SMART SKILLS

SESSION - 2021-2022

CHEMISTRY

CONTENTS

SYLLABUS
2021– 2022
TERM - I

April –May

Chapter 1 – Matter in our Surroundings

1. Particle nature of matter
2. States of matter.
3. Inter conversion of the states of matter.

Chapter 1 – Matter in our Surroundings(continued)

4. Scales of measuring the temperature
5. Evaporation and Sublimation.

June-July

Chapter – 2 Is matter around us pure?

1) Pure substance.
2) Classification of substances into elements, compounds and mixtures.
3) Difference between compounds and mixtures.
4) Heterogeneous and homogeneous mixtures.

August – September: Chapter continued.

5) True sol, Colloids and suspensions.
6) Separation of pure substances from a mixture by using different techniques of separation.
   a) Sublimation: -
   b) Magnetic separation
   c) Sedimentation decantation.
   d) Filtration.
   e) Distillation.
   f) Centrifugation.
   g) Chromatography.
7) Physical change and chemical change

PRACTICAL SYLLABUS

1. To determine the boiling point of water.
2. To determine the melting point of water.
3. To distinguish between a mixture and a compound using iron filings and sulphur powder.
4. To distinguish between a true sol., Suspension and colloidal sol. on the basis of transparency, filtration and stability.
5. To separate the components of a mixture of sand, salt and ammonium Chloride.
6. To study the reaction between Mg and oxygen
7. To study the effect of heat on lead nitrate crystals.
8. To study the reaction between sodium sulphate and barium chloride.
9. To study the reaction between zinc and sulphuric acid.
10. To study the chemical reaction between iron nails and copper sulphate solution.

PRACTICAL EXAM FOR 1st TERM

Practical exam would include the recording of the experiments in the practical file and conducting the given experiment in the laboratory during the practical exam, the criteria of marking for which is:

Aim

Apparatus

Theory

Observation

Conclusion

Equation, if applicable

Precautions

I. Smart skill assignments to be submitted on ruled sheets.

II. Timely completion and submission of notebooks.

III . Class test

TERM -II

October Chapter – 3 Atoms and Molecules.

1) Law of chemical combination.
2) Law of conservation of mass.

November

3) Dalton's atomic theory.
4) Atomic mass.
5) Molecule and molecular mass.
6) Chemical formulae.
7) Mole concept.

December: -

Chapter 4 – Structure of atom.

1) Nature of matter.
2) Discovery of electrons, protons and neutrons.
3) Thomson's model of atom.

January - February: - Chapter continued.

1) Rutherford's alpha ray scattering experiment.
2) Rutherford's Model of an atom.
3) **A**tomic number.
4) Mass number.
5) Electron distribution
6) Valences.
7) Isotopes and isobars.

Chapter 14 - Natural resources

1) Air composition
2) Role of air in climate control circulation of air
3) Rain
4) The process of cloud formation
5) Air pollution
6) Water- chemical structure
7) Properties of water
8) Water -a wonder liquid(properties of water including polarity and anomalous expansion)
9) Water pollution

PRACTICAL SYLLABUS

Experiment: To verify the law of conservation of mass in a chemical reaction.

Internal Assessment

I. Class tests

II Smart skill assignments

Second Term Total Marks: 80 + 20

EXAM PATTERN

Term 1 – 80 – Chapter 1 and chapter 2

20 – Internal Assessment

Term 2 – 80 – Complete syllabus

20 – Internal Assessment

Science Class 9 Syllabus

Annual Exam Structure

Units		Marks
I	**Matter - Its Nature & Behaviour**	**23**
	a) Matter in our surroundings **b) Is matter around us pure** **c) Atoms and molecules** **d) Structure of atom**	
II	**Organisation in the Living World**	**20**
	a) Fundamental Unit of life **b) Tissues** **c) Diversity in living organisms** **d) Why do we fall ill**	
III	**Motion, Force and Work**	**27**
	a) Motion **b) Force and law of Motion** **c) Gravitation** **d) Work and energy** **e) Sound**	
IV	**Our Environment**	**06**
	a) Natural resources -Air and water **b) Mineral riches in soil Water cycle**	
V	**Food; Food Production**	**04**
	a) Improvement in food resources	
	Total	**80**

Chapter No -1
Matter in our surroundings

Learning Objectives: The students will be able to

- Describe matter and the characteristics of the particles of matter.
- Understand the differences between the various states of matter.
- Evaluate the conditions for the interconversion of various states of matter.
- Apply the concept of change in pressure and temperature and its effect on state of matter
- Apply the concept of pressure to daily life in the use of a pressure cooker
- Explain latent heat of fusion and latent heat of vaporisation
- Apply the concept of latent heat to daily life experiences like cooling in desert cooler, matka etc
- Discuss Evaporation and explain various factors influencing evaporation.

Expected Learning Outcomes
The students would be able to

- Define matter with examples from day today life and state the composition of matter.
- Analyse the characteristics of the particles of matter applicable in day today life activities.
- Reason out the differences between the various states of matter on the basis of rigidity, fluidity, compressibility, density, i.e, shape, density, diffusion etc.
- Explain terms related -melting, freezing, boiling, condensation and sublimation.
- Apply the knowledge of latent heat (ice, steam) in day today life activities.
- Analyse the difference between evaporation and boiling.
- Interpret the factors affecting evaporation and appreciate the role of evaporation in daily lives.

Activities: i) Experiments will be performed to show that matter has particulate nature.
ii) Experiments to show diffusion.
iii) To show that ink diffuses in water much faster than honey.
iv) To show that gases are more compressible than liquids.
v) To study the effect of temperature on the physical state of water.
vi To show the process of sublimation.
vii) To determine the boiling point and melting point of water
viii) To show the factors affecting evaporation.
ix) To show sublimation in camphor.

Chapter No -1
Matter in our surroundings

Assignment – 1.1

Objective type questions

1. What are the characteristics of the particles of matter?
   a) Particles of matter are continuously moving and possess kinetic energy.
   b) Particles of matter intermix with each other.
   c) Both (a) and (b)
   a) Neither (a) and (b)

2. Solids have the tendency to maintain shape. This property of solids is termed as
   a) Fluidity b) Rigidity
   c) Density d) Ductility

3. Conversion of liquid state into solid state is termed as
   a) Sublimation b) Vaporisation
   c) Solidification d) Liquefaction

4. Three liquids A, B and C have boiling points of 80^0 C, 50^0C and 20^0C respectively, which of these will evaporate quickly
   a) A b) B
   c) C d) D

5. Which property of matter enables aquatic animals and plants to survive in water?
   a) Availability of carbon dioxide
   b) Availability of sea forest
   c) Diffusion of gases into water
   d) Due to dissolved oxygen in water

6. A gas can be best liquefied by
   a) increasing the temperature
   b) increasing the pressure
   c) increasing the pressure and lowering the temperature
   d) by using some solvent

7. Which of the following energy is absorbed during the change of state of a substance-
   a. Specific heat b) Latent heat
   c) Heat capacity d) Heat of the solution

8. What is the relation between Kelvin and Celsius scales temperature?
   a) K= 273 – ^{0}C b) ^{O}C = K – 273
   c) K= 273 X ^{O}C d) K = ^{0}C -273

9. Naphthalene balls disappear without leaving solid, which property explains this phenomenon
   a) Diffusion c) Evaporation
   b) Condensation d) Sublimation

10. On converting 308K , 329K and 391K to Celsius scale, the correct sequence of temperatures will be
   a) 33^{0}C,56^{0}C and 118^{0}C b) 35^{0}C,56^{0}C and 119^{0}C
   c) 35^{0}C,56^{0}C and 118^{0}C d) 56^{0}C, 119^{0}C and 35^{0}C

Chapter No -1

Matter in our surroundings
Assignment – 1.2

Q.1 What is meant by the particulate nature of matter?

Q.2 Why do gases diffuse easily?

Q.3 Where does the sugar go when dissolved in water? What information do you get from the dissolution of sugar in water?

Q.4 Bromine and air take about 15 minutes to diffuse completely but bromine diffuses into vacuum very rapidly. Why is this so?

Q.5 Convert the following temperature to Kelvin scale.

(a) 200^0 C (b) 350^0 C (c) -25^0 C (d) -175^0 C

Q.6 What determines the state of a substance?

Q.7 Distinguish between :

(i) Boiling and evaporation
(i) Gas and vapour

Q.8 How will you justify that ice, water and steam are not different substances but different states of the same substance?

Q.9 State two uses of interconversion of matter.

Q.10 How are gases liquefied? Name a gas which can be solidified and called dry ice.

Assignment – 1.3

Practice questions

Q1.Explain the following giving reasons:

i).Ice floats over water although it is a solid.

ii) Our palm feels cold when some ice is put on it.

iii) It is easier to remove fresh stains of ink from a cloth than stains caused a few days ago.

iv) We should not wear terylene clothes in summers.

v) We feel uncomfortable when humidity is very high.

vi) After a hot shower, your bath mirror is covered with water.

vii) In summers it is advised to fill less air in car tyres.

viii) Honey diffuses very slowly into water.

ix) On melting of ice, there is decrease in volume.

x) Ice cream appears colder than water at the same temperature.

xi) A perfume bottle must not be kept open.

xii) People wrap butter in cold cloth.

xiii) Food is cooked quickly in a pressure cooker.

xiv) On blowing air into balloon, it inflates.

xv) Diffusion becomes faster at higher temperature.

HOTS: Assignment 1.4

Answer the following questions by gathering knowledge through books, newspapers or the internet.

1) Name a solid metal whose melting point is less than boiling point of water?

2) How can you make ice cream without fridge?

3) How is snow removed from roads during heavy snow falls at hill station?

4) Why your blackboard does look white after using again and again?

5) Oxygen is more in atmosphere but goes on decreasing as we go higher in space, why?

6) Why should we cover fire pan with plate while cooking? Will it save cooking gas?

7) LPG does not have any smell. We find smell when it leaks, why?

8) Name the instrument used to measure relative humidity and describe the principle on which it works.

9) Find out working of plasma TV. How is it different from LCD and LED TV? Explain. Which of them is best and why?

10) Why is ozone found in upper atmosphere and not on earth. Give reason and also give use of ozone. Suggest methods to prevent ozone depletion and consequences if we don't care.

Some interesting information

What is the fourth state of matter?

The fourth state of matter is plasma.

Plasma is an ionized gas, a gas into which sufficient energy is provided to free electrons from atoms or molecules and to allow species, ions and electrons, to coexist.

In effect plasma is a cloud of protons, neutrons and electrons where all the electrons have come loose from their respective molecules and atoms, giving the plasma the ability to act as a whole rather than as a bunch of atoms.

Plasmas are the most common state of matter in the universe comprising more than 99% of our visible universe and most of that not visible.

Plasma occurs naturally and makes up the stuff of our sun, the core of stars and occurs in quasars, x-ray beam emitting pulsars, and supernovas.

Immunoglobulin's
Used in the treatment of immunological disorders, such as congenital and acquired primary immune deficiency as well as many diseases that strike healthy people due to some change in the body's Defence system.

Coagulation
Therapies Used in treatment of bleeding disorders, including haemophilia and von Willebrand disease.

Critical Care Products
Used in critical care settings for treatment of shock and burns, during surgery, and for fluid replacement therapy.

Wound Healing
Used in surgery and the treatment of wounds to facilitate healing.

Respiratory
Used in the treatment of alpha$_1$-antitrypsin deficiency (A genetic condition resulting in liver and lung failure).

Reference:-

https://www.youtube.com/watch?v=1PcnCWZP7l0

Chapter No – 2

Is matter around us pure?

Learning Objectives

The students will be able to-

- Describe and differentiate between elements, compounds and mixtures with examples. • Discuss homogeneous and heterogeneous mixtures with examples.
- Explain physical and chemical changes with examples.
- Describe the different types of solutions and their properties
- Understand the properties of True solution
- **Expected Learning Outcomes**

  The students would be able to-
- Classify substances as pure (element, compound) and impure (mixture) substances.
- Analyse the differences in the properties of elements, compounds and mixtures. classify elements as metals, nonmetals and metalloids based on their general physical properties.
- Classify mixtures as homogeneous and heterogeneous mixtures with examples from daily lives
- analyse the differences in physical and chemical changes and apply their knowledge and understanding in daily lives.
- analyse the characteristics of true solution and various types of true solution

Activities

1. To mix iron and sulphur physically and study its properties and then by heating the mixture study the change in properties.
2. To show and study the difference between homogenous and heterogeneous mixtures.
3. To prepare the true solution, colloid and suspension and study their characteristics.
4. Separation of pure substances from a mixture by using different techniques of separation.
   a) Magnetic separation : To separate iron filings from a mixture containing sulphur and iron.
   b) Sedimentation decantation: To separate sand particles from muddy water.
   c) Filtration : To obtain clear water from muddy water.
   d) Distillation: To obtain pure water from common salt solution by Distillation.
   e) Centrifugation. To separate cream from milk.
   f) Chromatography: To separate the coloured components of a mixture.
   g) Sublimation: - To separate the constituents of a mixture containing common salt and ammonium chloride
5. Physical change and chemical change

Videos of various techniques will be shown to the students.

