M.G.V.C. Arts, Commerce and Science College Muddebihal

Dt: Vijayapur-586212

Department of Chemistry

List of Students Projects for the year 2020-21

Si No	Year	Class	Title of the Project
1	2020-21	BSc V Sem	1. Sterilization of water by using Bleaching powder 2. Study of presence of Insecticides and pesticides in fruits and vegetables. 3. To study the amount of Casein present in different samples of Milk. 4. Study of the effect of acids and bases on the tensile strength of fibers.

DEPARTMENT OF CHEMISTRY
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M.G.V.C. Arts, Commerce and Science College Muddebihal

Dt: Vijayapur-586212

Department of Chemistry

Students Projects for the year 2020-21

Title of the Project:

"Sterilization of water by using Bleaching Powder"

Class BSc VI Sem

DEPARTMENT OF CHEMISTRY
M.G.V.C. COLLEGE MUDDEBIHAL

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Sterilization of Water by using Bleaching Powder

Abstract

This project look at the technique called Sterilization of Water by using Bleaching Powder which is used to purify water and make it fit for drinking.

Water is an important and essential ingredient in our quest for survival on this planet. It is very essential for carrying out various metabolic processes in our body and also to carry out Hemoglobin throughout the body. A daily average of 1 gallon per man is sufficient for drinking and cooking purposes. With the increasing world population, the demand for drinking water has also increased dramatically and therefore it is very essential to identify resources of water from which we can use water for drinking purposes. Since many available resources of water do not have it in drinkable form, in order to fulfill the demand of water, it needs to be purified and supplied in an orderly and systematic way.

Purification of Water

There are many methods for the purification of water, such as:

1. Boiling
2. Filtration
3. Bleaching powder treatment
4. SODIS (Solar Water Disinfection)

Need for a Stable Purification Technique

Therefore we need a purification technique which can be used anytime and anywhere, does not require the use of any third party content and which is also economically feasible on both normal scale and large scale. Hence we look at the method of purification of water using the technique of treatment by bleaching powder commonly known as "Chlorination".

Introduction

In 1854 it was discovered that a cholera epidemic spread through water. The outbreak seemed less severe in areas where sand filters were installed. British scientist John Snow found that the direct cause of the outbreak was water pump contamination by sewage water. He applied chlorine to purify the water, and this paved the way for water disinfection. This discovery led to governments starting to install municipal water filters (sand filters and chlorination). So in the 1890s America started building large sand filters to protect public health. These turned out to be a success. Instead of slow sand filtration, rapid sand filtration was now applied

Subsequently, Dr. Fuller found that rapid sand filtration worked much better preceded by coagulation and sedimentation techniques.

But the victory obtained by the invention of chlorination did not last long. After some time the negative effects of this chemical were discovered. Chlorine vapours reach faster than water and it was linked to the aggravation and cause of respiratory disease. Water experts started looking for alternative water disinfectants. In 1902 calcium hypochlorite and ferric chloride were mixed in a drinking water supply in Belgium, resulting in both coagulation and disinfection. To this day, bleaching powder remains the most commonly used drinking water disinfectant. Almost all systems use some type of chlorine based process to disinfect water. In addition to controlling disease-causing organisms, chlorination offers a number of benefits, including:

- Reduces many disagreeable tastes and odors.
- Eliminates slime bacteria, molds and algae that commonly grow in water supply reservoir
- Removes chemical compounds that have unpleasant tastes and hinder disinfection
- Helps remove iron and manganese from raw water.

For more than a century, the safety of drinking water supplies has been greatly improved by the addition of bleaching powder. However, bleaching powder also reacts with the organic matter naturally present in water, such as decaying leaves thus forming a group of chemicals known as disinfection by-products. When used with modern water filtration methods, chlorine is effective against virtually all microorganisms. Bleaching powder is easy to apply and small amounts of the chemical remain in the water as it travels in the distribution system from the treatment plant to the consumer's tap, thus ensuring prevention of recontamination of water.

But what is bleaching powder and how is it prepared?

Bleaching powder or Calcium hypochlorite is a chemical compound with formula $Ca(ClO)2$. This chemical is considered to be relatively stable and has greater available chlorine than sodium hypochlorite (liquid bleach). It is prepared by either calcium process or sodium process.

