

**NTR GOVERNMENT DEGREE COLLEGE(W)**

(AFFILIATED TO PALAMURU UNIVERSITY)

**MAHABUBNAGAR**

**DEPARTMENT OF CHEMISTRY**

(2022-2023)

**A PROJECT ON "STUDY OF PHOTOCATALYTIC  
EFFICIENCY OF TITANIUM DIOXIDE FOR  
DEGRADATION OF ORGANIC POLLUTANT  
RHODAMINE B "**



# CHAPTER-1

## INTRODUCTION

The contamination of Waste water with toxic organic pollutants is one of the main environmental concerns. The presence of organic pollutants in water supplies causes vital harm to human health as well as aquatic organisms and restricts exposures to sunlight for aquatic plant and animal species, thus altering the aquatic environment. Industrial progress is intimately related to toxic chemicals that are damaging to individuals, the environment, and hard to break down naturally, such as dyes and phenol compounds, which are typically found in industrial effluents. Large quantities of organic effluents are being discharged from textile, leather, paint, and other industries into water bodies.

Industrial discharges are complex combinations of chemical and biological compositions that have multiple environmental impacts depending on the source of the toxicant. Because of the carcinogenic and mutagen effects, organic pollutants are of significant consequences even after exposure to small concentrations types of pollutants. The rapid rise in the use of organic pollutants in manufacturing poses a risk to the protection of the environment and human health. It is inevitable to manage waste water before disposal into the atmosphere to preserve human life and environmental sustainability.

Many novel methods have recently been developed for the degradation of organic pollutants in order to reduce their harmful effects on the environment. These organic contaminants in industrial waste water are removed using a number of techniques, including biological, chemical, physical and advanced oxidation processes. For the degradation of industrial effluents, photo catalysis is also one of the most effective and commonly utilized techniques. A heterogeneous catalyst has been excited in photo catalytic degradation processes using a variety of light sources. Organic pollution remediation frequently employs the photo catalytic agent titanium dioxide. Pure  $\text{TiO}_2$  has a significant band gap, which makes it more susceptible to excitation when exposed to UV radiation, and a high rate of electron-hole( $e^+/h^-$ ) pair recombination, which results in a relatively low photo catalytic efficiency. But a model photo catalyst needs to have a band gap that allows for visible light stimulation. As a result, substituting oxygen in the  $\text{TiO}_2$  lattice to reduce the optical energy band gap is one way to adjust inner band structure of  $\text{TiO}_2$  and cause visible light absorption.  $\text{TiO}_2$  can absorb more visible light or be more reactive in the UV range by being doped with metal ions.

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**DEPARTMENT OF CHEMISTRY**

(2022–2023)

***A PROJECT ON “STUDY OF PHOTOCATALYTIC  
EFFICIENCY OF TITANIUM DIOXIDE FOR  
DEGRADATION OF ORGANIC POLLUTANT  
METHYLENE BLUE “***



## ABSTRACT

Organic compounds, which are produced by various industries, result in a variety of contaminant problems.  $\text{TiO}_2$  based photo catalysts can be used to improve the quality of waste water.  $\text{TiO}_2$  is better because of its non toxicity, strong degradation ability, and great thermal and chemical stability. The annihilation or transformation of dangerous chemical wastes to harmless end products, such as  $\text{CO}_2$  and  $\text{H}_2\text{O}$ , is the purpose of titanium dioxide nano particles, which are meant to be both supplemental and complimentary to current water treatment technologies. The use of doped  $\text{TiO}_2$  nano particles in photo catalytic waste water degradation has shown enormous potential in eliminating these complex organic pollutants. Visible light and solar light may now be used effectively as a light source because to advancements in the properties of doped  $\text{TiO}_2$  nano particles. Doped  $\text{TiO}_2$  nano particles have a lot of potential in terms of water and energy issues because they have two main characteristics: they are effective at eliminating pollutants that are persistent in nature and they use energy effectively. In this project photocatalytic efficiency of  $\text{TiO}_2$  for degradation of organic pollutant Methylene blue under visible light radiation is studied.