Reference:-

Chromatography- https://www.youtube.com/watch?v=ZCzgQXGz9Tg
Crystallisation- https://www.youtube.com/watch?v=WQdXbf8huuQ
Distillation- https://www.youtube.com/watch?v=mP4Hgui-g6U
Threshing and winnowing- https://www.youtube.com/watch?v=zG_0t7sIQ-c

Chapter -2
Is matter around us pure?
Assignment 2.1
Objective type questions

1 Which of the following would be described as pure
a) Crystallised salt b) Salt solution
c) Rock salt d) All of the above

2. A substance made up of single type of particles, having same chemical nature is
a) Pure substance b) Impure substance
c) Homogeneous mixture d) Heterogeneous mixture

3. Which of the following is not an element?
a. Graphite b. Germanium
c. Silica d. Silicon

4. The concentration of a solution indicates
a) The quantity of the solute present in a solution.
b) The quantity of the impurities present in a solution.
c) The quantity of the solvent present in a solution.
d) The total quantity of the solution.

5. A solution that has dissolved as much solute as it is capable of dissolving at a given temperature is
a) Only solution b) Unsaturated solution
c) Saturated solution d) Concentrated solution

6. Different gases of air can be separated by
a) Fractional crystallisation b) Fractional sublimation
c) Fractional distillation d) Filtration

7. The best method to separate the components of an ink
a) Evaporation b) Vaporization
c) Distillation d) Sublimation

8. Which type of liquids separate out in layers depending on their densities
a) Miscible liquids b) Immiscible liquids
c) Unsaturated solution d) Saturated liquids

9. The elements which exist in liquid state are-
a) bromine and iodine b) mercury and chlorine
c) iodine and mercury d) bromine and mercury

10. Soda water is a solution of carbon dioxide in water. This solution is composed of
a) Liquid solute in a gaseous solvent
b) Gaseous solute in a liquid solvent
c) Liquid solute in a liquid solvent
d) Gas in suspended form in liquid.

Chapter -2
Is matter around us pure?
Assignment 2.2

Q1. Name two properties of a substance to test its purity?

Q2. Sodium metal is a pure substance and so is Sodium chloride, in spite of the fact that Sodium chloride contains two different elements. Explain?

Q3**.** Sea water can be classified as a homogeneous as well as heterogeneous mixture. Comment.

Q4. 2.5 g of sugar is dissolved in 47.5 g of water .Calculate its concentration as per cent by mass .

Q5. A solution has been prepared by dissolving 60 g of sugar in 400 g of water. Calculate the mass percentage of this solution.

Q6. If 25ml of acetone is present in 150ml of its aqueous solution, calculate the concentration of the solution.

Q7. How much water should be added to 15g of salt to obtain 15% solution?

Q8. Describe briefly the principle and applications of the techniques used for the separation of the following mixtures

a) Two immiscible liquids.
b) Two miscible liquids whose boiling point differs by more than 25^0C
c) Cream and butter.
d) Coloured components in black ink.

Q9. Why is crystallization better than evaporation for the separation of mixtures ?

Q10. What is solubility of a salt? Discuss the effect of temperature on the solubility of salt in water and how does temperature and pressure affect the solubility of gases in water.

Chapter -2
Is matter around us pure?
HOTS- Assignment 2.3

1. List the different solutions used in your daily life and classify them.

2. Note the composition of liquid medicines and note the concentration/ active components present in them.

3. Observe bottle of Hydrogen peroxide and note how the concentration of H_2O_2 expressed is?

4 Find the composition of Mother dairy milk written on its packet.

5. Find out % of fats, proteins, cholesterol present in different packets of chips.

6. Many cough syrups and indigestion medicines are suspensions. What are the instructions of use written on the pack?

Question bank

(1mark)

Q1. A substance has no mass. Can we regard it as matter?

Q2. Out of water and alcohol which is more volatile?

Q3. Name a suitable technique to separate salt from ammonium chloride.

Q4. Define diffusion.

Q5. Melting butter in a pan is a physical change. Give reason.

Q6. Give two examples of metalloids.

Q7. A solution contains 16g of urea in 120g of the solution .What is the mass by mass percentage of solution.

Q8. What is the particle size of a colloidal solution?

Q9. How can we convert a saturated solution into an unsaturated solution?

Q10. State one instance where water undergoes a physical change and one in which it undergoes a chemical change.

(2marks)

Q1. How can you support the particulate nature of matter with the help of an experiment involving dissolution of sugar?

Q2. Define latent heat of fusion.

Q3. Why does temperature remain constant during melting and boiling?

Q4. Name the factors which affect evaporation.

Q5. Why does evaporation cause cooling?

Q6. Mention two applications of colloids.

Q7. Name two substances that sublime on heating.

Q8. Comment upon the statement that burning of a candle involves both physical and chemical changes.

Q9. After the winters are over we generally keep our woolens with moth balls. These moth balls disappear with time .What type of change is involved in this process.

Q10. Write four differences between a mixture and compound.

(3 Marks & 5 marks)

Q1) Give the main points of difference in the three states of matter in the tabulated form.

Q2. Ordinary water boils at 100^0C. Can it be boiled at 95^0C or 105^0C?

Q3. Differentiate between distillation and fractional distillation.

Q4. Describe an activity to show the compressibility of solids, liquids and gases.

Q5. What are the characteristics of particles of matter?

Q6. Compare the properties of a true solution, a suspension and a colloidal solution.

Q7. Explain-

a) Evaporation is a surface phenomenon.

b) Food is cooked faster in Delhi as compared to Manali

c) Compound cannot be separated into its constituents by physical methods.

d) Water Vapours have more energy than water.

e) Two cubes of ice are pressed between the palms, when the pressure is released, the two cubes join together.

Q8. How will you account for the following.

a) Fresh air cannot be regarded as a pure substance.
b) A mixture of ammonium chloride and camphor cannot be separated by sublimation.
c) Electrolysis of water is a chemical change.

Q9. Name and explain the technique used to separate the mixture of alcohol and water.

Q10. Draw a flow chart to show the separation of constituents of mixtures containing ammonium chloride, sand and iron filings .

TERM 2

Chapter 3
Atoms and Molecules

Learning objectives

The students will be able to

- State the laws of chemical combination
- Describe the laws of chemical combination.
- Evaluate Dalton's atomic theory with the present situation.
- Understand atoms, molecules and atomicity
- Describe the role of unified Mass and Carbon -12 as standard for reference
- Understand the concept of mole and its practical applications in lab

Expected Learning Outcomes

The students would be able to

- State the laws of chemical combination.
- State both the laws of chemical combination with examples.
- Analyse the importance and interdependence of both the laws of chemical combination on each other.
- relate the postulates of Dalton's atomic theory with the laws of chemical combination and Give explanation to the postulates of dalton's atomic theory which are being challenged now.
- Differentiate between an atom and a molecule.
- Write atomicity for similar and dissimilar elements.
- Define unified mass, relative atomic mass and give reason for the use of C-12 as standard for atomic mass.
- Recall the atomic masses of some prominent elements along with their symbols.
- Comprehend the constituting elements in a compound and their combination on the basis of their mass ratios.
- calculate numericals based on mole concept

Atoms and molecules

Activity: -1. To prove that there is no change in mass during a chemical reaction.
2. Power point presentation prepared by the teacher will be shown to the students.
3. video

Reference:- Mole concept- https://www.youtube.com/watch?v=Pft2CASl0M0

SMART NOTES

ATOMS AND MOLECULES

Merits of Dalton's Atomic theory

1. It has enabled us to explain the laws of chemical combination.

Drawbacks of Dalton's Atomic theory

1. Atoms are not indivisible but can be further divided into subatomic particles called electrons, protons and neutrons.

2. Atoms of the same element may not have same mass. (Isotopes)

3. Atoms of the different elements may not different mass. (Isobars)

4. Atoms do not always combine in a simple ratio. ($C_{12}H_{22}O_{11}$)

LANGUAGE OF CHEMISTRY

Smart Notes

Just like 26 letters make up an entire English language, a few elements are a basis of all chemical reactions. This makes it necessary for us to understand this exciting new language, the language of chemistry.

J.J. Berzelius laid the foundation of language of chemistry in the early 19^{th} century. In this, an atom is represented by a symbol, a molecule by a formula and a chemical reaction by a chemical equation. Let us learn more about what each of these terms mean and how are they allotted to a substance to make it meaningful and easy to understand.

Symbols

Early scientists used pictures to denote elements (pure substances made up of identical atoms). As more elements were discovered this was not possible. Every element is now denoted by a symbol/ English alphabet. A symbol is the short hand representation of an element. It represents-

An element in particular
An atom of an element
For ex- the symbol H represents one atom of the element hydrogen.

The symbols were allotted in a systematic manner-

I. The first letter of the English name of the element is written in Capital letter. For example

Name	Symbol	Name	Symbol
Carbon	C	Nitrogen	N
Hydrogen	H	Oxygen	O
Fluorine	F	Sulphur	S
Phosphorus	P	Boron	B

II The first letter of the English name written in Capital followed by another letter from the name written in Small(this becomes necessary when two elements share the same first letter)

For example-

Name	Symbol	Name	Symbol
Helium	He	Aluminium	Al
Neon	Ne	Calcium	Ca
Nickel	Ni	Chlorine	Cl
Magnesium	Mg	Zinc	Zn
Manganese	Mn	Barium	Ba

III One or two letters of the Latin name of the elements with the first letter written in Capital and the second written in Small. For example

Name	Latin name	Symbol
Sodium	Natrium	Na
Potassium	Kalium	K
Iron	Ferrum	Fe
Copper	Cuprum	Cu
Silver	Argentum	Ag

Gold	Aurum	Au
Mercury	Hydrargyrum	Hg
Tin	Stannum	Sn
Lead	Plumbum	Pb

Atomicity

The atomicity is the number of atoms of an element present in a molecule(the molecule may be of an element or a compound).

Some examples of molecules of elements are-

Atomicity	Element	Exists as
Monoatomic/Atomicity 1	Helium	He
	Neon	Ne
Diatomic/atomicity 2	Hydrogen	H_2
	Oxygen	O_2
	Nitrogen	N_2
	Chlorine	Cl_2
Triatomic/atomicity 3	Ozone	O_3
Polyatomic/ atomicity >3	Phosphorus	P_4
	Sulphur	S_8

Valency : Valency is the combining capacity of an element or a group of atom combined together(radical/ion).

For example- Valency of hydrogen is 1. This means that a hydrogen atom needs to combine with I more atom to make a molecule.

Valencies of different elements are different. You will learn in higher classes about how these valencies are derived.

The valencies of some elements and compound radicals(groups of atoms) are given below-

Positive radicals		
Name	Valency	Radical representation
Sodium	1	Na^+
Potassium	1	K^+
Hydrogen	1	H^+
Copper/Cuprous	1	Cu^+
Ammonium	1	NH_4^+
Magnesium	2	Mg^{2+}
Zinc	2	Zn^{2+}
Copper/Cupric	2	Cu^{2+}
Iron/Ferrous	2	Fe^{2+}
Calcium	2	Ca^{2+}
Aluminium	3	Al^{3+}
Iron/Ferric	3	Fe^{3+}

Negative radicals		
Name	Valency	Radical representation
Chloride	1	Cl^-
Fluoride	1	F^-
Bromide	1	Br^-
Iodide	1	I^-
Nitrate	1	NO_3^-

Nitrite	1	NO_2^-
Hydroxide	1	OH^-
Bicarbonate	1	HCO_3^-
Oxide	2	O^{2-}
Sulphide	2	S^{2-}
Sulphate	2	SO_4^{2-}
Sulphite	2	SO_3^{2-}
Carbonate	2	CO_3^{2-}
Phosphate	3	PO_4^{3-}
Nitride	3	N^{3-}

Chemical formula

A chemical formula is the short hand representation of a chemical compound which is written using symbols of the elements involved. Let us learn how to deduce the chemical formula of an ionic chemical compound comprising of a positive and a negative radical or a metal and a non metal.

Steps for writing a chemical formula-

I Write the symbols of the radicals side by side, keeping the positive radical on the left and the negative radical on the right.

For example- Na O

II Write the valencies of the radicals on their top right hand side.

For Example- Na^{1+} O^{2-}

III Cross the valencies and write them as sub-scripts.(the valency of the negative radical becomes the atomicity of the positive radical and vice versa). The charges on the radicals are NOT written in the chemical formula.

For example- Na^{1+} O^{2-}

Na_2O

IV If possible, bring the valencies to the lowest terms.

For example- Ca^{2+} O^{2-}

Ca_2O_2 or CaO

V If a radical has more than element, keep it in a bracket. The atomicity of the individual atoms in such a radical cannot be brought to lowest terms.