Calcium Process

$2Ca(OH)2 + 2\ Cl2 \rightarrow Ca(ClO)2 + CaCl2 + 2\ H2O$

Sodium Process

$2Ca(OH)2 + 3Cl2 + 2NaOH \rightarrow Ca(ClO)2 + CaCl2 + 2H2O + 2NaCl$

What are the actual processes involved in disinfecting and purifying water?

The combination of following processes is used for municipal drinking water treatment worldwide:

1. Pre-chlorination - for algae or any biological growth control
2. Aeration - removal of dissolved iron and manganese

3. Coagulation - for flocculation

4. Coagulant aids also known as polyelectrolyte's - to improve coagulation and for thicker floc formation

5. Sedimentation - for solids separation i.e. removal of suspended solids trapped in the floc

6. Filtration - for removal of carried over floc

7. Disinfection - for killing bacteria

Out of these processes, the role of Bleaching powder is only in the last step i.e. for Disinfection of water.

Aim:

To determine the dosage of bleaching powder required for sterilization or disinfection of different samples of water.

Requirements:

Burette, titration flask, 100ml graduated cylinder, 250ml measuring flask, weight box, glazed tile, glass wool.

Bleaching Powder, Glass wool, 0.1 N $Na_2S_2O_3$ solution, 10% KI solution, different samples of water, starch solution.

Pre-Requisite Knowledge:

1. Bleaching powder when dissolved in contains dissolved chlorine, liberated by the action of bleaching powder with water

$Ca(OCl)2+H2O \rightarrow Ca(OH)2+Cl2$

2. The amount of Chlorine present is determined by treating a known volume with excess of 10% KI solution, when equivalent amount of I2 is liberated. The I2 thus liberated is then estimated by titrating it against a standard solution of Sodium thiosulphate using starch solution as indicator.

$Cl2+2KI \rightarrow 2KCl+I2$

$2Na2S2O3\ I2+ \rightarrow Na2S4O6+2NaI$

Procedure:

1. Preparation of bleaching powder solution Weigh accurately 2.5g bleaching powder and transfer it to a 250ml conical flask. Add about 100ml of distilled water. Stopper the flask and shake it vigorously. The suspension thus obtained is filtered through glass wool and the filtrate is diluted with water to make the volume 250ml. The solution obtained is 1% bleaching powder solution.

2. Take 20ml of bleaching powder solution in a stoppered conical flask and add it to 20ml of 10% KI solution. Stopper the flask and shake it vigorously. Titrate this solution against 0.1N $Na_2S_2O_3$ solution taken in the burette. When the solution in the conical flask becomes light yellow in color, add about 2ml starch solution. The solution now becomes blue in color. Continue titrating till the blue color just disappears. Repeat the titration to get a set of three concordant readings.

Observation:

Volume of bleaching powder sol. taken 20ml•

Volume of KI solution added 20ml•

Volume of different samples of water 100ml•

Titration Table for Distilled Water

Sr.No	Initial Reading	Final Reading	Final Vol. of 0.2N $Na_2S_2O_3$ sol. Used (ml)	Mean Vol. (ml)
1	2.0	10.1	8.1	8.2
2	10.1	18.4	8.3	
3	18.4	26.6	8.2	

Titration Table for Tank Water

Sr.No	Initial Reading	Final Reading	Final Vol. of 0.2N $Na_2S_2O_3$ sol. used (ml)	Mean Vol (ml)
1	15.1	25.2	10.1	10.1
2	25.2	35.2	10.0	
3	35.2	45.4	10.2	

Titration Table for Pond Water

Sr.No	Initial Reading	Final Reading	Final Vol. of 0.2N $Na_2S_2O_3$ sol. used (ml)	Mean Vol. (ml)
1	7.2	12.1	4.9	4.8
2	12.1	16.9	4.8	
3	16.9	21.9	4.7	

Calculations:

TANK WATER (Sample I)

Amount of bleaching powder used to disinfect 100ml of tap water = (8.2 – 10.1) ml of 0.2 N of Na2S4O6 solution

= 1.9ml Of 0.2 N of Na2S4O6 solution

Since, 250ml bleaching powder solution contains 2.5g bleaching powder

Thus, 1ml of bleaching powder solution contains bleaching powder = 2.5/250 = 0.01g

