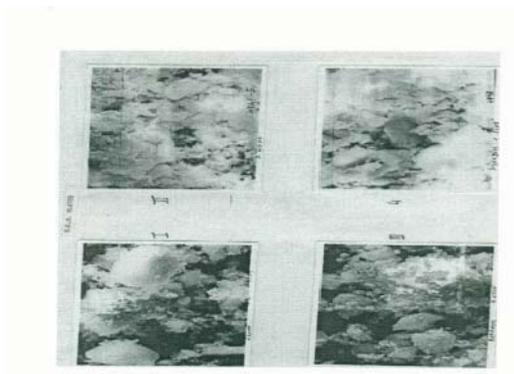


fig. 2 SEM of extracted silica



IV.CONCLUSION

The absorption spectra of the eluant obtained from the column containing individual's dyes were taken and the absorption maxima of pure textile dyes were collected from the factories it is observed that no migration was seen from the spectra of the eluants obtained from column containing either individuals dye or dye mixtures. It is shown that the dyes were absorbed by extracted slurry and were not eluated by the eluants and the eluants were clear.

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