For example- Ca^{2+} SO_4^{2-}

$Ca_2(SO_4)_2$ or $CaSO_4$ (The number 4 here cannot be cancelled). Also, the formula cannot be written as $Ca_2S_2O_8$

Steps for naming a chemical compound

I Write the name of the metal/ positive radical (the first alphabet written in capital) followed by the name of the negative radical/non-metal (written in small).

II Note- The names of the metal and radicals remain the same. The name of the non-metal is written ending in " –ide".

For example-

NaCl- Sodium chloride

NH_4OH- Ammonium hydroxide

III The names of radicals consisting of more than one atom remains the same. For example- Carbonate (CO_3), hydroxide (OH^-)

IV In case of variable valency, the radical with a lower valency ends in **–ous** while the higher valency is written as **–ic.**

For example Ferrous sulphate (Fe^{2+}), Ferric chloride (Fe^{3+})

Assignment 3.1

Practice questions-

Q1. Write down the chemical formulae for the following:

1) Aluminium hydroxide

2) Hydrogen sulphide

3) Ammonium sulphate

4) Calcium phosphate

5) Sodium carbonate

6) Copper (II) sulphate

7) Aluminium (III) chloride

8) Magnesium sulphate

9) Potassium nitrate

10) Calcium chloride

11) Zinc sulphate

12) Calcium oxide

13) Magnesium hydroxide

14) Sodium oxide

Q2. Calculate the molecular mass for the following:

(C- 12 u, H – 1u, N - 14u, O- 16u, P- 31u, Cl - 35.5 u, S - 32 u)

1) HNO_3

1) CH_3OH

2) C_2H_6

3) $C_6H_{12}0_6$

4) H_3PO_4

5) H_2SO_4

Assignment 3.2
Objective type questions

1. All matter is made up of very small indivisible particles called atoms. This statement is one of the assumptions of
   a) Rutherford's theory
   b) Bohr's theory
   c) Dalton's atomic theory
   d) Kinetic theory of gases

2. Hydrogen was passed over heated 2g copper oxide till only copper was left. The mass of copper obtained was 1.6 g. The percentage of oxygen in copper oxide is
   a) 80% b) 60%
   c) 40% d) 20%

3. Which of the following is the correct symbol for copper
   a) Co b) Cu
   c) Cp d) Cr

4. Which of the following molecule has an atomicity of four
   a) H_2O b) NH_3
   c) CH_4 d) CO_2

5. Molecular mass of ozone is
   a) 16u b) 32u
   c) 48u d) 64u

6. The correct formula of Aluminum sulphate is
   a) $AlSO_4$ b) Al_2SO_4
   c) $Al_3(SO_{4)2}$ d) $Al_2(SO_4)_3$

7. The atomicity of Ozone, Sulphur Phosphorus and Argon are respectively
   a) 8,3,4,1
   b) 1,3,4,8
   c) 4,1,8,3
   d) 3,8,4,1

8. Number of moles of water in 180g of water will be
   a) 5 b) 10
   c) 15 d) 18

9. Which of the following has the same molecular mass as its atomic mass-
   a. nitrogen b) neon
   c. oxygen d) chlorine

10. 1 Mole of atoms is
   a) Gram atomic mass b) Both (a) and (b)
   c) None of these d) 6.022×10^{23} atoms

Assignment -3.3

Q1 Define the following

b) Atom
b) Molecule
c) Atomic mass
d) Molecular mass
e) Atomicity

Q2 What do you understand by a polyatomic ion? Give two examples.

Q3 Give the example of trivalent cation and monovalent anion .Write the formula of the compound formed by their combination.

Q4 State any four postulates of Dalton's atomic theory of matter. Which of his postulates do not hold good .

Q5 An element M forms the oxide M_2O_3. What will be the formula of its carbonate?

Q6 Give the names of any five elements whose names have been derived from Latin. Give their Latin names and symbols.

Q7 Define Atomic mass unit.

Q8 What is the difference between 2N and N_2

Q9 Define law of constant composition. Illustrate the law by taking an example of CO_2.

Q 10 State and explain the law of conservation mass. Give an activity to verify the law .

Assignment No- 3.4

Q1 Calculate the number of particles in each of the following :
- i) 46 g of Na atoms
- ii) 8g of O_2 molecule

Q2 What mass of silver nitrate will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate, if the law of conservation of mass is true?

Q3 Calculate the mass of Carbon present in 2 g of Carbon dioxide?

Q4 What is the mass of 0.5 mole of CO_2?

Q5 Copper oxide was prepared by two different methods. In one case 1.75 g of metal gave 2.19 g of oxide. In the second case 1.14 g of metal gave 1.43 g of the oxide. Show that the given data illustrates the law of constant proportion.

Q6 What is the mass of
- a) 1.20 X10 ^{24} atoms of Na (Na-23u)
- b) 3.011x10^{24} atoms of carbon (C -12 u)

Q7 Which of the following weighs most ?
- i) 32 g of oxygen
- ii) 2.0 g atoms of nitrogen
- iii) 0.5 mole of iron
- iv) 3.011 x 10 ^{23} atoms of C

(Atomic masses : O=16 , N =14 , Fe = 56 , C = 12)

Q8 Calculate the number of atoms in each of the following :
- i) 0.08 g of hydrogen
- iii) 0.008 g of sulphur

Q9 Calculate the number of molecules contained in a drop of water weighing 0.05 g?

Q10 The mass of a single atom of an element 'X' is 2.65x10^{-23} g . Calculate the atomic mass of the element ?

Q11 Which of the following has greater mass? Justify.

0.1Mole of CO_2 or 0.2 Mole of NH_3 (N=14, H=1, C=12 and O=16u)

Assignment No- 3.5

Laws of chemical combination

Q1 When 20.8g of barium chloride reacts with 9.8g of sulphuric acid, it produces 7.3g of hydrochloric acid and some amount of barium sulphate equal to _____.
b. Name the person who proposed the law behind this calculation.

Q2 Two elements X and Y combine in gaseous state to form XY in the ratio of 1:35.5 by mass. The mass of Y which combines with 2g of X will be- _____.
b. Name the law behind this calculation.

Q3 State the law on which 'The balancing of chemical equations 'is based?

Q4. 28g of nitrogen react completely with 6g of hydrogen. What is the mass of ammonia thus formed?

Q5 When 18g of water is electrolyzed , how much weight of oxygen will be formed?

Q6 3g of hydrocarbon on combustion in excess of oxygen produces 8.8g of carbon dioxide and 5.4g of water. What will be The amount of oxygen used ?

Q7 How much silver nitrate must a student take to carry out a reaction between silver nitrate and 5.85g of common salt to obtain 14.35g of silver chloride and 8.5g of sodium nitrate?

Q8 When we react lead nitrate and sodium chloride to get lead chloride and sodium nitrate so as to prove the law of conservation of mass, which of the following is correct-

a) Mass of lead nitrate = mass of sodium chloride
b) Mass of lead nitrate + mass of sodium chloride= mass of lead chloride + mass of sodium nitrate
c) Mass of lead chloride + mass of sodium chloride= mass of lead nitrate+ mass of sodium nitrate
d) Mass of sodium chloride mass of sodium nitrate= mass of lead chloride + mass of lead nitrate

Q9 H_2S gas was prepared through a flask containing 20 g of copper sulphate dissolved in water. After some time , passage of gas was stopped. Contents of the flask weighed 22.5 g. How much H_2S gas was passed through the flask.

Q10 A test tube containing 15 g of a solution of Sodium sulphate was poured into a beaker containing 15 g of Barium chloride solution. How much mass of the products will be obtained in the beaker?

LETS HAVE SOME FUN!!

Try it Yourself

A	**M**	**I**	**R**	**O**	**N**	**S**	**E**	**M**	**C**	**L**
M	**L**	**O**	**R**	**N**	**R**	**Y**	**P**	**N**	**O**	**D**
K	**A**	**N**	**A**	**D**	**C**	**M**	**P**	**D**	**S**	**R**
C	**E**	**A**	**T**	**S**	**C**	**Y**	**G**	**O**	**T**	**V**
A	**A**	**V**	**O**	**G**	**A**	**D**	**R**	**O**	**F**	**A**
O	**F**	**U**	**M**	**B**	**R**	**Y**	**A**	**C**	**E**	**L**
X	**O**	**W**	**I**	**Y**	**B**	**Z**	**M**	**O**	**L**	**E**
Y	**S**	**D**	**C**	**K**	**O**	**T**	**M**	**N**	**T**	**N**
G	**I**	**N**	**I**	**D**	**N**	**E**	**C**	**G**	**P**	**C**
E	**R**	**E**	**T**	**D**	**R**	**S**	**T**	**N**	**D**	**Y**
N	**I**	**H**	**Y**	**D**	**R**	**O**	**G**	**E**	**N**	**E**

CLUES

1. **Indian philosopher who named smallest particle (5)**
2. **A positively or negatively charged particle (3)**
3. **Number of atoms constituting a molecule (9)**
4. **Indian scientist who gave number of particles in one mole of any species (8)**
5. **The relative atomic mass is found with respect to an isotope of this element (6)**
6. **Unit of molar mass (9)**
7. **Quantity having mass equal to atomic mass/molecular mass (4)**
8. **Combining capacity of an element (7)**
9. **Atomic radii of the element is 10^{-10} m (8)**
10. **Is a symbol given by Dalton (6)**

Chapter - 4

Structure of Atom

Learning Objectives

Students will be able to

- Explain Bohr's model of an atom
- Understand the distribution of various electrons in shells
- Comprehend the concept of valency
- Write the electronic configurations of first twenty elements along with their valency with explanation.
- Explain atomic number and mass number
- Differentiate between isotopes and isobars
- Discuss the applications of Isotopes.

Expected Learning Outcomes

- Students would be able toExplain Bohr's model of an atom and critically analyse by comparing with the previous proposed models of atom.
- Write the electronic configurations of first twenty elements along with their valency with explanation.
- Write electronic configuration of the ions formed by the first twenty elements excluding the noble gases.
- Comprehend the meanings of atomic number and mass number and try to represent the element with them.
- Analyse the difference between isotopes and isobars with examples.
- Compare the number of sub atomic particles of various isotopes of the same element.
- Write electronic configuration of the various isotopes of the same element.
- Write the applications of isotopes in day today life.

Chapter will be done by showing power point presentation prepared by the teacher.

Videos will be shown to explain the discoveries of rays, nucleus and structure of atom.

Reference-

Cathode ray tube- www.youtube.com/watch?v=4QAzu6fe8rE

Thomson's model of atom- www.youtube.com/watch?v=X2uvuSThtuI

Rutherford's experiment- www.youtube.com/watch?v=XBqHhraf8iE

Game- http://www.learner.org/interactives/periodic/basics_interactive.html

Assignment 4.1
Objective type questions

1. Who discovered electrons?
   a) J .J Thomson b) Goldstein
   c) Chadwick d) Yukawa

2. Cathode rays have
   a) only mass b) only charge
   c) neither mass nor charge d) both mass and charge

3. Mass number = Atomic number + number of _____
   a) Neutrons b) Electrons
   c) Protons d) none of these

4. What will be the composition of nucleus of an element with atomic number 6 and mass number14
   a) 6 protons, 6 electrons b) 6 protons, 6 neutrons
   c) 6protons, 8neutrons d) 8 protons, 6 neutrons

5. Which of the following is the correct configuration of sodium
   a) 2,8 b) 2,8 ,1
   c) 8,2,1 d) 2,9

6. In $_{92}U^{235}$, The number 92 represents the
   a) Atomic number b) Atomic mass
   c) Isobar number d) Neutron number

7. Isotopes differ in the number of
   a) Protons b) Electrons
   c) Neutrons d) All of these

8. The atomic number of an element is 15. Hence it will show a valency of
   a) 3 b) 5
   c) Both 3and 5 d) Neither 3 or 5

9. The four atomic species can be represented as follows. Out of these, the two species which can be termed as isobars are
   i) $^{201}X_{60}$ ii) $^{200}X_{61}$ iii) $^{200}X_{58}$ iv) $^{203}X_{60}$
   a) i) and ii) b) ii) and iii) c) i) and iii) d) i) and iv)

10. Four elements W, X, Y and Z contain 8,11,9 and 17 protons per atom respectively. The element which cannot form an anion is most likely to be
    a) W b) X c) Y d) Z

Assignment -4.2

1) Why is an atom neutral in spite of the charged particles present in it?

2) Describe Thomson's model of an atom?

3) Which experiment established the presence of atomic nucleus? What features of the nucleus were deduced from this experiment?

4) Why are Bohr's orbits called stationary states?

5) Valency of 'X' is 3 while that of 'Y' is 2. Write the formulae of the compounds formed when each of them separately combine with oxygen .

6) Explain why $_{6}C^{14}$ and $_{7}N^{14}$ are not considered isotopes?