Also, 20ml of bleaching powder solution = 8.2ml of 0.2N of Na2S2O3

So 1ml of Na2S2O3 solution = 20/8.2 ml of bleaching powder solution

Volume of bleaching powder solution used to disinfect 100ml of water = 1.9x20/8.2ml

1.9 x 20/8.2 ml. of bleaching powder solution =1.9x20x0.01/8.2 (gm) Bleaching Powder

Amount of bleaching powder used to disinfect 1 ltr. of water = 1.9x20x0.01x1000/8.2x100 = 0.4634gm

POND WATER (Sample II)

Amount of bleaching powder used to disinfect 100ml of water. = (8.2 – 4.8) ml of 0.2 N Na2S2O3 solution = 3.4ml

Accordingly,

Volume of Ca(OCl)2 solution required to disinfect 1lt of water = 3.4x20x0.01x1000/8.2x100 = 0.8293 gm.

Result

Amount of the given samples of bleaching powder required to disinfect one liter of water

Samples I = 0.4634gm

Samples II = 0.8293 gm

Since amount of bleaching powder required for disinfecting POND WATER is more than that required for TANK WATER, thus it can be concluded that former contains more impurities.

Conclusion

While household bleaching solutions are widely available but it is not recommended to use it for household water treatment. If bleach is used for household water treatment system, concentration should be regularly checked and proper dosage strategy should be developed recommended by authorized organizations

Bleaching Powder water treatment is useful in disinfecting water in places or conditions where boiling method cannot be practiced.

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Dt: Vijayapur-586212

Department of Chemistry

Students Projects for the year 2020-21

Title of the Project:

"Study of presence of Insecticides and Pesticides in fruits' and vegetables"

Class BSc VI Sem

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Study the Presence of Insecticides and Pesticides in Various Fruits and Ve

Abstract

To Study the Presence of Insecticides and Pesticides in Various Fruits and Vegetables.

In the past decade there has been a tremendous increase in the yields of various crops to meet the demand of overgrowing population, achieved by using pesticides and insecticides.

These are chemicals that are sprayed over crop to protect it from pests. For example: DDT, BHC, zinc phosphide, Mercuric chloride, dinitrophenol, etc. All pesticides are poisonous chemicals and are used in small quantities with care. Pesticides are proven to be effective against variety of insects, weeds and fungi and are respectively called insecticides, herbicides and fungicides. Most of the pesticides are non biodegradable and remain penetrated as such into plants, fruits and vegetables. From plants they transfer to animals, birds and human beings who eat these polluted fruits and vegetables. Inside the body they get accumulated and cause serious health problems. These days preference is given to biodegradable insecticides like Malathion. The presence of insecticides residues in even raw samples of wheat, fish, meat, butter etc. have aroused the concern of agricultural administrators, scientists and health officials all over the world to put a check over the use of insectiodes and to search for non insecticidal means of pest control.

Materials required:

Mortar and pestle, Beakers, Funnel, Glass rod, Filter paper, China dish, Water bath, Tripod stand, Fusion tube, Knife, Test tube.

Requirements:

Samples of various fruits and vegetables, Alcohol, Sodium Metal, Ferric Chloride, Ferrous Sulphate Crystals, Distilled Water and Dil. Sulphuric Acid.

Theory

Nitrogen present in organic compounds is detected by "Lassaigne's Test". The elements present in the compound are converted from covalent form into the ionic form by fusing the compound with sodium metal. Following reaction take place:

$$Na + C + N \xrightarrow{\Delta} NaCN$$

(Sodium cyanide)

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Department of Chemistry

Students Project Reports

Class: B.Sc VI Sem

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Dt: Vijayapur-586212

Department of Chemistry

Students Projects for the year 2020-21

Title of the Project:

"To study the amount of Casein present in different samples of Milk"

Class BSc VI Sem

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Amount of casein present in different samples of milk.

Aim

To determine the amount of casein present in different samples of milk

Milk is a multinutrient fluid and it is the primary source of nutrition for human. It consists of 80% of proteins. The protein in the milk is classified into casein and whey protein. Milk protein consists of 80% of casein and 20% whey protein. The function of casein is to provide energy to human body. The name of casein is related to the family of phosphoproteins. These proteins are commonly found in the mammalian milk. This study deals with the precipitation of casein from the various milk samples such as cow milk, goat milk, buffalo milk and also the samples that availed from the market. The technique of precipitation of casein is used to predict the protein content in the milk samples.

