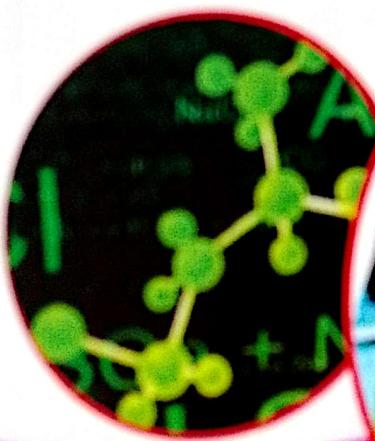


S.2

New curriculum

Chemistry

Class Work Book



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1st
Edition
2023

Group activities | Chapter Exercises | Sample Papers

CHAPTER 1: ACIDS AND ALKALIS.



Competence: You should be able to appreciate the properties and importance of acids, bases and salts in everyday life.

By the end of this chapter you should be able to,

- Recongise that locally available materials and substances are either acidic or alkaline.
- Understand the concept of pH as a measure of its strength and alkalis.
- Understand the reaction between acids and alkalis.

Introduction.

Acids and alkalis are encountered daily in chemistry and our every day life. Both acids and alkalis make the critical part and parcel of our livelihood. They play an efficient role inside and outside our bodies. Many substances we use in every day life are made up of either an acid or alkali. Acids and alkalis have different distinct physical and chemical properties which will be looked at ahead.

-Wash the given fruits provided with clean water, cut one piece from each given fruit, bite a small piece and taste them, each time rinsing your mouth with clean water after every taste. Touch to feel them.

-Dissolve ash wood, baking powder in little distilled water in beakers, taste each of them and also touch to feel them.

-Taste and feel other substances provided.

--Record your observations in the table below. Share your answers to the rest of other members in the class.

Substance	Taste	Feeling when touched	Nature of substance.
Raw lemon			
Wood ash			
Detergent			
Raw mango			
Soap solution			
Aloe vera			
Baking powder			
Toothpastes			
Bleaching solution			

Conclusion.

After carrying out the above activity, what general conclusion can you make about acids and alkalis?

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1:2 EXAMPLES OF ACIDS AND ALKALIS /BASES .

Natural source	Acid	Natural source	Acid
Vinegar	Acetic acid	Sour milk (Curd)	Lactic acid
Orange	Citric acid	Lemon	Citric acid
Tamarind	Tartaric acid	Ant sting	Methanolic acid
Tomato	Oxalic acid	Nettle sting	Methanolic acid

1:3 ACID-BASE INDICATORS.



1:3:1 Plant extract indicators.

Many leaves and flower petals of red, purple and blue plants contain chemicals called **anthocyanin** which dissolve in water and change colour in response to acidity or alkalinity of a substance. Solutions obtained from these plants are called **plant extract indicators**.

Activity 1:3:1 (a).

- (a) In your respective groups, research using internet or any other source of information such as text books about what is meant by "acid -base indicator?"

- (a) In your respective groups, read and make research about the scenario below.

In holiday, you visited your S.2 friend in the village, and as you moved around their farm, you saw red cabbage plants. You informed your friend that a suitable solution can be obtained from red cabbage plants which you could use to know whether a substance is acidic or alkaline. Your friend could not believe you and instead argued how red cabbage plants could be used in chemistry of acids and alkalis.



Task.

Provide a practical guidance to your friend to settle the argument using any one acidic and alkaline substance naturally available.

(c) The importance of pH concept.

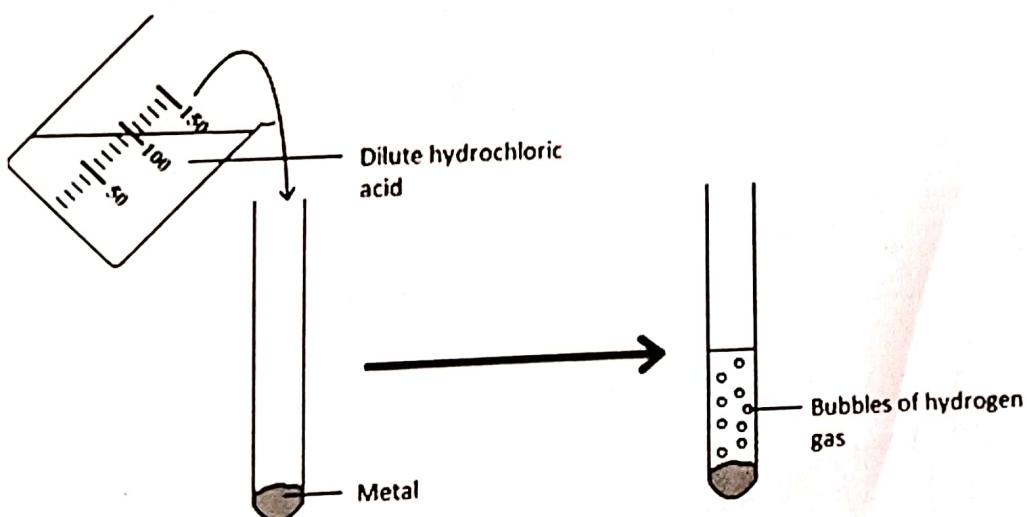
The pH concept in chemistry plays a significant role in various scientific disciplines for example human body is a complex system that relies on maintenance of a precise pH balance to function optimally , the field of food and nutrition, soil science , aquatic life, water treatment, brewing industry and medicine