7) Why do elements have fractional atomic masses? Explain giving example?

8) The atomic number of two elements A and B are 18 and 16 respectively. Which of the two should be chemically more reactive and why?

9) What are the numbers of protons, neutrons and electrons present in $^{59}CO_{27}$ and

   ^{108} Ag $_{47}$?

10) What is the relationship between valency and valence electrons in case of metals and non metals. Classify the following as metals or non metals on the basis of their valency. Hydrogen, Magnesium, Carbon, Chlorine and Oxygen?

Assignment - 4.3

1) The mass number and atomic number of an isotope of uranium are 235 and 92 respectively. Calculate the number of protons and neutrons in the nucleus of the atom?

2) Given that a natural sample of iron has isotopes $^{54}_{26}Fe$, $^{56}_{26}Fe$ $^{57}_{26}Fe$ and in the ratio of 5%,90% and 5 % respectively, What will be the average atomic mass of iron?

3) Naturally occurring copper consists of isotopes of $^{63}Cu_{29}$ and $^{65}Cu_{29}$ in the ratio of 8: 3 Calculate the average atomic weight of copper.

4) Given that the percentage abundance of the isotope of $^{20}Ne_{10}$ is 90% and that of the isotope of $^{22}Ne_{10}$ is 10%, calculate the average atomic mass of neon.

5) What is the electronic configuration of Na^+? If the atomic number of Na atom is 11 and mass number is 23, what is the atomic number and mass number of Na^+?

6) An element has atomic number 16. How many electrons will be present in K, L and M energy shells of its atom?

7) Nucleus of an atom has 5 protons and 6 neutrons. What would be the atomic number, the mass number, the number of electrons and the number of valence electrons per atom of this element?

8) If bromine atom is available in the form of, say, two isotopes $^{79}Br_{35}$ (49.7%) and $^{81}Br_{35}$ (50.3%) , calculate the average atomic mass of bromine atom .

9) An ion M^{3+} contains 10 electrons and 14 neutrons .What is its mass number and atomic number?

10) An ion X^{2-} contains 10 electrons and 8 neutrons. What is its mass number and atomic number?

HOTS

Practice Assignment- 4.4

Q1. There are 15 protons and 16 neutrons in the nucleus of an atom. Calculate its atomic number and mass number.

Q2. Justify the statement: The nucleus of an atom is positively charged but the atom as a whole is neutral.'

Q3. Draw the structure of-

a. Magnesium atom

b. Magnesium ion

Q4. Chlorine occurs in nature in two isotopic forms with masses 35u and 37u in the ratio of 3:1. Calculate the average atomic mass of chlorine atom on the basis of this data.

Q5. Give reasons-

a. Helium has two valence electrons but its valency is not 2.

b. Isotopes of an element have same chemical properties but different physical properties.

c. Most of the alpha particles passed straight through the gold foil in Rutherford's experiment.

Q6. The relative atomic mass of Cu is 63.5u. It exists as two isotopes which are $^{63}Cu_{29}$ and $^{65}Cu_{29}$. Calculate the percentage of each present in it?

Chapter 14

NATURAL RESOURCES

Learning outcomes:

Students will be able to

- **tell about the classification, utilization and conservation of natural resources and focus on factors that deplete our environment.**
- **Learn about air pollution, its causes and effects like acid rain, global warming, ozone layer depletion.**
- **learn about Water pollution as well as the water pollutants and the harmful effects like eutrophication and biomagnification.**

NATURAL RESOURCES

Multiple Choice Questions

Assignment No-5.1

1. The atmosphere of the earth is heated by radiations which are mainly

(a) radiated by the sun

(b) re-radiated by land

(c) re-radiated by water

(d) re-radiated by land and water

2. If there were no atmosphere around the earth, the temperature of the earth will

(a) increase

(b) go on decreasing

(c) increase during day and decrease during night

(d) be unaffected

3. What would happen, if all the oxygen present in the environment is converted to ozone?

(a) We will be protected more

(b) It will become poisonous and kill living forms

(c) Ozone is not stable, hence it will be toxic

(d) It will help harmful sun radiations to reach earth and damage many life forms.

4. Total earth's surface covered by water is

(a) 75%

(b) 60%

(c) 85%

(d) 50%

5. The two forms of oxygen found in the atmosphere are

(a) water and ozone

(b) water and oxygen

(c) ozone and oxygen

(d) water and carbon-dioxide

6. An increase in carbon dioxide content in the atmosphere would not cause

(a) more heat to be retained by the environment

(b) increase in photosynthesis in plants

(c) global warming

(d) abundance of desert plants

7. Rainfall patterns depend on

(a) the underground water table

(b) the number of water bodies in an area

(c) the density pattern of human population in an area

(d) the prevailing season in an area

8. An increase in carbondioxide content in the atmosphere would not cause

(a) more heat to be retained by the environment

(b) increase in photosynthesis in plants

(c) global warming

(d) abundance of desert plants

9. Oxygen is returned to the atmosphere mainly by

(a) burning of fossil fuel

(b) respiration

(c) photosynthesis

(d) fungi

10. Low visibility during cold weather is due to

(a) formation of fossil fuel

(b) unburnt carbon particles or hydrocarbons suspended in air

(c) lack of adequate power supply

(d) none of these

11. Marked temperature changes in aquatic environment can affect

(a) breeding of animals

(b) more growth of aquatic plants

(c) process of digestion in animals

(d) availability of nutrients.

12. The term "water-pollution" can be defined in several ways. Which of the following statements does not give the correct definition?

(a) The addition of undesirable substances to water-bodies

(b) The removal of desirable substances from water-bodies

(c) A change in pressure of the water bodies

(d) A change in temperature of the water bodies

13. Which of the following is not a green house gas?

(a) Methane

(b) Carbon dioxide

(c) Carbon monoxide

(d) Ammonia

14. Which of the following is a recently originated problem of environment?

(a) Ozone layer depletion

(b) Green house effect

(c) Global warming

(d) All of the above

Natural resources
Assignment no. 5.2

Q1 List the different components of the environment.

Q2. What are the type of air movements that form winds and that form clouds.

Q3.Why does the average temperature of the earth remain constant?

Q4. Name the acids that form the acid rain?

Q5. What are the harmful effects of photochemical smog?

Q6.How does increase in nutrient lead to oxygen depletion in a water body?

Q7. Write any two adverse effects of acid rain.

Q8. What are the various causes of water pollution?

Q9. Why is water essential for life ?

Q10. How is the quality of air affected ? How does the poor AQI affect the life of people staying in metropolitans?

Practicals

Experiment No. 1

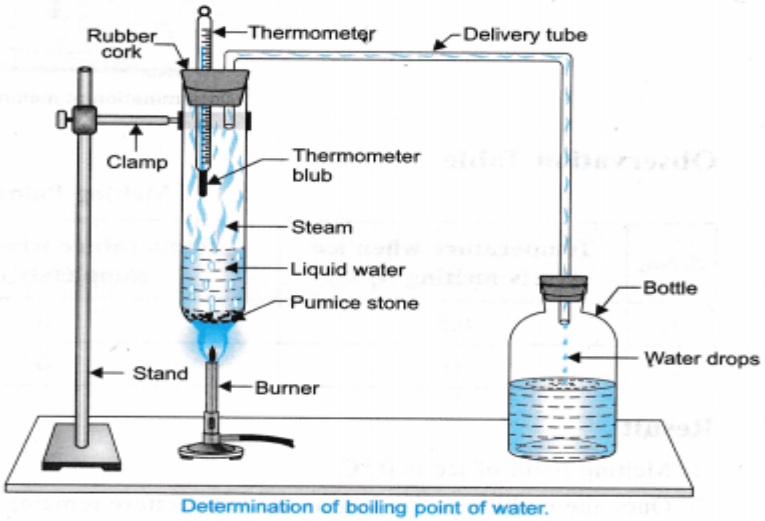
Aim: To determine the melting point of ice and boiling point of water.

Theory

1. **Melting Point:** The temperature at which the solid changes into liquid at the atmospheric pressure is called melting point. For example, ice melts at 0°C to form water.
2. **Boiling Point:** The temperature at which the liquid boils and changes into gaseous state at the atmospheric pressure is called boiling point. For example, water boils at 100°C to form water vapour (at 76 cm pressure).
3. **Latent Heat of Fusion:** The heat energy absorbed during the melting of ice is stored in the water formed, this energy is called latent heat of fusion. The amount of heat energy that is required to change 1 kg of a solid into liquid at atmospheric pressure at its melting point is known as the latent heat of fusion.
4. **Latent Heat of Vaporisation:** The heat energy absorbed by water when it changed its phase to steam, this hidden heat is called latent heat of vaporisation.

Materials Required

Two thermometers, (Celsius scale), boiling tube, a glass rod, two iron stands, a bunsen burner, wire gauze, beakers, tripod stand, distilled water, ice cubes prepared from distilled water.



Determination of boiling point of water.

Procedure

(A)To determine the boiling point of water.

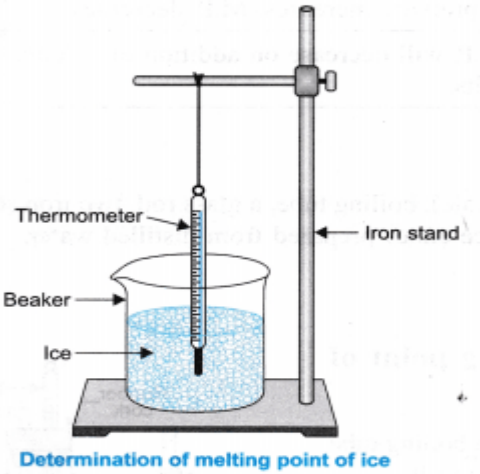
1. Take 25-30 ml of water in a boiling tube .
2. Clamp the boiling tube on iron stand with a holed cork, fix the thermometer .Place the thermometer above the water in the flask as shown in the figure and record its temperature.
3. Place a burner under the boiling tube.Read the temperature and record it in the given observation table till the water boils. Record the reading after the time interval of 1Minute .
4. **Observation Table**

S.NO	Time (min)	Temp ^{0}C

Result

1. Boiling Point of water is _____
2. Once the boiling point is attained the temperature reading on thermometer does not change for sometime.

(B)To determine the melting point of ice.



Determination of melting point of ice

1. Take a beaker half-filled with the dry crushed ice obtained from distilled water.
2. Suspend a Celsius thermometer from the clamp stand such that the bulb of the thermometer is completely surrounded by ice.
3. Read the thermometer reading and record the temperature after every 1 minute till the ice melts and the thermometer reading remains stationary for 2 minutes.
4. **Observation Table**

S.NO	Time (min)	Temp ^{0}C

Result

1. Melting point of ice is _____.

2. Once the melting of ice begins the temperature remains constant for some time.

Precautions

1. Choose a better quality thermometer whose graduated scale is clearly readable.
2. Record the temperature in whole numbers.
3. While reading the thermometer the eye level should be parallel with mercury level.
4. Dip only the bulb of thermometer into water/ice.
5. Thermometer should not touch the walls of beaker or boiling tube.

VIVA VOCE

1. What is the melting point of pure water ice cubes?
Answer:
0°C.

2:What is the boiling point of pure water?
Answer:
100°C.

3:At what temperature is the density of water maximum?
Answer:
At 4°C.

4:At what temperature will you get the latent heat of fusion for water?
Answer:
At 0°C.

5:What is the latent heat of fusion of ice?
Answer:
336 kJ/kg.

6: What is the principle of working of a pressure cooker?
Answer: In pressure cooker the pressure is increased. The water boils at temperature more than 100°C.

7: Which of the two contains more heat energy, water at 100°C or steam at 100°C?
Answer: Steam at 100°C, contains more heat energy.

8:When ice and cold water both are at 0°C then why does ice floats on water?
Answer: Density of ice is less than water.

9:In cold countries why do people sprinkle common salt over it?
Answer: The ice melts faster when salt is sprinkled over it and the clearance of ice from the path becomes easier and faster impurities decreases the melting point.

10: State the temperature at which water and ice co-exist.
Answer: Water and ice co-exist at 0°C/ 273 K.

11: Why is the bulb of thermometer kept above the surface of water while determining the boiling point of water?
Answer: The water boils and the steam is formed at its boiling point. Hence to get the accurate boiling point of water the thermometer is placed above the surface of water.

12: Why does the temperature remain unchanged until the entire solid changes into liquid even if we are heating the solid?
Answer: The temperature remains unchanged until the entire solid changes into liquid even if we are heating the solid; it is because the heat is used up by the molecules in overcoming the force of attraction.

