

DEGRADATION APPROACHES OF COPPER(II) SOAP COMPLEXES WITH PERCENT DEGRADATION

Dr. Vandana Sukhadia*

ABSTRACT

In the field of science and technology, Photodegradation is considered as familiar and interdisciplinary due to inclusion of the growth of narrative methods for the fortification as well as preservation of our surroundings. The purpose of this study is to analyse the photocatalytic degradation of complexes include Copper as metal which is prepared by natural edible oils with long chain fatty acids and precise rate of reaction and overall study of photocatalytic degradation of Copper (II) Soya Thiourea complex in which N and S act as donor atoms, as a function of various functioning parameters such as catalyst loading light intensity, reactivity in polar and non-polar solvent. Investigation of comparative performance in percent degradation of Copper Soya soap complexes were also done expected that it will create novel hopes in the pitch of biological applications. Photocatalysis applications in the area of renewable energy and biological activities also will make innovative ideas in the field of biological and pharmaceutical studies.

Keywords: *Copper Mustard Thiourea Complex, Percent Degradation, Copper (II) Soya Thiourea Complex, Light Intensity.*

Introduction

Copper(II) soaps and their complexes called anionic surfactants which have Copper ion are acquisition esteem on description of their functional consequence such as herbicide, fungicide, anti microbial activities etc. In different fields of science and technology, Copper (II) soap complexes in which nitrogen and sulphur ligands are present show major role due to cause of pollution controller which is a major confront to material scientists. Significant information towards safe and green chemistry has been gain by the Degradation of lignin [1], polycyclic aromatic hydrocarbons [2], and synthetic dyes etc. use several Copper(II) complexes. [3,4]

Now a days ample study on transition metal complexes of heterocyclic ligands and polymetallic complexes have been completed and also their structure and biological characteristics have been discussed.[5-9] The effectiveness of Copper soaps as insecticides fungicides, bactericides, and herbicides were also studied.[10-16]

Study show about the photocatalytic degradation of Copper (II) soap complexes formed by Soyabean oil, in the occurrence of semiconducting Zinc oxide (ZnO) and noted spectrophotometrically.

* Department of Chemistry, S. D. Government College, Beawar, Rajasthan, India.

Experimental

Direct metathesis [17] were performed for the synthesis of Copper(II) soaps. By refluxing 1:1 ratio of Copper(II) Mustard soap and Copper(II) soya soap with ligand like urea, thiourea. [18], complexes were synthesised, filtered off, washed with purified hot benzene, and dried. The formed product was sticky in nature and get fined by passing throughout a filter, washed some times with ethanol and dried out. Finally clearly green in color and soluble in benzene non-polar and organic solvents but insoluble in polar solvent water product was formed[19].

Abbreviations of Copper complexes are as:

- [CST]: Copper Soya Thiourea complex
- [CMT]: Copper Mustard Thiourea complex

During the experiment, the degradation rate and the kinetics of photodegradation of CST and CMT complexes, photocatalytic activity of the complexes has been evaluated. We can use enclosed glass bottles (pyrex-50 ml) having 25 ml solutions for shielding of evaporation of solvent throughout irradiation with a 200 W tungsten lamp (visible light, Philips). Thermal emission was eliminate by using a water strain in degradation method.

Quantity of catalyst (ZnO) used for the study were variety from 0.01 g to 0.06 g. and a 200 W tungsten lamp (Philip) was used for irradiation with light radiation range 18 mWcm⁻² to 42 mWcm⁻². By varying the space between the light resource and reaction mixture and Suryamapi (CEL model SM 201), difference in the light intensity had done and measured. After each observation, calibration of the spectrophotometer was done. Benzene blank was used as reference, during analysis and absorbance measured. 680 nm for blank absorbance maxima were reported.

Result and Discussion

Percent degradation of the complex has calculated by this expression. [20]

$$\% \text{ degradation} = \frac{A_0 - A_t}{A_0} * 100.$$

Overall Percent Degradation Analysis

In term of percent degradation, photocatalytic degradation of Copper (II) soap complexes was expressed. The rate of complex degradation was recognized by color transform. At the start the color of complex was dark green- blue, which was step by step fades to light green after 2 h. Additionally light green was disappears bit by bit and solution gets almost colorless at the end 18 h light disclosure.