Write a detailed report explaining the importance of pH concept above scientific disciplines.

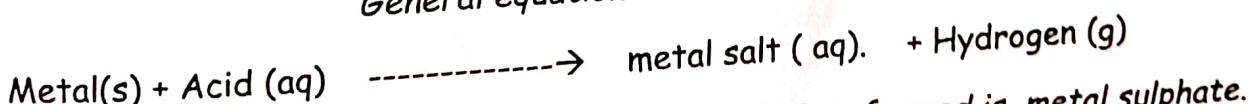
1:5. CHEMICAL PROPERTIES (CHEMICAL REACTIONS) OF ACIDS AND ALKALIS..

(a) Reaction of acids and some metals

Dilute acids react with some metals for example calcium, magnesium, zinc and iron forming a corresponding metal salt solution and liberating hydrogen gas.



General equation



Note, (I) For dilute sulphuric acid , the salt solution formed is metal sulphate.

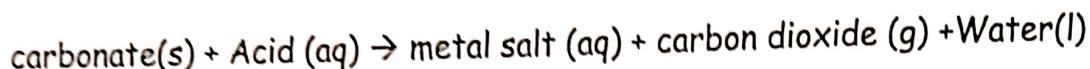
Practical investigation two. (Group activity)

You are provided with zinc powder, magnesium ribbon, iron powder, dilute sulphuric acid and all other materials needed for practical investigation. Carry out an investigation for the reaction between given metals and dilute acid provided. Write a detailed report for the practical investigation

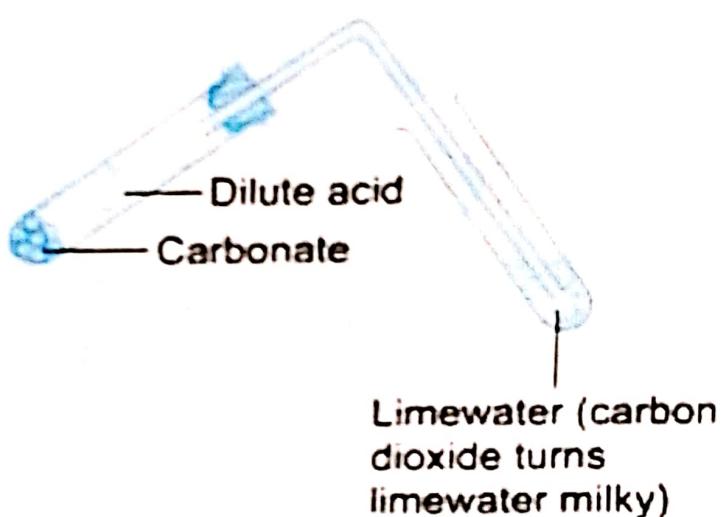
(b) Reaction of acids and solid carbonates and solid hydrogen carbonates.

Dilute acids react with solid carbonates and solid hydrogen carbonates producing a metal salt solution, liberating carbon dioxide gas and water.