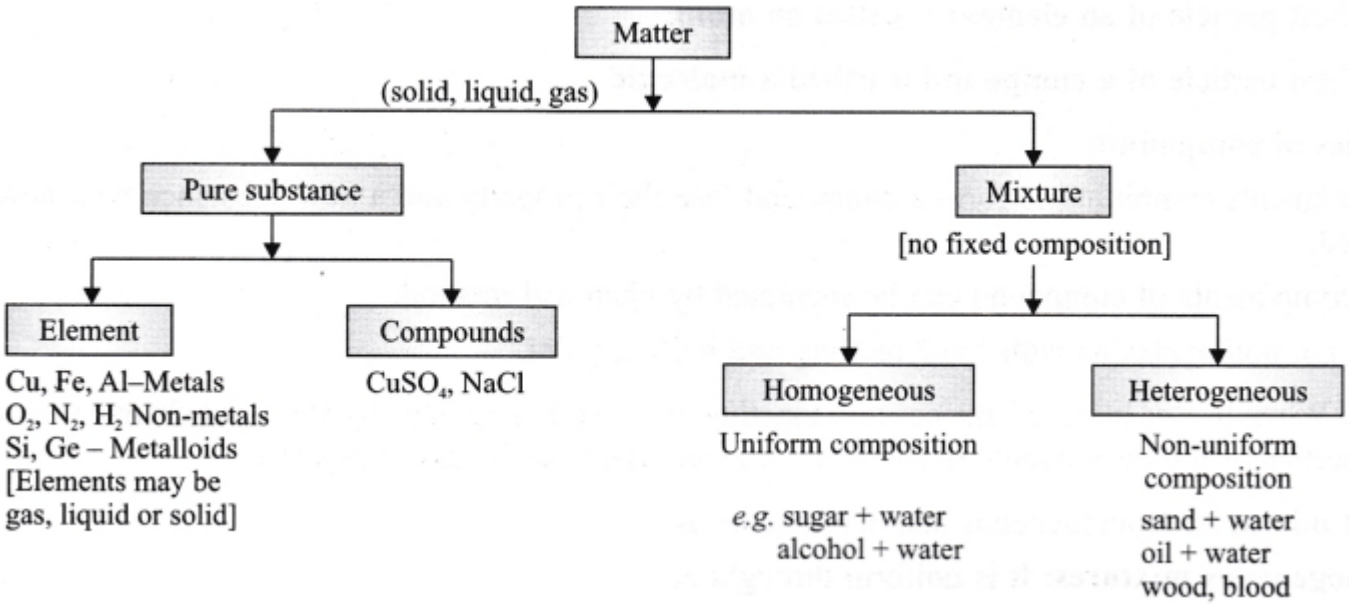
13: Why do we fix a two holed-cork in the round bottom flask while determining the boiling point of water?
Answer: The two holed-cork is fixed in the round bottom flask while determining the boiling point of water. Through one hole fix the thermometer and through the other hole the delivery tube is fixed which allows the steam to pass through.

Experiment No. 2

Aim 2 To study the properties of: a mixture and a compound using iron filings and sulphur powder and distinguish between these on the basis of :

1. appearance i.e., homogeneity and heterogeneity.
2. behaviour towards a magnet
3. behaviour towards carbon disulphide as a solvent.
4. effect of heat.

Theory

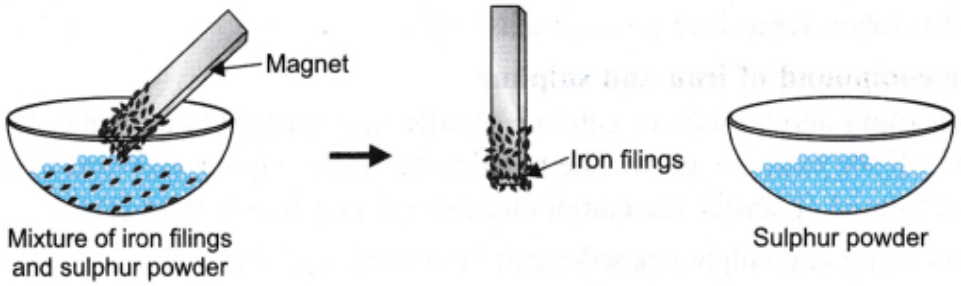


Mixture: When two or more than two substances mix together in any proportion physically and do not show any chemical change, retain their individual properties, then they form a mixture.
Compound: When two or more than two substances combine together chemically in a fixed ratio, such that they can be separated only by chemical means, then a compound is formed.

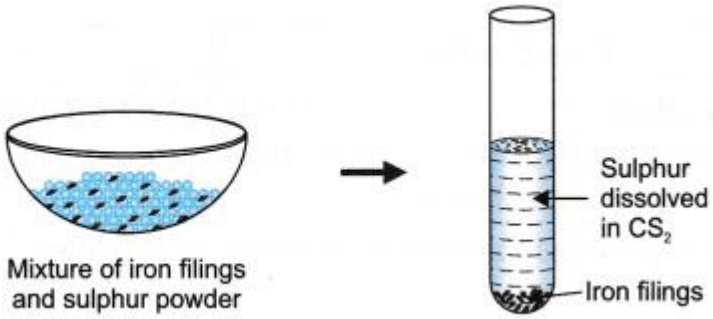
Mixture

Separation of Iron and Sulphur from its Mixture

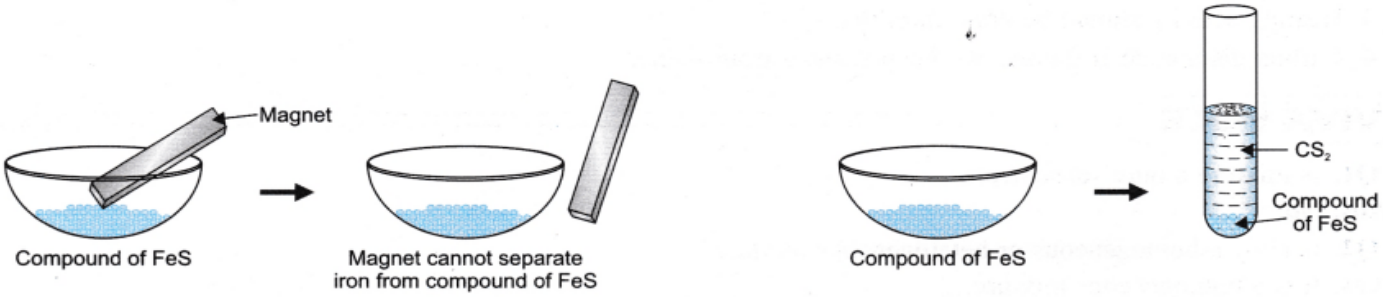
I.



II.



Separation of Iron and Sulphur from its compound



Materials Required

Test tubes, test tube stand, test tube holder, hard glass test tube, magnet, China dish and a watch glass.

Chemicals Required

Iron filings, sulphur powder, carbon disulphide. dil. HCl ,FeS .

Observations

S.NO	Experiment	Observation	Inference
1	Appearance		

2	Action with magnet		
3	Reaction with dil. HCl		
4	Behaviour towards CS_2		

Precautions

1. Avoid wasting the chemicals, use very little amount of it.
2. Carbon disulphide is flammable, keep it away from flame.

VIVA VOCE

1: Is mixture a pure substance?
Answer: No.

2: Is alloy a homogeneous or heterogeneous mixture?
Answer: It is a homogeneous mixture.

3: Give one test to show that mixtures can be separated physically.
Answer: Take sulphur + iron-mixture, roll magnet over it, iron filings clings to magnet.

4: Why doesn't air show same composition over all places? .
Answer: Air is a mixture but various gases, particles, pollutants keep on adding in air in various proportions.

5: Give two examples of uniform composition in mixture.
Answer: Sugar in water, salt in water.

6:Give two examples of non-uniform composition.
Answer: Sand and salt, sugar and salt, blood.

7: Why do mixtures show heterogeneous appearance?
Answer: The constituents of mixture are not mixed uniformly hence show heterogeneous appearance

.8**:** Name the constituents of the following compounds.
Water, Sugar, Magnesium oxide, Iron sulphide.
Answer: Water – Hydrogen and Oxygen
Sugar – Carbon, Hydrogen, Oxygen
Magnesium Oxide – Magnesium and Oxygen
Iron sulphide – Iron and Sulphur.

9: What happens when dilute sulphuric acid is added to a mixture of iron and sulphur?
Answer: Iron reacts with dilute sulphuric acid and hydrogen gas is released.

10: What happens when dilute sulphuric acid is added to a compound of iron and sulphur?
Answer: The iron sulphide reacts with dilute sulphuric acid to form hydrogen sulphide gas, it is colourless gas with the smell of rotten eggs.

EXPERIMENT- 3

Aim To distinguish between True solutions, colloids and mixtures on the basis of:

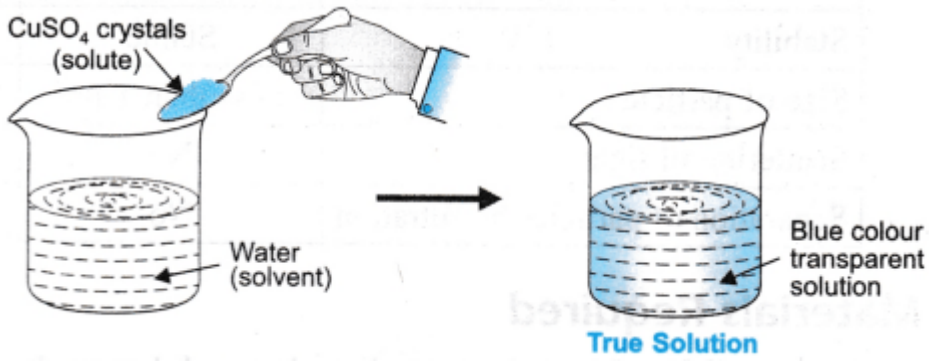
- transparency
- filtration criterion
- stability

Theory

1. **True solution:** A solution that has solute particles of size smaller than 1 nm (10^{-9} metres) in diameter, and cannot be seen with naked eyes. They do not scatter a beam of light, the particles do not separate by filtration and the particles do not settle down.
2. **Suspension:** It is a heterogeneous mixture in which solute particles do not dissolve but remain suspended, particles can be seen with naked eyes, it scatters a beam of light, particles can be separated from the mixture by filtration.
3. **Colloidal solution:** The solution appears to be homogeneous, the particles can scatter a beam of light, they do not settle down when left undisturbed, it is stable and particles cannot be seen by naked eyes. The particles cannot be filtered. The size of particles is between 10^{-7} cm to 10^{-4} cm in diameter.

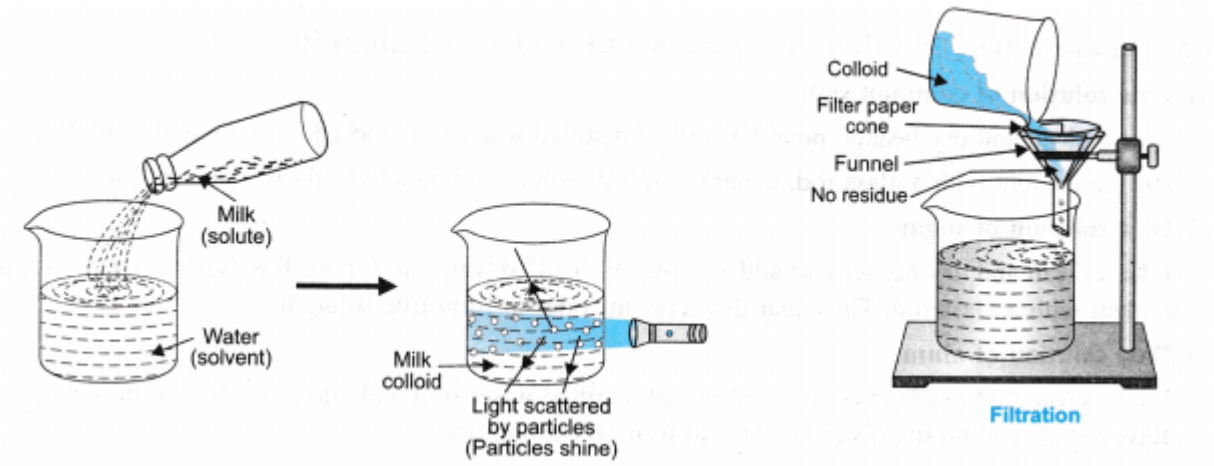
Properties of True Solutions

1. A true solution is a homogeneous mixture of solute and solvent.
2. The particle size of solute is less than 1 nm (1 nm =10^{-9}m).
3. The components do not scatter light and do not show Tyndall effect.
4. The particles cannot be separated by filtration.
5. The solution is stable (remains uniform).
6. The solution is transparent.