Percentage degradation of the complex calculated by this turn of phrase:

- $\% \text{ degradation} = \frac{A_0 - A_t}{A_0} * 100.$
- Here A_0 = initial concentration of Copper (II) soap complex
- A_t = concentration of Copper (II) soap complex after irradiation

To obtain the highest rate of degradation for photocatalytic degradation of Copper (II) soap complexes, various rate affecting parameters for percentage degradation were varied.

Effect of Light Intensity on Percent Degradation

The degradation of CMT and CST complex in benzene using Zinc oxide in powder way photocatalytic degradation process, the wavelength and intensity of the light irradiation source affects a lot. By increasing the light intensity, the rate of degradation decreases, which is graphically represented in Figure-1. At 34 mWcm⁻² light intensity both the complex molecules degrade with the identical rate and furthermore in both systems rate of degradation decrease extremely fast as shown in the figure.

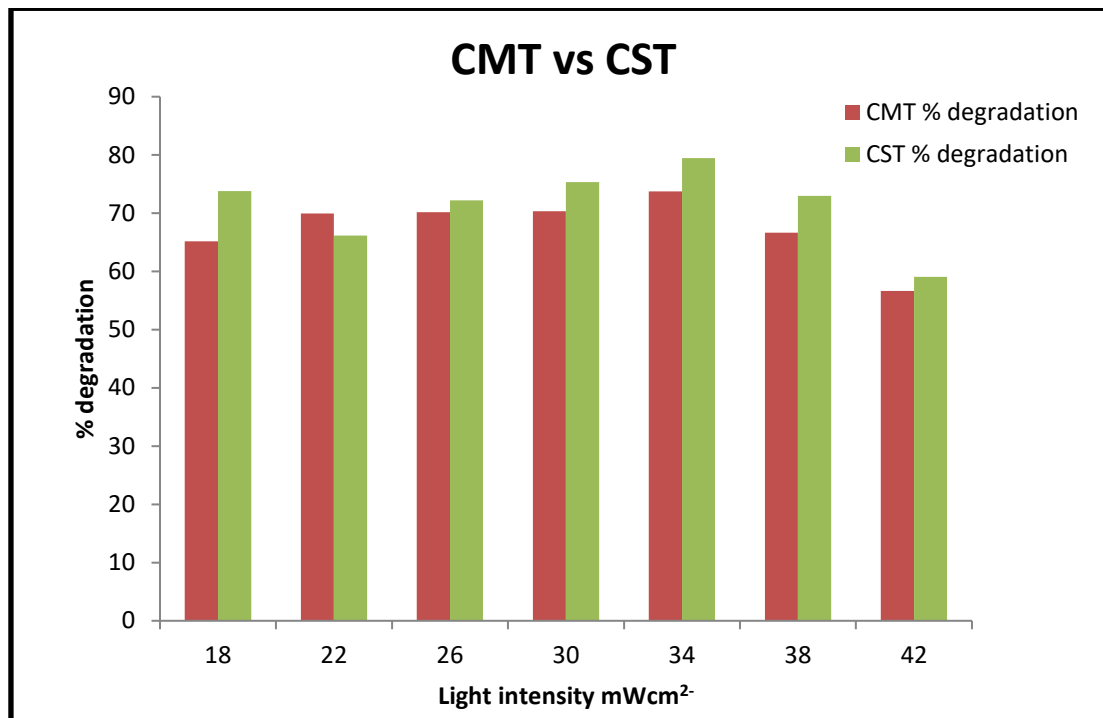


Figure 1: Effect of Light Intensity of CMT and CST Complexes in Term of Percent Degradation

Conclusion

This research work includes synthesis and percent degradation of Copper (II) soap complex (CST) of complex system (CST and CMT) in benzene solution with Zinc Oxide as semiconductor under UV visible light intensity. By increasing in light intensity, the rate of percent degradation of Copper (II) soap complexes increases although after a certain limit it decreases. Percent degradation of Copper (II) soap complexes complex also affected by different parameters.

Copper (II) Mustard Thiourea and Copper(II) Soya Thiourea complexes show a specific pattern against intensity of light and polarity of solvent has been described here. CMB complex shows higher resistivity at higher concentration. It reveals that photodegradation supply an unique involvement in a comparatively novel field of systematic acquaintance.

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Conflict of interest

The authors assert no conflict of interest, economic or else.

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