Introduction

Casein is the main protein constituent of milk. It constitutes about 80% of the total protein in cow's milk and about 3% of its weight. It group of protein precipitated when the milk is slightly acidified. It dissolves slightly in water, extensively in alkalis' or strong acids. Casein is a complete protein meaning that it contains all of the essential amino acids, which the body can not manufacture on its own. When dried, it is a white, amorphous powder without taste and odour. It is a mixed phosphoprotein and occurs in milk as calcium salt (calcium caseinate) in the form of micelle. The micelle has a negative charge. When an acid is added to the milk, the negative charges are neutralized.

Calcium caseinate + acetic acid → casein (s) + calcium acetate (aq)

The quantity, quality and fat-content from the various milk samples differ with the type of particular mammals and their fodder. The composition of milk varies with according to the animals from which it comes, providing the correct growth rate and development for the young of that species. Casein is a slow digesting protein and it was suspended in the milk in a complex called micelle. m in diameter. Milk compositionThe micelles are spherical and are 0.04 to 0.03 varies with the stage of location, age and breed. Milk is colloidal nature due to the presence of proteins. The proteins are heavy molecules; they form colloids when dispersed in water medium. The primary function of protein in living cells is to promote growth and maintenance. The nitrogen content of milk is distributed among casein 76%, whey protein and non-protein nitrogen is 6% The structure of protein consist of a polypeptide chain of amino acids joined together by peptide linkages. Around the world, there are more than six billion consumers of milk and milk products. Over 750 million people live in dairy farming households. It is used in paints for fast drying water-soluble medium (Figure 1). Casein based glues are formulated from the mixture of casein, water, hydrated lime and sodium hydroxide

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Department of Chemistry

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Department of Chemistry

Students Projects for the year 2020-21

Title of the Project:

"Study of the effect of acids and bases on the tensil strength of fibers"

Class BSc VI Sem

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Study of the effect of acids and bases on the tensile strength of fibers

Objectives

"Project Report Effects of Acids & Bases on the Tensile Strength of Fibres"
The aim and objective of this project is to
(i) *Compare the tensile strength of given samples of nylon and cotton fibres.*
(ii) To investigate the *Effect of Acids and Alkalies on the tensile strength of these fibres.*

Introduction

Depending upon the sources, the various types of fibres can be classified into the following three main categories :
(i) Animal fibres e.g. Wool & Silk.
(ii) Vegetable Fibres e.g. Cotton & Linen.
(iii) Synthetic Fibres e.g. Nylon & Polyester.

Besides their chemical composition and properties, most important property of these fibres is their tensile strength. ***Tensile strength mean the extent to which a fibre can be stretched without breaking and it is measured in terms of minimum weight required to break the fibre.*** To determine the tensile strength of any fibre, it is tied to a hook at one end and weighted are slowly added to the other end until the fibre break. Since peptide bonds are more easily hydrolyzed by bases than acids therefore wool and silk are affected by basis not by acids. It is because of this reason that wool and silk threads breakup into fragments and ultimately dissolve in alkalines.
In other words alkalines decreases the tensile strength of animal fibres (wool & silk). Vegetable fibres (cotton & linen), on the other hand, consist of long polysaccharide chains in which the various glucose units are joined by ethers linkage. Since ethers are hydrolised by acids and not by bases therefore, vegetable fibres are affected by acids but not by bases. ***In other words acids decreases the tensile strength of vegetable fibres. In contrast, synthetics fibres such as nylon & polyester practically remains unaffected by both acids and bases.***

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Students Project Reports

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25	S1827758	Saraswati B. Mathapati	S.P. Sondur	S.P. Sondur
26	S1827760	Sarvesh P Sondur	[illegible]	[illegible]
27	S1827762	Shahid H. Banwan	S.B. Biradar	S.B. Biradar
28	S1827765	Shankaragoud B. Biradar	[illegible]	[illegible]
29	S1827766	Sharanabasava S. Shidaganal	[illegible]	[illegible]
30	S1827767	Shashankumar Hirehal	[illegible]	[illegible]
31	S1827769	Shivakumar R. Manami	[illegible]	[illegible]