General equation of reaction



Note: The solid carbonate used in the set apparatus below can be replaced with



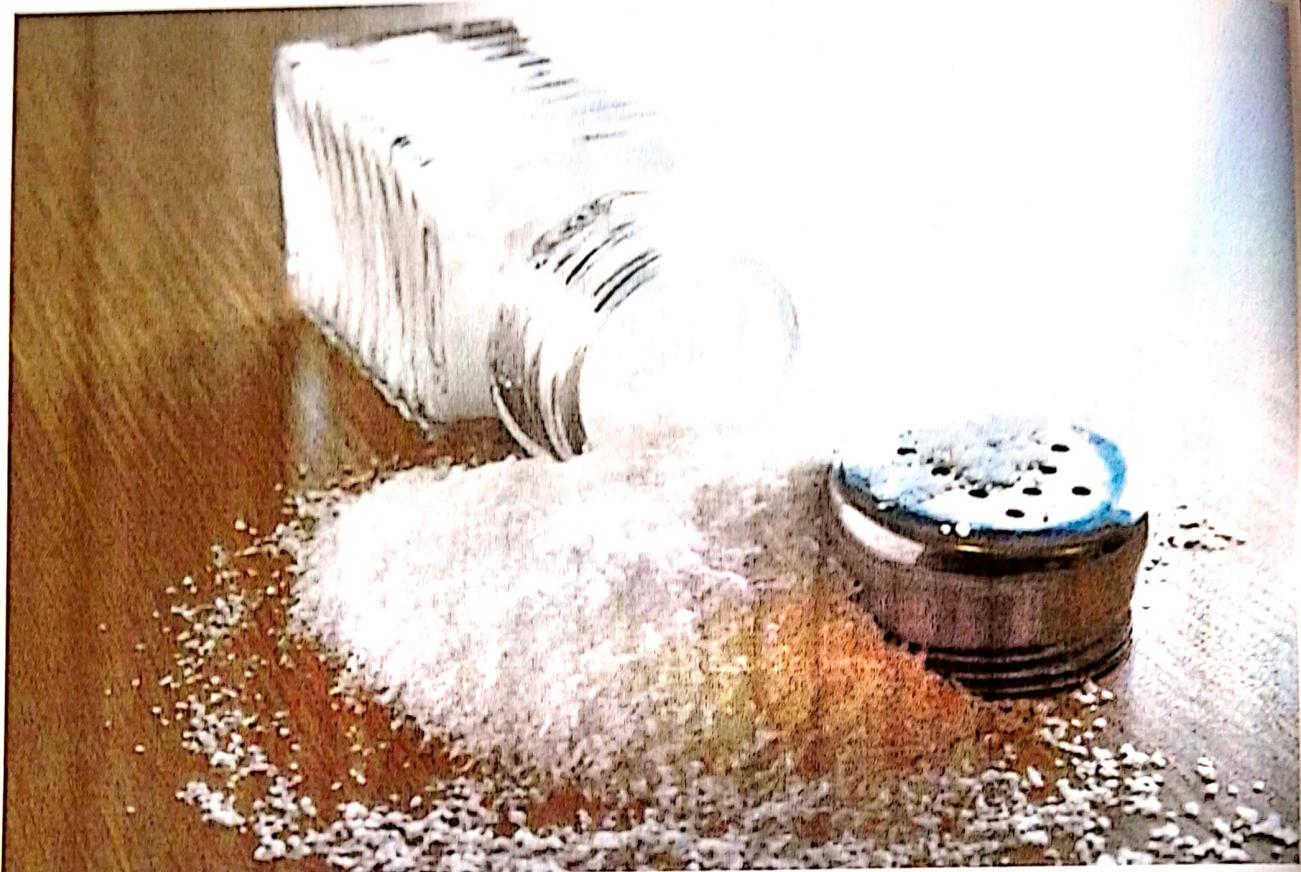
solid hydrogencarbonates. In each reaction, carbon dioxide gas is liberated.

Practical investigation one (group activity)

You are provided with sodium carbonate, calcium carbonate, magnesium carbonate, zinc carbonate, lead(II) carbonate, copper (II) carbonate, dilute nitric acid and all other materials needed for practical investigation. Carry out the practical investigation between the given solid carbonates and dilute acid provided. Write a detailed report for the practical investigation.

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CHAPTER 2: SALTS .



Competency: You should be able to appreciate that acids and alkalis form salts.

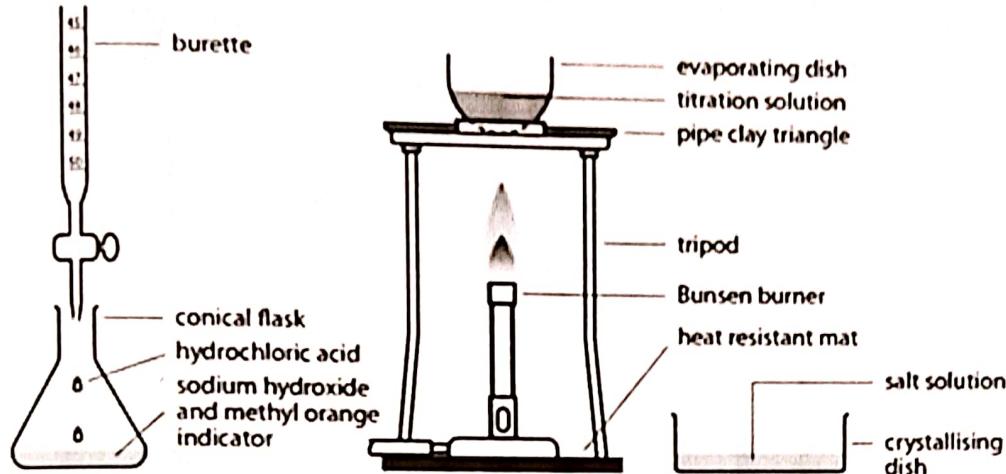
By the end of this chapter, you should be able to:

- a) Be familiar with and be able to carry out neutralization reactions to prepare salts.
- b) Know and appreciate the uses of common salts in everyday life.