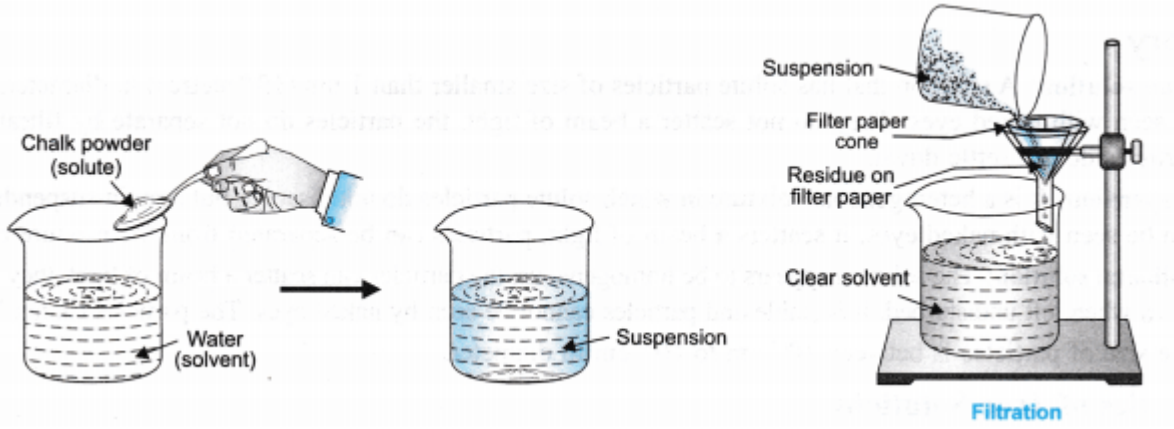
Properties of Colloid

1. It is a heterogeneous solution but appears to be homogeneous.
2. The particle size of solute is 1 nm-1000 nm. (10^{-9}-10^{-6} m)
3. The components scatter light and shows Tyndall effect.
4. The particles can be separated only by centrifugation.
5. The solution is stable.
6. The solution is translucent



Properties of Suspension

1. It is a heterogeneous mixture.
2. Particle size is more than 1000 nm (10^{-6} m) and can be seen with naked eyes.
3. The particles of suspension, in its suspended form scatter a beam of light, i.e., shows Tyndall effect.
4. It is unstable.
5. The particles can be separated by filtration
6. It is opaque.



Materials Required

1. Beakers (250 mL), a glass rodthree funnels, filter papers,

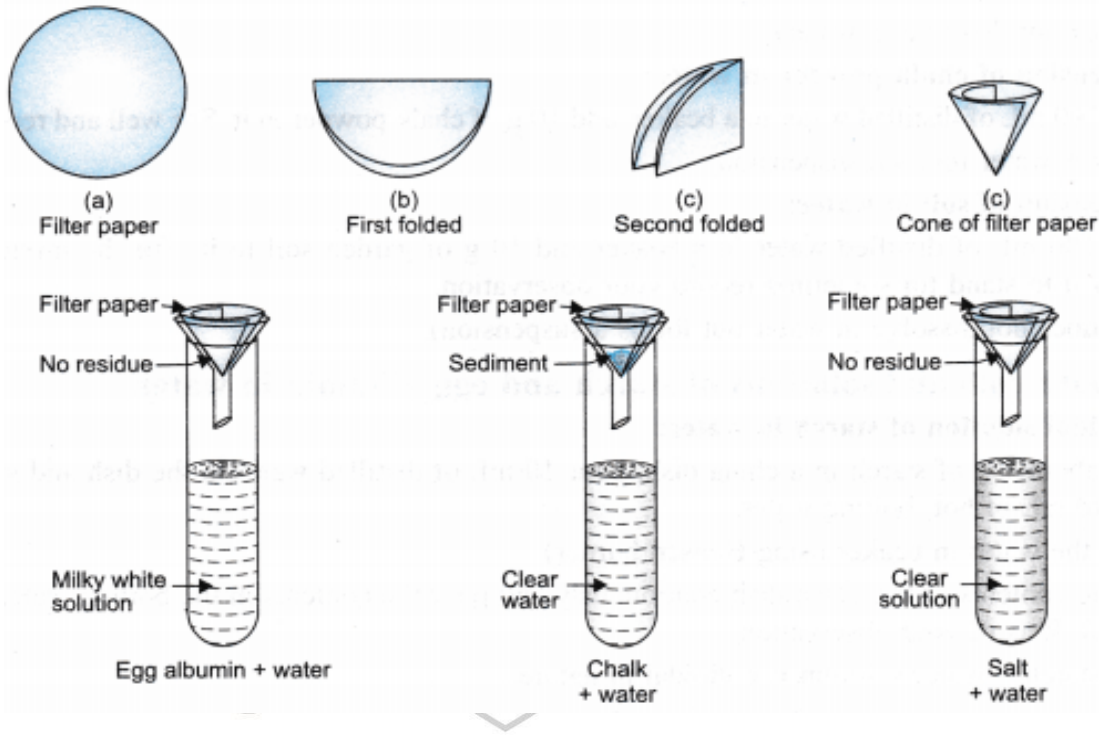
   Chemicals Required Common salt, Soap solution chalk powder,

1. **To distinguish the above formed solutions on the basis of transparency, filtration criterion and stability:**
   Take one true solution —> salt + water
   Take one suspension —> chalk + water
   Take one colloidal solution —>soap solution + water

1. Transparency:
Take 3 test tubes with a colloid, suspension and true solution in each respectively. Paste a white paper with tick mark on one side of each test tube. Look at the tick mark through the contents of the three test tubes from the other side. Check for the transparency of tick mark. Record your observations.

2. **Stability Criterion:**
Take 3 test tubes with a colloid, suspension and true solution in each respectively. Shake all the test tubes and keep them in the test tube stand, allow it to stand for 5 minutes. Record your observations.

3. **Filtration Criterion:**
Take 3 tripod stands, place a funnel over each stand. Fix the filter paper in t the Funnel and check for the filtration criterion.Record your observations.



Observation Table

S.NO	Property	True Solution	Colloidal Solution	Suspension
1	Particle size			
2	Nature			
3.	Visibilty			
4	Stability			
5. 5	Filteration			
6	Transparency			

Precautions

1. Do not waste the chemicals and distilled water. Use it wisely.
2. Always stir the contents in the test tube nicely and gently.
3. Use only distilled water to make solutions.

VIVA VOCE

1: Give one example of liquid solution.
Answer: lemonade + water.

2: Give one example of gaseous solution.

3: Give one example of solid solution.
Answer: Alloys: Brass—30% Zinc and 70% copper.

4: Name the solute and solvent in sugar solution.
Answer: Solute —> sugar Solvent -> water.

5: Name one solution that has gas as solute.
Answer: Soda water, solute is $C0_2$, solvent is water.

6: What is tincture of iodine solution?
Answer: A solution of iodine in alcohol is 'tincture of iodine'.

7:What is the size of particles in true solution?
Answer: The size is less than 1 nm (10^{-9} metre) in diameter.

8: Why does a true solution not scatter a beam of light?
Answer: Due to very small particle size, it does not scatter a beam of light.

9: What is Tyndall effect? .
Answer: The scattering of beam of light is called Tyndall effect.

10: How can you separate colloidal particles from its solution?
Answer: By centrifugation.

11: What are saturated and unsaturated solutions?
Answer: A solution which cannot dissolve more solute at a given temperature is called a saturated solution. A solution which can dissolve more of the solute at a given temperature is called an unsaturated solution.

12: Give three examples of solvents, commonly used.
Answer: Water, acetone, alcohol.

13. Why is water called a universal solvent?
Answer: Water is called universal solvent as maximum number of substances dissolve in it.

14. How can you make a saturated solution unsaturated?
Answer: Saturated solution on heating becomes unsaturated.

15: How can you make unsaturated solution saturated?
Answer: The unsaturated solution on cooling/freezing can become saturated.

Experiment : 4

Only to be observed

Aim : To separate the components of a mixture of sand, common salt and ammonium chloride (or camphor) by sublimation.

Theory : In the mixture given ammonium chloride is a sublimating substance. On heating the mixture, sublimating substance directly changes into gaseous state, its fumes are collected and cooled to get solid sublimate.

1. To separate mixture of salt and sand following processes are used:
    - Dissolve the mixture in water —> as one substance is soluble and the other (sand) is insoluble.
    - Sedimentation' sand settles down at the bottom of the solution.
    - **Filtration:** salt + sand + water solution is filtered to separate sand particles completely from it.
    - **Evaporation:** The water from salt solution is evaporated by heating to get salt.

Materials Required

1. A China dish, tripod stand, a wire gauze, a bunsen burner, glass funnels, cotton, a glass rod, a beaker, filter paper, a clamp stand.

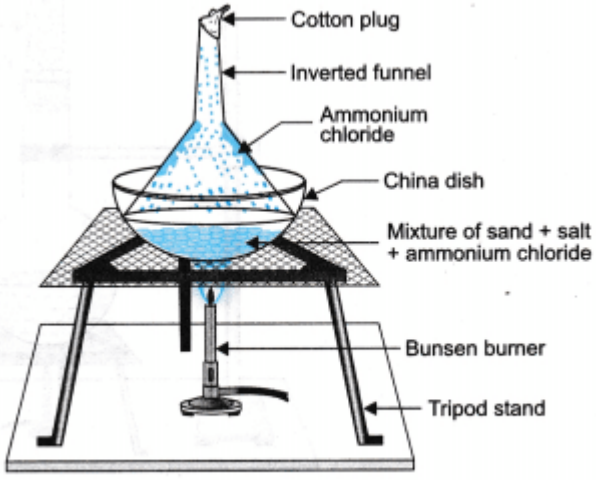
Chemicals Required

1. Sand, common salt, ammonium chloride (or camphor powder), and distilled water.

Procedure 1. Sublimation
Separation of ammonium chloride from the given mixture.

- Take a tripod stand, place a wire gauze over it.
- Keep the china dish with the given mixture on the wire gauze.
- Place the glass funnel in an inverted position on the mixture and plug the stem hole of the funnel with cotton.
- Heat the mixture with bunsen burner or spirit lamp, for few minutes (till you see white fumes released from the mixture).
- Turn off the burner and allow the fumes to collect on the inner side of the funnel.
- Remove the funnel to collect the deposited ammonium chloride on the funnel.
- Place the funnel again on the mixture, heat it and collect all the white fumes that comes out of the mixture. This procedure will continue till all the white fumes are collected and

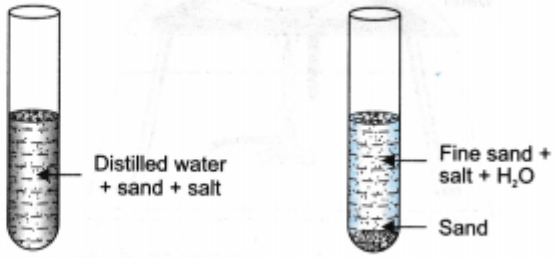
on further heating no more white fumes are released. The left out mixture has only salt.



Separation of ammonium chloride

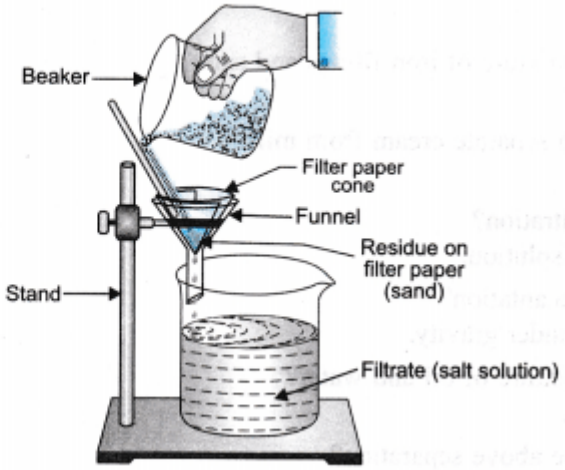
2. **Sedimentation and Decantation/Filtration**
   Separation of sand from the mixture
   - The mixture left in the last step of sublimation is transferred into a beaker.
   - Add 5-10 mL of distilled water into the mixture (water should be sufficient to dissolve the salt into it) and stir it with glass rod.
   - Make a cone of filter paper as shown in the diagram. Fix this cone in the glass funnel. Place the funnel over tripod stand or clamp it on the stand. Place a clean beaker under the stem of the funnel.
   - Allow the mixture to stand so that sand particles settle down in the beaker.
   - Now transfer the solution into the funnel with filter paper slowly for filtration.
   - The residue collected on the filter paper is sand and the filtrate is salt solution.
- Collect the sand from the beaker and filter paper, dry it to get the sand completely separated from the mixture.