## KEYWORDS:

$\text{TiO}_2$  photo catalyst, Metal doped  $\text{TiO}_2$ , Photo catalytic degradation, Organic pollutants, Waste water.

A PROJECT WORK ON  
**CAFFEINE ANALYSIS**  
SUBMITTED DURING THE 3<sup>rd</sup> YEAR OF

BACHELOR OF SCIENCE  
BOTANY,ZOOLOGY,CHEMISTRY

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2022-2023



# ABSTRACT

Tea and coffee are the most common and popular Indian drinks. Tea powder is prepared from *Camellia sinensis* plant. Its preparation process includes withering, rolling, fermentation, drying. Coffee is prepared from *Coffea arabica* (coffee beans). Its preparation process includes dry method and wet method. It contains many active ingredients but the most important ingredient is caffeine. Caffeine is a Central nervous system (CNS) stimulant that has several health benefits. Coffee contains Riboflavin (vitamin B2), Niacin (vitamin B3) phenolic compounds or antioxidants. Tea contains vitamin C, tea protein mainly contains glutelin and prolamin. Tea gives excitement and freshness. Coffee reduces digestive disorders. excess intake results in ulcers.

## Key words:-

Caffeine, phenolic compounds, antioxidants, glutelin, prolamin.



SAPONIFICATION-THE PROCESS OF MAKING SOAP

PROJECT WORK

DEPARTMENT OF CHEMISTRY

NTR GOVT DEGREE COLLEGE (W) – MAHABUBNAGAR



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## INTRODUCTION

Soap is essential to our personal life. Soaps are made from fats, oils or fatty acids. Soap is a sodium salt of long chain fatty which have cleansing properties in water. The most common process of making soap is "Saponification" in which triglycerides present in fats and oils react with alkali such as NaOH and KOH to form soap and glycerol. If NaOH is used as alkali, the soap formed called hard soap and is used in washing soap. If KOH used as alkali the formed is soft soap and used in some liquid hand soap and shaving creams.

There are many types of soaps:





**"ESTIMATION OF OXALATE ION IN GUAVA FRUIT"**

A PROJECT REPORT ON  
A PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT  
FOR THE AWARD OF DEGREE OF



**BACHELOR OF SCIENCE IN BOTANY ZOOLOGY  
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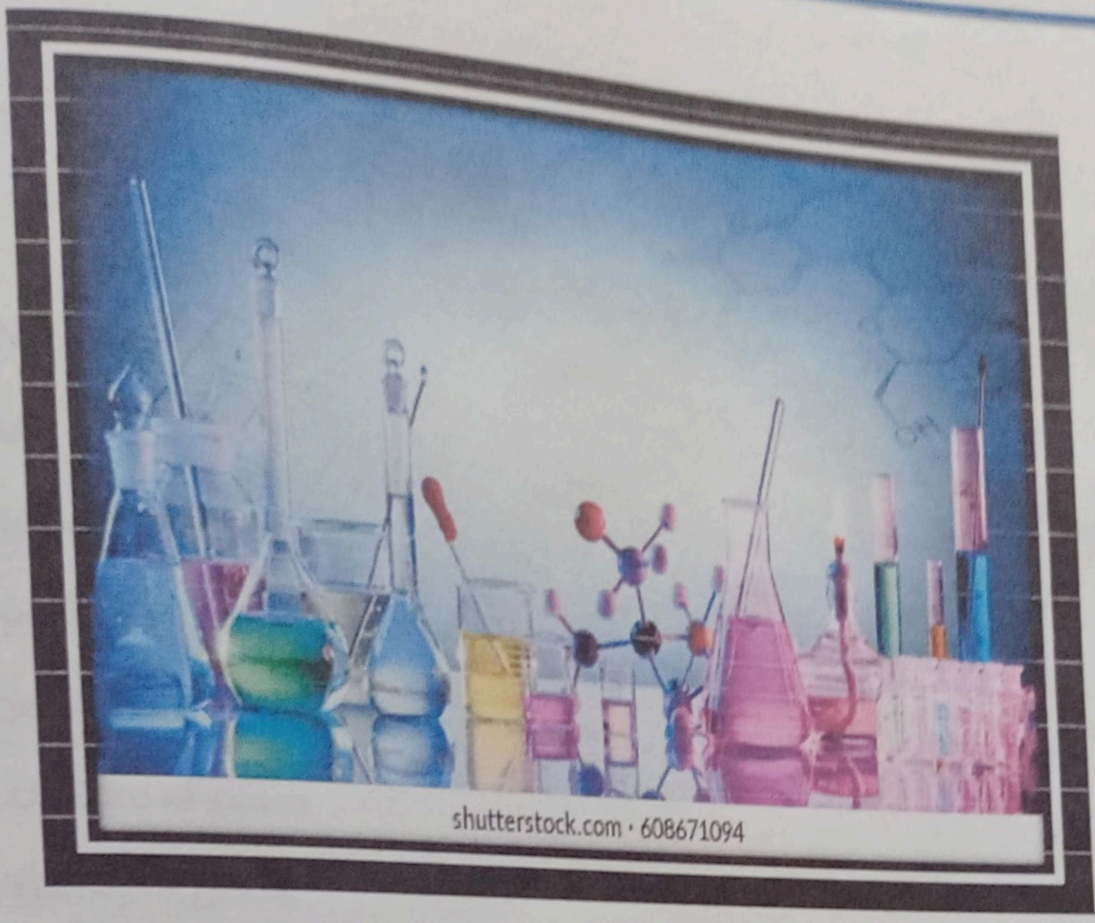
**DEPARTMENT OF CHEMISTRY  
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## ABSTRACT