Introduction.

Sodium chloride is one of the commonest known salts. It is known to almost everyone because of its wide spread use in every day life. Sodium chloride is essential for animal life and many other salts are used in everyday life and at commercial scale.

endpoint is reached, and noting the volume of acid $V\text{ cm}^3$ used to reach endpoint. The volume of alkali is again pipetted and $V\text{ cm}^3$ of acid added without using indicator. Resultant solution is evaporated over a water bath, then solution cooled for crystals to form.



Sample question. (scenario)

Your teacher gave you an activity to be conducted in the laboratory. One of the salts you are required to use for the activity given is sodium chloride. You went to the laboratory and requested the laboratory attendant for sodium chloride. The laboratory attendant told you that sodium chloride was used up a few days ago. He instead advised you and provided you with all materials required to prepare a small sample of the salt using a suitable method which you agreed to do in a group.



(b) From a metal carbonate and dilute acid.

Remember one of the chemical properties of acids; is acids react with metal carbonate and metal hydrogen carbonates as well to liberate carbon dioxide, forming a corresponding metal salt and water in the reaction. Some salts can be prepared in the laboratory using this method.

Students group activity.

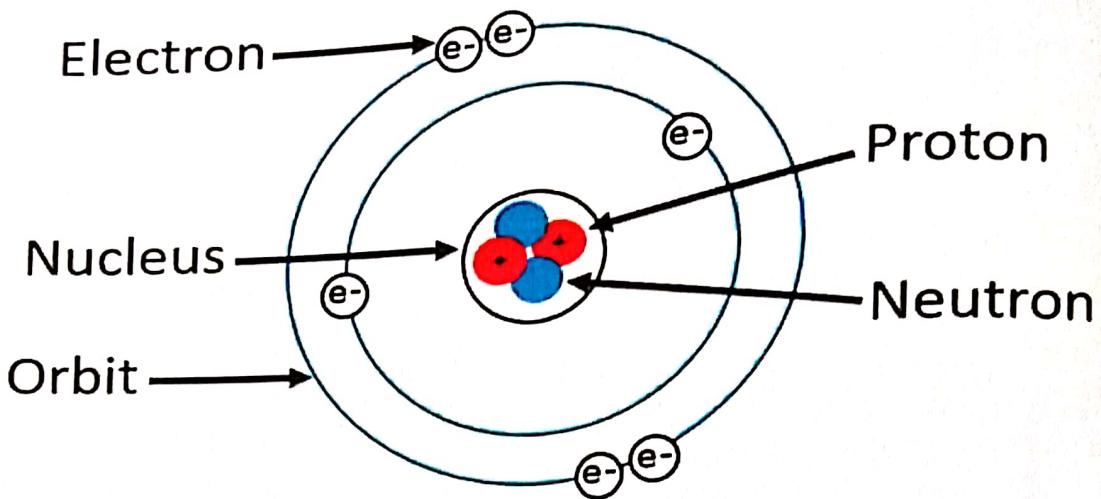
Preparation of dry sample of lead(II) nitrate salt can be prepared from lead(II) carbonate.

Materials needed.

- (I) Lead(II) carbonate.
- (II) Dilute nitric acid.
- (III) Beaker.(Plastic and glass)
- (IV) Stirring rod.
- (V) Spatula.
- (VI) Source of heat.
- (VII) Filter papers.
- (VIII) Filter funnel.

Procedures /What to do.

- (I) Using a spatula ,add lead(II) carbonate powder to dilute nitric acid in a beaker a little at a time, as you stir until lead(II) carbonate is added in excess.
- (II) When effervescence stops, filter the mixture to remove off excess unreacted lead(II) carbonate. Resultant solution is lead(II) nitrate solution collected as the filtrate.
- (III) Put Lead(II) nitrate solution in a glass beaker and carefully evaporate the solution.
- (IV) Remove the solution from heat and allow it to cool for crystals to form.
- (V) Filter off lead(II) nitrate crystals formed, and wash it with two times with a small amount of distilled water.
- (VI) Dry lead(II) nitrate crystals between two filter papers.



Group activity 1

In your respective groups, use internet or any other source of information such as text books, make research , read and;

- (a) write short notes about the model structure of an atom and the fundamental particles of an atom.
- (b) (I) Write briefly what is meant by the terms "Atomic number" and "atomic number"
 - (II).Show how the number of neutrons can be obtained using the general representation of atom of element below



- (c) write what is meant by the term " electronic configuration " and the guidelines for writing the electronic configuration.