• **Dissolving the Mixture, Sedimentation and Decantation**



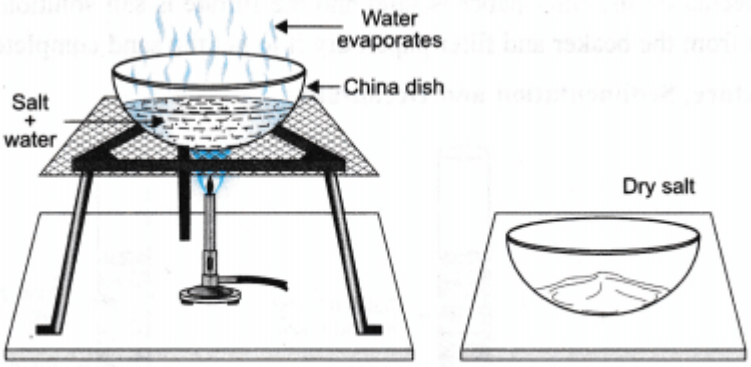
Dissolving mixture in water Sedimentation

• **Filtration of Sand & Salt Solution**



Filtration

3. **Evaporation**
   Separation of common salt.
   - The filtrate obtained in the beaker in previous step consists of common salt solution. Transfer it to the china dish.
   - Place the china dish on tripod stand with bunsen burner and heat it in low flame (controlled heating) till all water gets evaporated.
   - The salt is collected in the china dish, as all the water is evaporated.



Separation of common salt

Precautions

1. Be careful during heating experiments.
2. Prolonged heating should be avoided.
3. Keep the flame low if you are using bunsen burner.
4. Use clean and dry apparatus.
5. Use distilled water for making solution.
6. While filtering ensure that the filter paper cone does not tear up and allow the mixture to pass slowly through it.
7. During sublimation, you can keep an extra plugged funnel to collect the dense white fumes.

VIVA VOCE

1: How will you separate a mixture of sand and camphor?
Answer: By sublimation.

2: How can you separate the mixture of iron filings and sand?
Answer: By magnet.

3:Name the technique used to separate cream from milk.
Answer: Centrifugation.

4: What is the principle for filtration?
Answer: The size of particles in the solution.

5: What is the principle for decantation?
Answer: Settling down of particles under gravity.

6: How will you separate a mixture of oil and water?
Answer: By using separating funnel.

7: What is the principle for the above separation?
Answer: Immiscible liquids and difference in their densities.

8:Name two sublimating substances.
Answer: Camphor, ammonium chloride.

9 : How will you separate a mixture that has soluble substance A and insoluble substance B?
Answer: It can be separated by dissolving in distilled water, followed by filtration and then evaporation.

10: What is the principle of centrifugation?
Answer: Difference in the densities of substances in a mixture.

11: If in the first step the mixture had been dissolved in water what would have been the difficulty in separation?
Answer: The mixture given for separation is sand, common salt and ammonium chloride. The later two (i.e., common salt and ammonium chloride) dissolve in water. If the mixture had been dissolved in water then the separation of the constituents would be a difficult task.

12: Instead of common salt if one component in the given mixture is sulphur, how would you carry out separation process then?
Answer: The steps would be:

1. Sublimation to remove ammonium chloride which will sublime and can be collected.
2. Dissolve sulphur in carbon disulphide and filter, the filtrate would be dissolved sulphur and the sand can be separated.
3. By heating the filtrate at controlled temperature, sulphur can be collected.

Experiment No.5

Aim

To carry out the following chemical reactions and classify them as physical or chemical changes.

1. Iron with copper sulphate solution in water.
2. Burning of magnesium ribbon in air.
3. Zinc with dilute sulphuric acid.
4. Heating of copper sulphate.
5. Sodium sulphate with barium chloride in the form of their solutions in water.

Theory

1. **Physical Change:** When there is no change in the composition of a substance and no change in chemical nature of the substance, such change is called as physical change.
2. In physical change, the interconversion of state takes place. For example,

$$\text{Ice} \underset{\text{freezes}}{\overset{\text{melts}}{\rightleftharpoons}} \text{Water} \underset{\text{condenses}}{\overset{\text{boils}}{\rightleftharpoons}} \text{Water vapour}$$

3. **Chemical Change:** It is a change which brings change in the chemical properties of matter and a new substance is obtained. For example, burning of oil, fuel.
4. In a chemical change – heat is evolved or taken in, formation of bubbles, gas, fumes takes place, there is a change in colour of the reactants when they form a product.

$$Reactants \longrightarrow Products$$

$$A + B \longrightarrow C(Chemical \quad reaction)$$

The chemical reactions are of four types:

1. Combination reaction: Two elements/compounds combine to form a single product.
2. Decomposition reaction: When a compound decomposes/breaks due to energy, heat, light or electricity to form simpler substance.

$$CaCO_3(s) \xrightarrow{\text{heat}} CaO(s) + CO_2(g)$$

$$2H_2O(l) \xrightarrow{\text{electricity}} 2H_2(g) + O_2(g)$$

3. Displacement reaction: It takes place when more reactive metal reacts with the salt of less reactive metal and displaces it to form a new compound.

$$\underset{\text{Silver Grey}}{Fe(s)} + \underset{\text{Blue}}{CuSO_4(aq)} \longrightarrow \underset{\text{Light Green}}{FeSO_4(aq)} + \underset{\text{Reddish Brown}}{Cu(s)}$$

4. Double displacement reaction: In this reaction when two salts are mixed together in solution form then exchange of ions takes place and a new product is obtained.**E.g**

$$\text{Sodium sulphate} + \text{Barium chloride} \longrightarrow \text{Barium sulphate} + \text{Sodium chloride}$$

$$\underset{\text{Colourless}}{Na_2SO_4(aq)} + \underset{\text{Colourless}}{BaCl_2(aq)} \longrightarrow \underset{\text{White ppt.}}{BaSO_4(s)} + \underset{\text{Colourless}}{2NaCl(aq)}$$

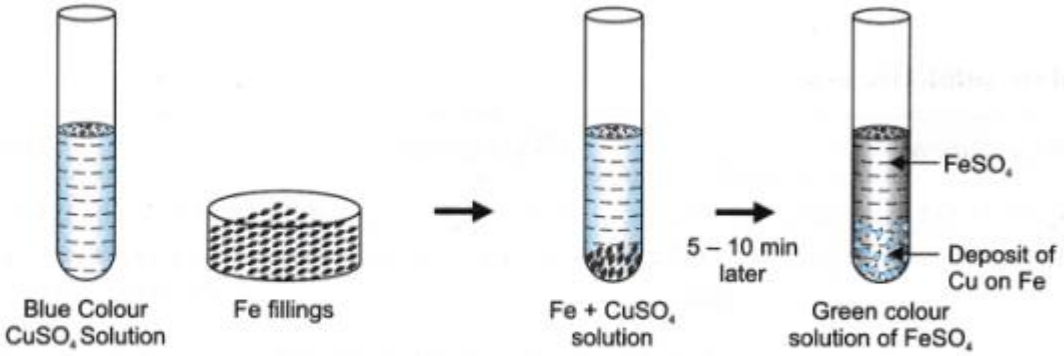
Materials Required
Test tubes, test tube stand, test tube holder, a pair of tongs, Bunsen burner.

Chemicals Required
Iron filings, copper sulphate solution, magnesium ribbon, zinc granules, dilute sulphuric acid, sodium sulphate and barium chloride solutions and copper sulphate crystals.

Procedure

1. Iron with copper sulphate solution in water

Reactions of Fe+$CuSO_4$

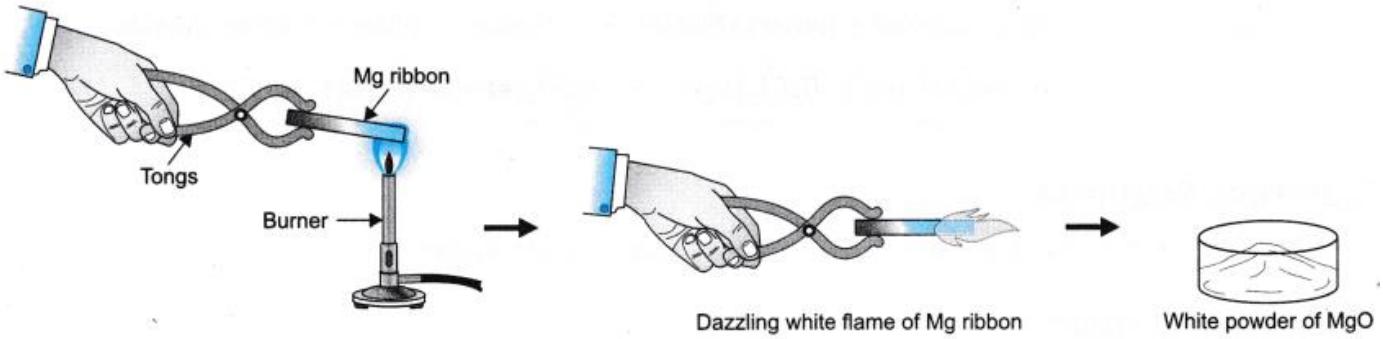


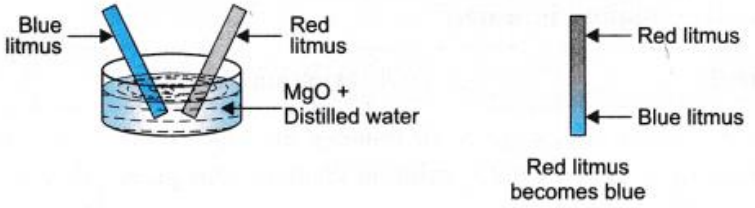
Reaction: $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$
Silver grey; blue soln.; light green; reddish brown

	Experiment	Observation	Inference

2. Burning of magnesium ribbon in air

Reaction of $Mg + O_2$





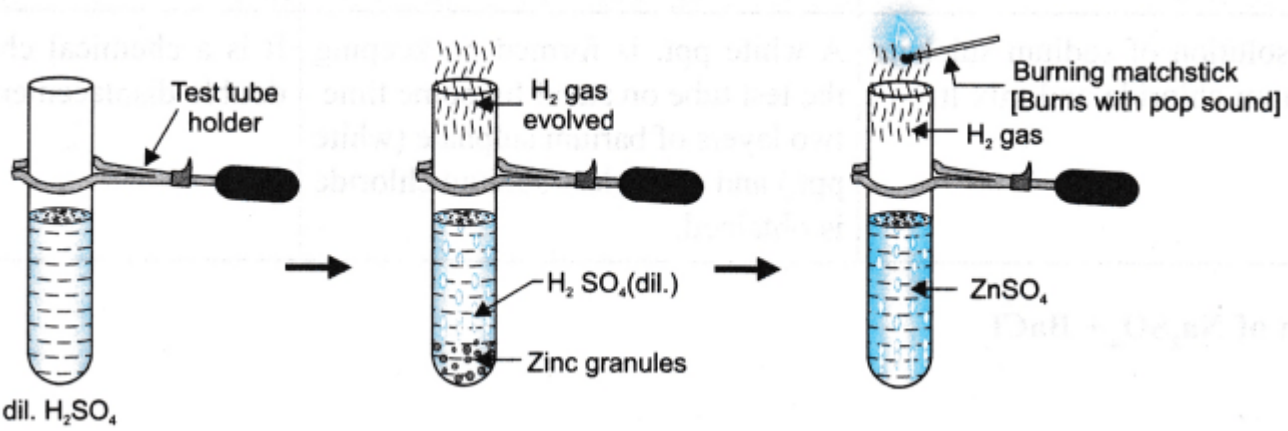
Reaction: (*i*) $\underset{\text{Silver colour}}{2Mg(s)} + O_2(g) \xrightarrow{\text{Heat}} \underset{\text{White powder mass}}{2MgO(s)}$

(*ii*) $MgO(s) + H_2O(l) \longrightarrow Mg(OH)_2(aq)$

S.No	Experiment	Observation	Inference

3. Zinc with dilute sulphuric acid.

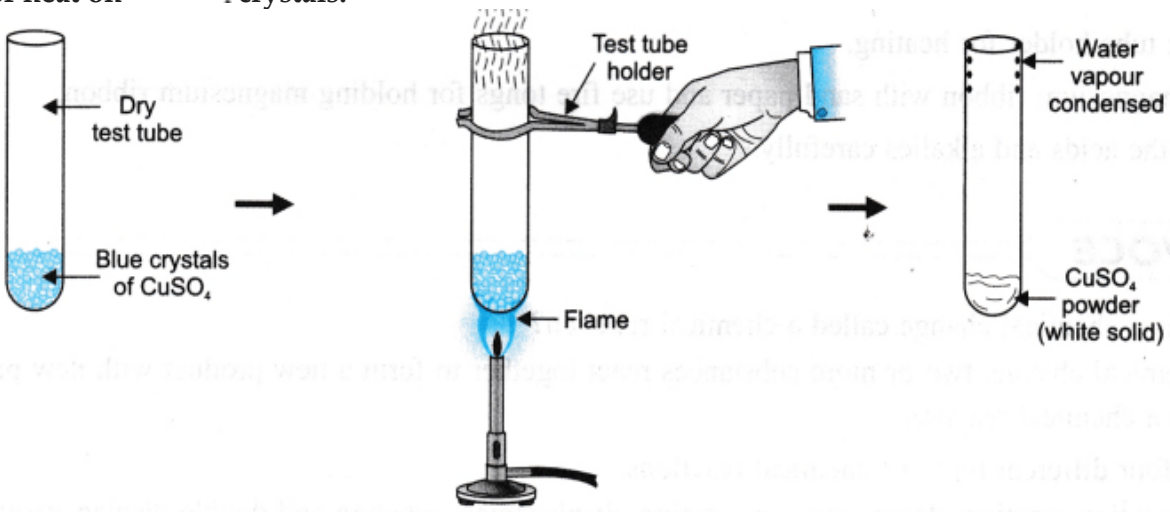
Reactions of $Zn \quad + \quad H_2SO_4$



Reaction: Zn(s)+ $Zn \quad + \quad H_2SO_4 \longrightarrow ZnSO_4(aq) + H_2(g)$

S.No	Experiment	Observation	Inference

4. Reaction of heat on $CuSO_4$ crystals.



Reaction: On heating $CuSO_4.5H_2O$ crystals

$$\underset{\text{Blue crystals of copper sulphate}}{CuSO_4.5H_2O} \longrightarrow \underset{\text{anydrous copper sulphate}}{CuSO_4} + 5H_2O$$