To study the presence of oxalate ions in guava fruit at different stages of ripening. Guavas are plants in the Myrtle family (Myrtaceae) genus: psidium (meaning "pomegranate" in Latin), which contains about 100 species of tropical shrub. On ripening it turns yellow in colour. Rich in vitamin C, this fruit is a rich source of oxalate ion whose content varies during the different stages of ripening.

The oxalate content of guava fruits at different stages of ripening were found out by permanganometric method. Oxalate rich foods are usually restricted to some degree, particularly in patients with high urinary oxalate level. Guava fruit have the highest percentage of vitamin C among citrus fruits. It also contains oxalate amount of which varies with ripening of the fruit. During ripening of guava fruit; the oxalate content increases progressively and the fully ripe fruit has a next maximum oxalate content. Oxalate form an insoluble complex with calcium in the urine, or hyper-oxaluria, is even more important to stone formation than high levels of calcium or hypercalciuria. Excessive intake of food and drink containing oxalate leads to calcium oxalate stone. Also, excessive intake of vitamin C which metabolized to oxalate may lead to hyper calciuria and an increase in stone formation. Pain medications can be prescribed for symptom relief. Surgical techniques have also been developed to remove kidney stones.



- \* Aim of the project
- \* Introduction
- \* Theory
- \* Requirements
- \* Chemical Equation
- \* Procedure
- \* Precautions
- \* Observation
- \* Calculations
- \* Result
- \* Conclusion
- \* Bibliography

A PROJECT REPORT ON  
STUDY OF PHOTOCATALYTIC EFFICIENCY OF TITANIUM DIOXIDE FOR  
DEGRADATION OF ORGANIC POLLUTANT RHODAMINE B  
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## ABSTRACT

Organic compounds, which are produced by various industries, result in a variety of contaminant problems.  $\text{TiO}_2$  based photo catalysts can be used to improve the quality of waste water.  $\text{TiO}_2$  is better because of its non toxicity, strong degradation ability, and great thermal and chemical stability. The annihilation or transformation of dangerous chemical wastes to harmless end products, such as  $\text{CO}_2$  and  $\text{H}_2\text{O}$ , is the purpose of titanium dioxide nano particles, which are meant to be both supplemental and complimentary to current water treatment technologies. The use of doped  $\text{TiO}_2$  nano particles in photo catalytic waste water degradation has shown enormous potential in eliminating these complex organic pollutants. Visible light and solar light may now be used effectively as a light source because to advancements in the properties of doped  $\text{TiO}_2$  nano particles. Doped  $\text{TiO}_2$  nano particles have a lot of potential in terms of water and energy issues because they have two main characteristics: they are effective at eliminating pollutants that are persistent in nature and they use energy effectively. In this project photocatalytic efficiency of  $\text{TiO}_2$  for degradation of organic pollutant Rhodamine B under visible light radiation is studied.