3.5 Using electronic configuration to determine the group and the periodic table to which an element belongs.

Group activity.

In your respective groups, use the periodic table extract of the first 20 elements and discuss the activity that follows.

	Group							Number of occupied shells
	1	2	3	4	5	6	7	0
Period 1								He 2 2 1
Period 2	Li 2.1 3	Be 2.2 4	B 2.3 5	C 2.4 6	N 2.5 7	O 2.6 8	F 2.7 9	Ne 2.8 10 2
Period 3	Na 2.8.1 11	Mg 2.8.2 12	Al 2.8.3 13	Si 2.8.4 14	P 2.8.5 15	S 2.8.6 16	Cl 2.8.7 17	Ar 2.8.8 18 3
Period 4	K 2.8.8.1 19	Ca 2.8.8.2 20						
	1	2	3	4	5	6	7	8

Number of electrons in highest occupied shell (except for helium)

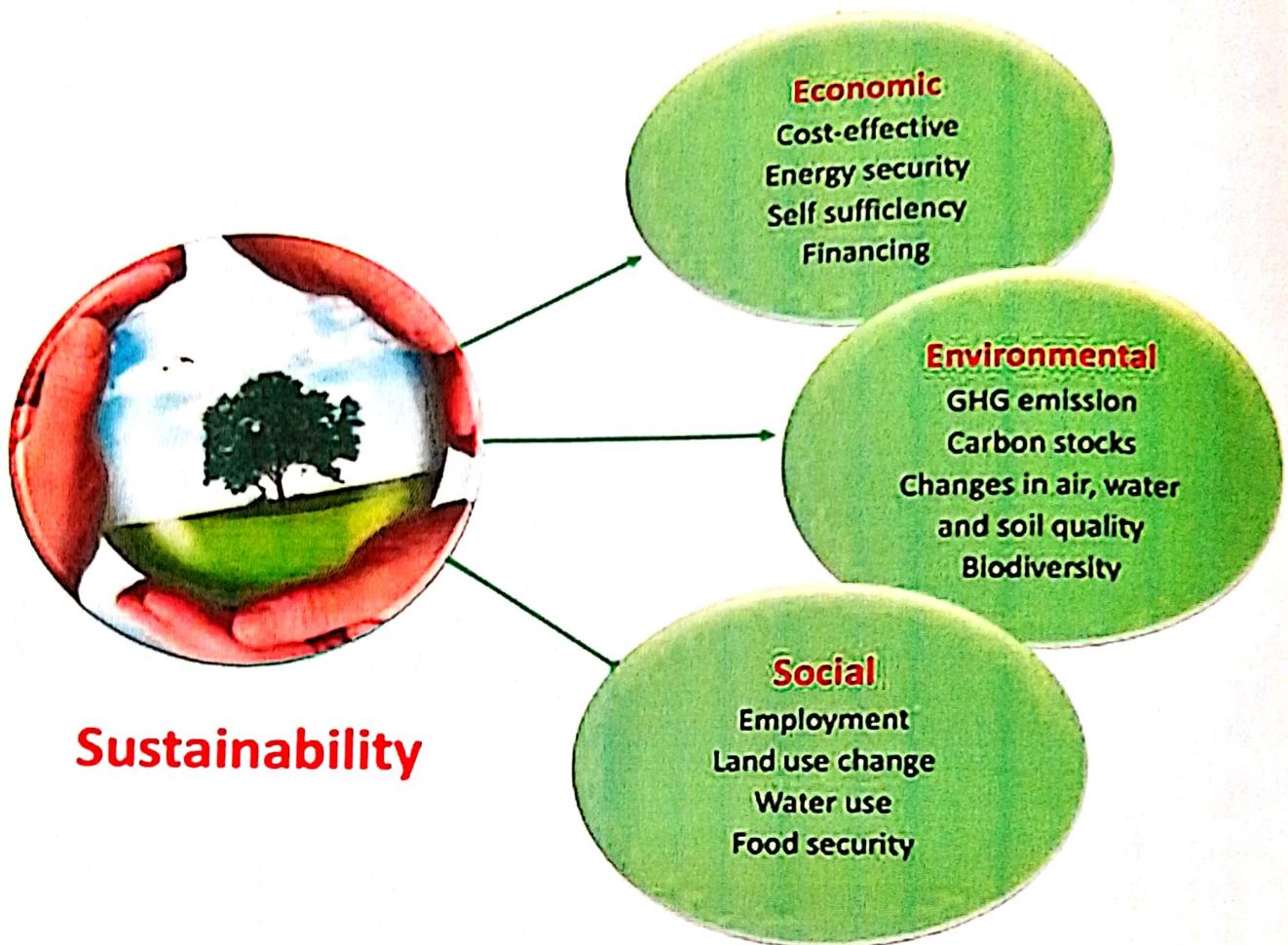
- (a) Observe well the electronic structure of elements in each period and write your observation in terms of similarity for each period
 - (I) Period 2.
 - (II) Period 3
 - (III) Period 4
- (b) From your observations, give a general conclusion about the period to which an element belongs.
- (c) Observe well the electronic configuration of elements in each group. Write your observation in terms of similarity for each group.
 - (I) Group I

CHAPT 4: CARBON IN THE ENVIRONMENT.