## KEYWORDS:

$\text{TiO}_2$  photo catalyst, Metal doped  $\text{TiO}_2$ , Photo catalytic degradation, Organic pollutants, Waste water.

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**PROJECT REPORT ON**  
**"DIFFUSION OF SOLIDS IN LIQUIDS"**  
**3RD YEAR OF BACHELOR OF SCIENCE IN BZC(E/M)**

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## ABSTRACT

When substance are brought in contact with each other they intermix , this property is known as diffusion. This property of diffusion takes place very rapidly in case of liquids. where as solids also not show this process of diffusion with each other but which we an observe in case of solids is that the diffusion of solids in liquid takes place at a very slow rate.

If a solid is kept in contact with an excess of solvent in which it is soluble, some portion of the solid gets dissolved. We know that this process is known as dissolution of solid in liquid and this process has taken place due to the diffusion of solid particles into liquid medium.



## **CONTENTS:**

- **DIFFUSION OF SOLIDS IN LIQUIDS**
- **INTRODUCTION**
- **MELTING AND BOILING POINT**
- **PROPERTIES OF SOLUTIONS**
- **VAPOUR PRESSURE**
- **OBJECTIVE**
- **TEMPERATURE**
- **SIZE OF THE PARTICLES**
- **MASS OF THE PARTICLE**
- **EXPERIMENT-1**
- **EXPERIMENT-2**
- **RESULT**
- **REFERENCE**

**AN INVESTIGATORY PROJECT ON**  
**MEASURING THE AMOUNT OF ACETIC**  
**ACID IN VINEGAR BY TITRATION**  
**METHOD.**

**NTR GOVT DEGREE COLLEGE FOR**  
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## ABSTRACT

Vinegar is a liquid consisting mainly of acetic acid ( $\text{CH}_3\text{COOH}$ ) and water. The acetic acid is produced by the fermentation of ethanol by acetic acid bacteria. Vinegar is now mainly used as a cooking ingredient, but historically, as the most easily available mild acid, it had a great variety of industrial, medical, and domestic uses, some of which (such as a general household cleanser) are still promoted today.

Commercial vinegar is produced either by fast or slow fermentation processes. In general, slow methods are used with traditional vinegars, and fermentation proceeds slowly over the course of months or a year. The longer fermentation period allows for the accumulation of a nontoxic slime composed of acetic acid bacteria. Fast methods add mother of vinegar (i.e., bacterial culture) to the source liquid before adding air using a venturi pump system or a turbine to promote oxygenation to obtain the fastest fermentation. Commercial vinegar contains residual alcohol (about 6 to 7 %).

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A  
PROJECT ON  
TO DETECT THE PRESENCE OF DIFFERENT ANIONS AND  
CATIONS IN DIFFERENT BRANDS OF TOOTHPASTE AND  
DETERMINE ITS QUALITY”

A PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT  
FOR THE AWARD OF DEGREE OF



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2023

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**A**  
**PROJECT REPORT ON**

**STUDY OF OXALATE IONS CONTENT IN GUAVA FRUIT**



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1. Aim of the project
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**A**  
**PROJECT REPORT ON**  
**PRESENCE OF CASEIN PROTEIN FROM MILK**  
**NTR GOVERNMENT DEGREE COLLEGE FOR**  
**WOMENS**



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## ABSTRACT

Analysis of different samples of milk to determination amount of casein, protein, minerals, carbohydrates, fats and water content. Casein is a major constituent in milk and is a mixed phosphorous protein. Casein is present in milk as a caseinated in the form of micells. Micelle have negative charge and adding acid to milk the negative charges are neutralized.  $\text{Ca}^{2+} + \text{caseinated} + 2\text{CH}_3\text{COOH}(\text{aq}) \rightarrow \text{Casein} + (\text{CH}_3\text{COO})_2\text{Ca}$  Addition of saturated ammonium sulphate solution to the milk casein was precipitated out. Then add 30ml water heat the precipitate at  $40^\circ\text{C}$  then add 1% acetic acid drop wise precipitate is obtained and filter the precipitate, dry weigh. The weight of precipitate give the amount of Casein present in a milk. This procedure is repeated for different samples of milk. For analysis of amount protein present in milk done by adding the small amount of calcium oxide to 5 drops of milk in a test tube and 3 drops of water check the sample with litmus then heated the test tube in flame precipitate is obtained and filter the precipitate, dry weigh. The weight of precipitate give the amount of protein present in milk. this procedure is repeated for different samples of milk. For analysis of fat Butyrometer is used. It shows amount of fat and water present in milk.