Competency: You should be able to investigate the diversity of carbon compounds in the environment

4.2 Use of carbon based fuels sustainably .



Living in an age where life revolves around energy in all forms, a crisis of sustainability is indeed indispensable. With the continued consumption of carbon based fuels by expanding population, maintenance of sustainability is a difficult proposition hence strong abatement practices and policies to encourage research on fuels have been developed.

Students activity.

In your respective groups, make research and write a report on how carbon based fuels In your community can be made more sustainable. Read out your report to the rest of the class members.

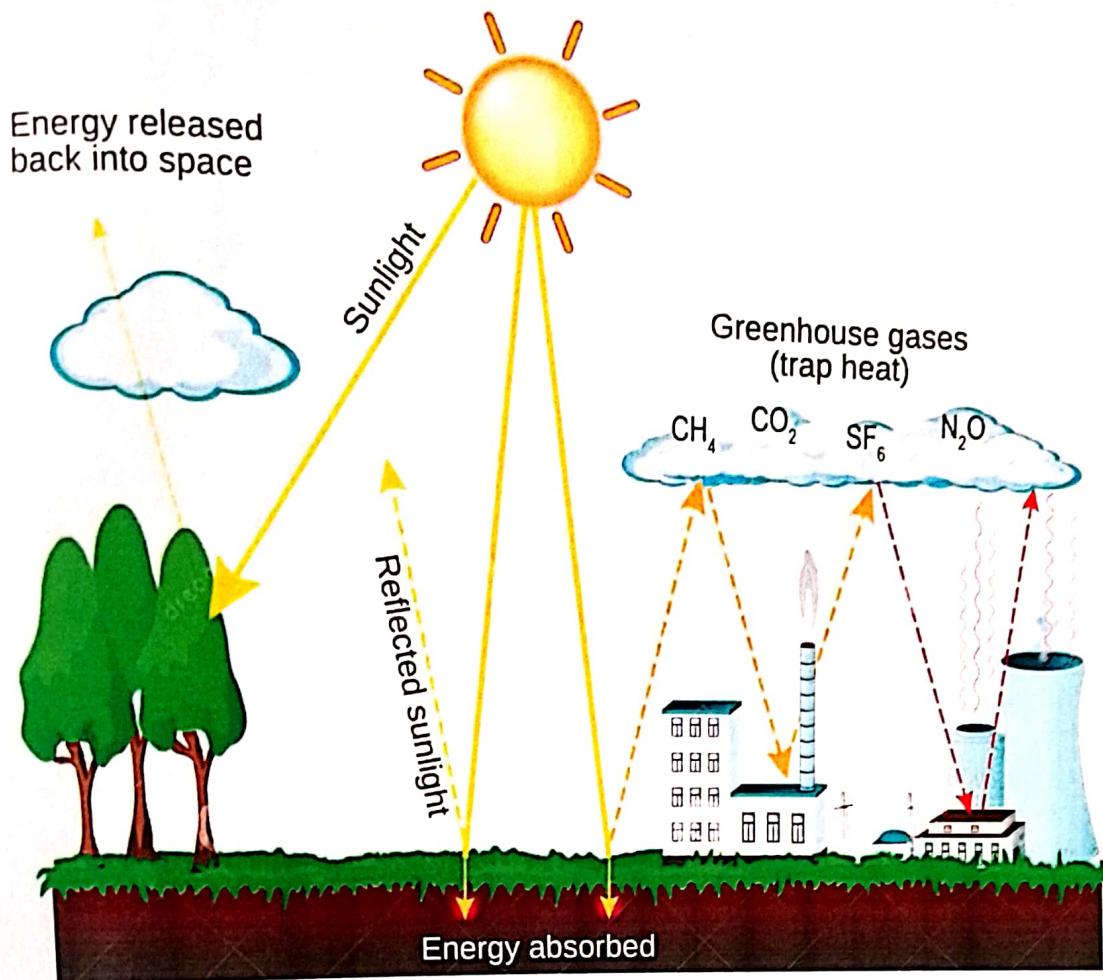
4:3 What is the impact of burning of carbon based fuels on the environment.



Questions.

- (a) State what happens
 - (I) in the plastic bottle when you added vinegar to baking powder during the preparation of carbon dioxide gas using the set up .
 - (II) to the balloon during the preparation of the carbon dioxide. Explain your results.
- (b) Write word equation of reaction that took place.

Greenhouse effect

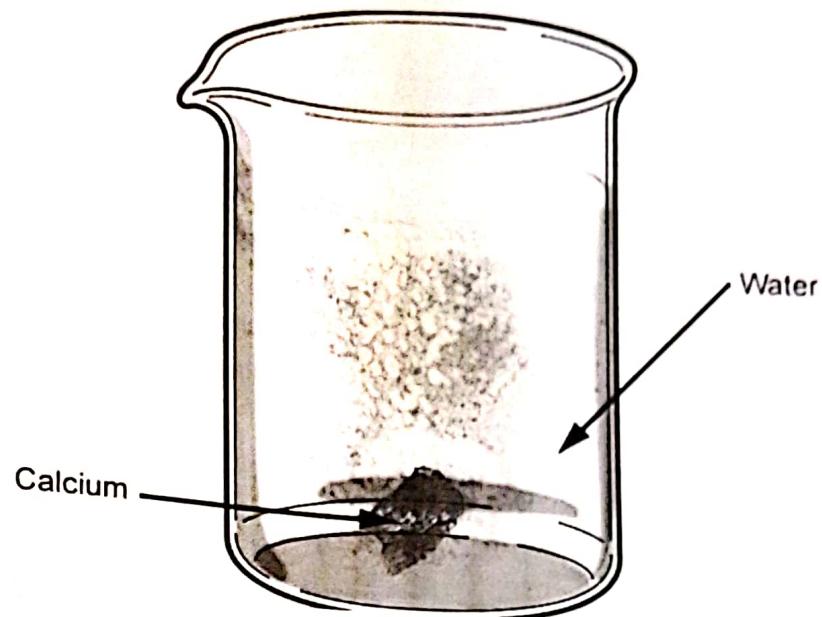


Students activity.

1. In your respective groups, use internet or any other source of information such as text books, research about the following.
 - (a) State what is meant by green house
 - (b) Explain what is meant by the term green house effect
 - (c) State what is meant by greenhouse gas, and mention the different examples of greenhouse gases.
2. Write short notes about the sources of different greenhouse gases(where they come from), their effect and suggest the possible control measures.

4:8. The types of water (Soft and hard water)

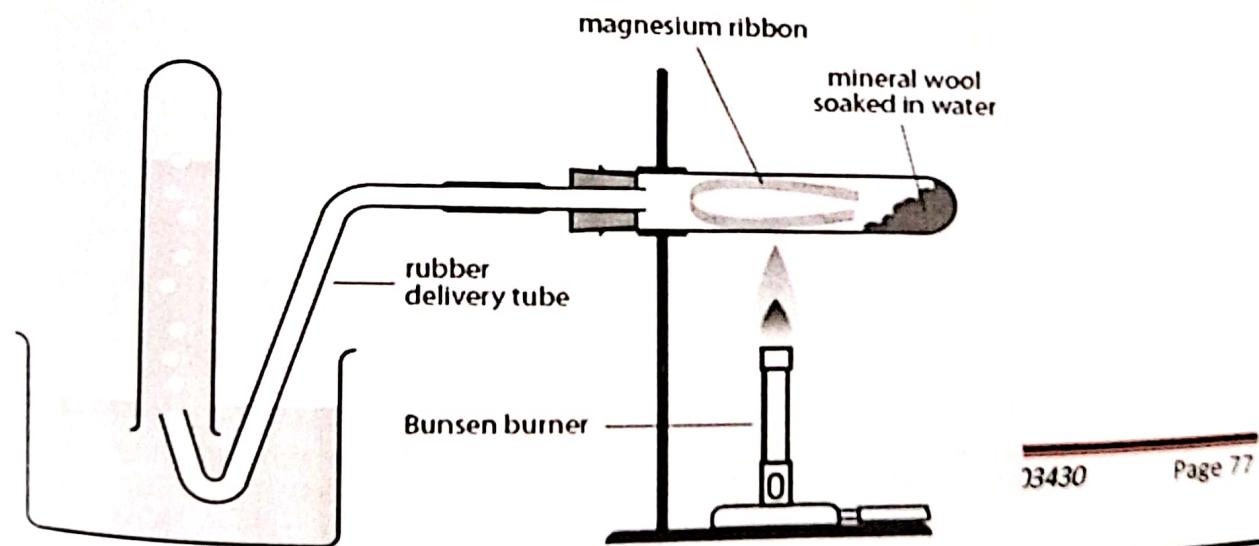
5:0(C) The reaction of calcium with water.