Likewise amount of casein, protein, minerals, carbohydrates, fats and water content is determined in different samples of milk. Cow, Buffalo, goat, Sheep, Horse, Camel and Donkey milk. Out of these samples Cow milk have good for nutrition. Type equation here. Donkey milk is rich in Vitamins.

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A PROJECT WORK ON EDIBLE OIL ANALYSIS  
DEPARTMENT OF CHEMISTRY  
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## ABSTRACT

Edible oils consist of about 96% triacylglycerides, composed of different fatty acids. Some other compounds or groups of compounds, such as free fatty acids, phospholipids, phytosterols, tocopherols, other antioxidants or waxes, can also be found. Fatty acids, free or bound to glycerol are susceptible to oxidative processes resulting in a wide range of volatile and non-volatile degradation products. Therefore one of the major challenges for the oil processing industry is to maintain the high quality of the product after processing until use by the consumer. However, the oxidative stability of edible oils not only depends on conditions during storage, but also the history of the raw material and the processing steps involved.

The pathway of the oxidative degradation of edible fats and oils results in many physical changes in the product, such as increased viscosity, changes in composition, and the formation of degradation products. To measure and assess these changes, a wide range of methods is available for describing the oxidative state of edible oils. Additionally, some methods can be applied to assess the oxidative stability of the product. Oxidative state and oxidative stability should be clearly distinguished: the first describes the product at the present time, and the latter tries to give information about the possible behavior of the product during further storage. In this context, it must be taken into consideration that the measurement of a parameter is one thing, while the interpretation and usefulness of that parameter to describe the real situation are other tasks

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ISOLATION OF CASEIN PROTEIN FROM MILK

PROJECT WORK

DEPARTMENT OF CHEMISTRY

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## ABSTRACT

Casein is isolated from milk commercially and is industrially important because after dissolving in alkaline solutions and drying, it becomes a sticky substance that can be used in glues, the coating of paper, and the binding of colours in paints and wallpaper. Casein protein is a protein found in milk that gives milk its white colour.

Most protein shows a minimum solubility at their isoelectric pH and this principle is used to isolate casein by adjusting the pH of the milk to 4.6, its isoelectric point. The purpose of casein will be isolating the proteins casein and lactalbumin from a sample of milk. In the isolation of casein from milk, the precipitation of albumin and globulin can be observed.



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**SAPONIFICATION-THE PROCESS OF MAKING SOAP**

**PROJECT WORK**

**DEPARTMENT OF CHEMISTRY**

**NTR GOVT DEGREE COLLEGE (W) – MAHABUBNAGAR**



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**2022 - 2023**

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**EFFECT OF TEMPERATURE OF VITAMIN C IN TOMATO**

**PROJECT WORK**

**DEPARTMENT OF CHEMISTRY**

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**2022-2023**

## ABSTRACT

Vitamin C content of tomato fruit is at its highest level in raw green tomatoes and then decreases as the fruit develops into mature stage. One medium sized green tomato has approximately 29 mg of vitamin C. Levels of vitamin C generally decreases as the fruit ripens from green raw stage to mature stage. As the fruit ripens the levels of flesh increases even to over ripe stage. Most of the vitamin C content in the tomato is in the jelly i.e The flesh portion of the fruit. So one medium sized green tomato has approximately 20 mg of vitamin C .

Vitamin C in a tomato decreases due to the increase in temperature because vitamin C is a water soluble and temperature sensitive vitamin.

∴ Tomatoes that are cooked will have less vitamin C than uncooked or not tomatoes.

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