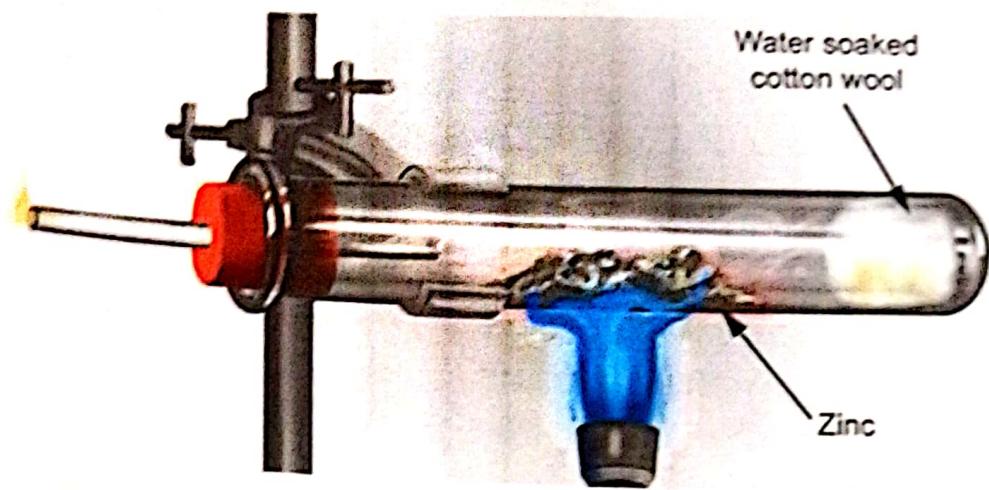


Students group activity.

In your respective groups, use internet or text books and make research about the reaction between calcium and water. Carry out a practical investigation in the laboratory about the reaction between calcium and water. Write a detailed report about the investigation.

5.0(d) The reaction between magnesium and water.

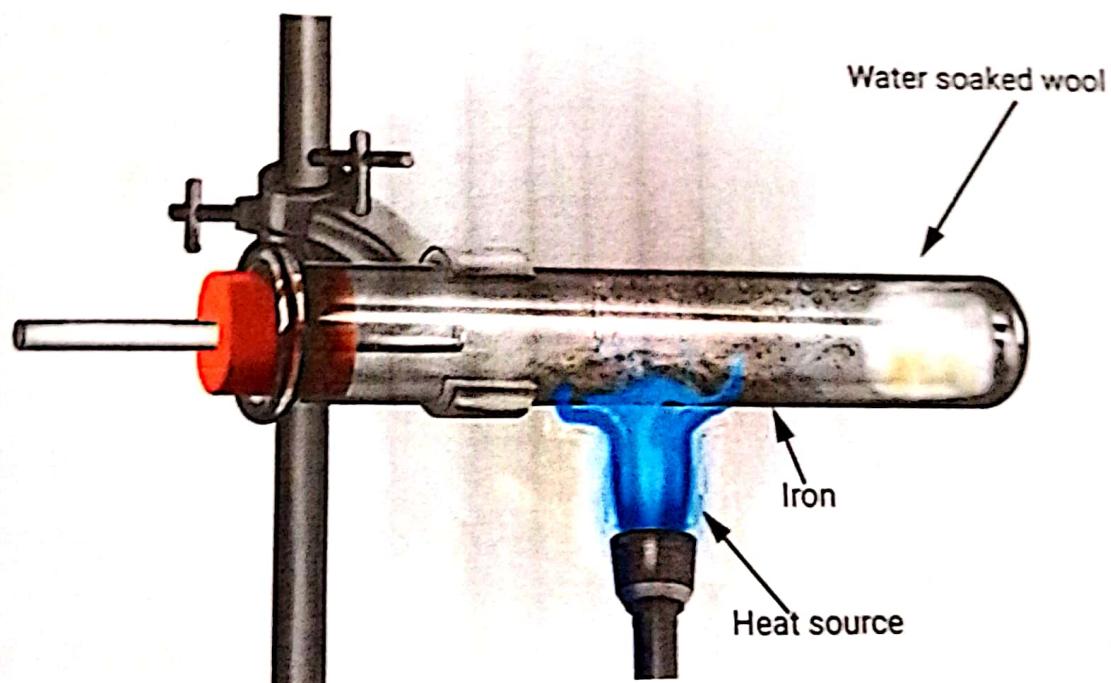




Students activity.

In your respective groups, use internet or text books and make research about the reaction between zinc and water. Perform a practical investigation for the reaction in the laboratory. Write a detailed report for the practical investigation.

5.O (f) The reaction between iron and water.



Students activity

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