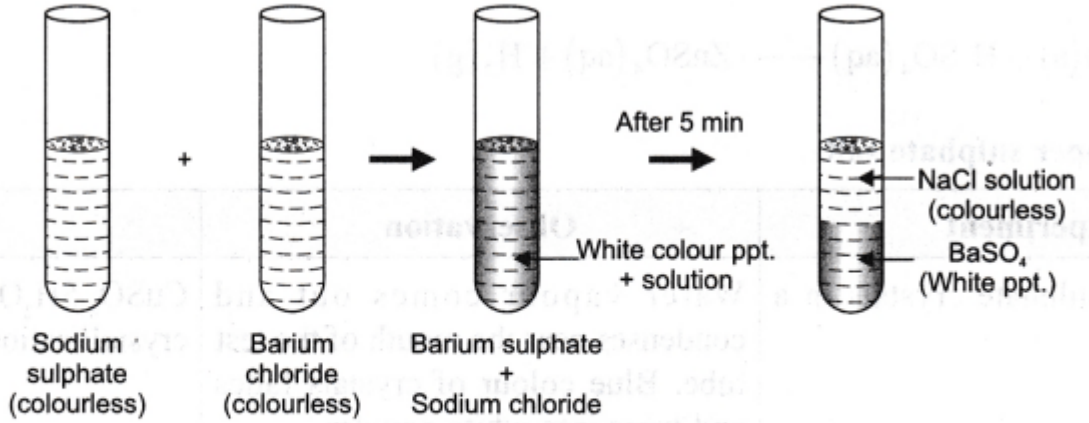
On adding water to white powder of anhydrous copper sulphate

$$\underset{\text{white solid}}{CuSO_4(s)} + \text{Water} \longrightarrow \underset{\text{blue solution}}{CuSO_4(aq)}$$

S.No	Experiment	Observation	Inference

5. Reaction of sodium sulphate and barium sulphate solutions.

Reaction of $Na_2SO_4 + \quad BaCl_2$



Reaction: $Na_2SO_4(aq) + BaCl_2(aq) \longrightarrow \underset{\text{White ppt.}}{BaSO_4(s)} + 2NaCl(aq)$

S.No	Experiment	Observation	Inference

Precautions

1. Use all the chemicals in very less quantity.
2. Use test tube holder for heating.
3. Clean magnesium ribbon with sand paper and use fire tongs for holding magnesium ribbon.
4. Handle the acids and alkalies carefully.

VIVA VOCE

1: Why is a chemical change called a chemical reaction?
Answer: In chemical change, two or more substances react together to form a new product with new properties, so it is called a chemical reaction.

2: State four different types of chemical reactions.
Answer: Combination reaction, decomposition reaction, displacement reaction and double displacement reaction.

3: Give two examples of combination reaction seen in daily life.
Answer: Iron reacts with oxygen to form iron oxide and copper reacts with carbonates present in air to form copper carbonate.

4: Name the metal that is silver grey, brittle in nature, present in granules.
Answer: Zinc.

5: Name the metal that is silvery white, present in ribbon form.
Answer: Magnesium.

6: What would happen if you place zinc metal in copper sulphate solution?
Answer: Zinc metal reacts with copper sulphate to form zinc sulphate, colourless solution and copper metal is displaced.

7: Give one example of a chemical reaction in which precipitate is formed.
Answer: Sodium sulphate and barium chloride react together to form barium sulphate, which is white insoluble precipitate.

8: Give two physical properties of hydrogen gas.
Answer: It is colourless, odourless and combustible gas.

9: What is the colour of iron sulphate crystals?
Answer: It is green in colour.

10: Give one example/reaction which shows both physical change and chemical change.
Answer:
Burning of candle
Melting of wax $\longrightarrow$Physical change
Burning of wax$\longrightarrow$ Chemical change

11: Why is burning of magnesium ribbon considered to be a chemical change?
Answer: When magnesium ribbon is burnt, it reacts with oxygen to form magnesium oxide, a completely new product with new properties.

12: What happens to blue colour copper sulphate when zinc is added to it?
Answer: The blue colour fades and becomes colourless because zinc displaces copper ions from copper sulphate to form zinc sulphate solution.

13: When sodium sulphate reacts with barium chloride, white ppt. is formed. What is it due to?
Answer: When sodium sulphate reacts with barium chloride an insoluble white precipitate (ppt.) of barium sulphate is formed.

14.: When zinc reacts with sulphuric acid, what is formed and how do you test the same?
Answer: When zinc reacts with dilute sulphuric acid, zinc sulphate solution is formed and hydrogen gas is released, it can be tested by bringing a burning matchstick near the evolving gas which will bum with a pop sound.

15.: Give the test for H_2 gas.
Answer: Take a burning matchstick near the mouth of a test tube in which hydrogen gas is released, the matchstick burns with a pop sound.

16. What happens to the blue colour copper sulphate solution when you dip an iron nail into it?
Answer: When iron nail is dipped into blue coloured copper sulphate solution, the blue colour changed to green as iron displaces copper ions and on the surface of iron, brown colour copper metal gets deposited.

17. What happens when copper metal is dipped in iron sulphate solution?
Answer: No change as copper is less reactive than iron and cannot displace it.

18. What is your observation when you bum magnesium ribbon in air?
Ans. It catches fire, bums with dazzling white flame and forms white powdery mass of magnesium oxide.

19 : What happens when crystals of copper sulphate are heated in a test tube?
Answer: The blue coloured copper sulphate crystals on heating loses water and turns white.

20. Why should magnesium ribbon be cleaned before burning it in air?
Answer: To remove the impurities from magnesium ribbon and use it in pure form. Magnesium has the tendency to form a layer of magnesium oxide on the strip.

Revision

Assertion and Reasoning Assignment

DIRECTION: For questions given below two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below

(a) Both A and R are true and R is correct explanation of the A.
(b) Both A and R are true but R is not the correct explanation of the A.
(c) A is true but R is false.
(d) Both A and R are false.

1. Assertion (A): Air is a mixture.

   Reason (R): Air is made up of gases.

2. Assertion (A): The molecular mass of Argon is 40 u.

   Reason (R): Argon is diatomic molecule.

3. Assertion (A): Bohr's orbits are called stationary orbits.

   Reason (R): Electrons remain stationary in these orbits for some time .

4. Assertion (A): Solid carbon dioxide changes its state when exposed to air.

   Reason (R) : Carbon dioxide undergoes sublimation.

5. Assertion (A) In steam particles has low kinetic energy.

   Reason (R): Kinetic energy decreases with increase in temperature.

6 Assertion (A) Atoms are neutral.

Reason (R) : The number of all the subatomic particles are same

7. Assertion (A): Isotopes are the atoms of the same element.

   Reason (R) : Hydrogen is the lightest gas.

8. Assertion (A): 5 moles of CO_2 and 5 moles of H_20 have the same mass.

   Reason (R): 100 g of NH_3 has more atoms than that present in 100 g of N_2 .

9. Assertion (A): Coloured components of the ink can be separated by evaporation.

   Reason (R): Evaporation is used to separate a soluble component from liquid.

10. Assertion (A): It is easier to remove fresh stains of ink from a cloth.

    Reason (R): Ink diffuses in the cloth slowly.

Question bank

Second Term

(1Mark)

Q1. To what type of substances is the law of constant composition applicable?

Q2. Find the formula unit mass of sodium carbonate and sodium bicarbonate .
[Atomic mass of Na= 23u , H = 1u , C = 12u , O= 16u]

Q3. What is the atomicity of O_3 and NH_3 ?

Q4. Give the latin name of Sodium and Potassium.

Q5. Define the term mole.

Q6. An atom consists of one proton and one electron. Has it some residual charge?

Q7. Is the atomic mass of an element its actual mass?

Q8. Define isotopes.

Q9. If Z =4, what would be the valency of the element? Also name the element.

Q10. If K and L shells are completely filled, what will be the name of an element?

(2 Marks)

Q1. How many moles are present in 11.5g of sodium?

Q2. If the valency of carbon is 4 and that of sulphur is 2 write the formula of the compound formed between carbon and sulphur atoms.

Q3. Give four postulates of Dalton's atomic theory.

Q4. An element forms an oxide B_2O_3. Find its valency and write the formula of its chloride.

Q5. What is atomicity? Give one example of each of monoatomic and diatomic substances.

Q6. Most of the space in an atom is empty? Justify.

Q7. Discuss in brief Rutherford model of an atom.

Q8. Enlist the main postulates of Bohr Theory.

Q9. An ion M+2 contains 10 electrons and 12 neutrons .What is the atomic number and mass number of the element M? Name the element.

Q10. Write any four applications of radioisotopes.

(3 and 5 Marks)

Q1. 0.44g of a hydrocarbon on complete combustion with oxygen gave 0.88g of Carbon dioxide and 1.8g of water. Show that the results are in argument with the law of conservation of mass.

Q2. Write the chemical formulae of

a) Barium chloride b) Magnesium sulphate c)Ammonium nitrate
d) Potassium dichromate e) Calcium phosphate

Q3. The element boron occurs in nature as two isotopes having masses 10u and 11u what are the percentage abundance of these isotopes in a sample of boron having average atomic mass of 10.8u?

Q4. Draw the electronic configuration of the elements sulphur and nitrogen.

Q5. Which of the two will be more reactive an element X with atomic number 17 or an element Y with atomic number 16 ? Give reason.

Q6. Helium atom has 2 electrons in its valence shell but its valency is not 2. Explain.

Q7. Calculate the number of molecules of sulphur (S8) present in 16 g of solid suphur. (S- 32u)

Q8 (a) State reason for the following statements :

(i) Some elements possess fractional atomic mass. Explain with an example

(ii) Isotopes of an element have similar chemical properties. Explain with an example .

Q9 A compound XH is formed by combination of an element X with hydrogen. Find the valency of element X. State the formula of the compounds formed by combination of:

(a) X with sulphate ion
(b) X with oxide ion

Q10 You are given an element

$$^{14}_{7}X$$

Find out
(i) Number of protons, electrons and neutrons in 'X'.
(ii) Valency of 'X'.
(iii) Electronic Configuration of 'X'. Draw its atomic structure.

MIXED BAG MCQ'S

Q.1) In a reaction,4 g of sodium carbonate reacted with 10 g of HCl solution. the product was a mixture of 2.5 g of CO2 and 11.5 g of sodium chloride solution. If the data is in agreement with the law of conservation of mass, then mass of reactants and mass of products will be

A. 14g=14g
B. 28g=28 g
C. 11.5g=11.5 g

Q.2) In a reaction, 5.3g of sodium carbonate reacted with 6g of ethanoic acid.The products were 2.2g of C02,0.9g water and some sodium ethanoate. What is the expected weight of sodium ethanoate?

A. 8g
B. 8.2g
C. 6g

Q.3) If 6.3g of sodium bicarbonate are added to 15 g of ethanoic acid solution, the residue left is found to weigh 18 g.What mass of CO2 is released in the reaction?

A. 3g
B. 4g
C. 3.3g

Q.4) Hydrogen and oxygen combine in a ratio of 1:8 by mass to form water.What mass of oxygen will be required to react completely with 4g of hydrogen?

A. 34g

B. 32g
C. 16g

Q.5) 0.24 g of a sample of a compound having boron and oxygen was found on analysis to contain 0.096g of boron and 0.144g of oxygen. Calculate the percentage composition of boron and oxygen respectively in the compound.

A. boron-42%;oxygen 38%
B. boron-40%;oxygen 38%
C. boron-40%;oxygen 60%

Q.6) Calculate the mass of carbon present in 2 g of carbon dioxide.(given that C:O::3:8)
A. 0.545g
B. 0.678g
C. 0.586g

Q.7) What mass of silver nitrate will react with 5.85g of sodium chloride to produce 14.35 g silver chloride and 8.5g of sodium nitrate if the law of conservation of mass is true?
A. 13g
B. 15g
C. 17g

Q.8) How many grams of sodium oxide is formed by burning 46g sodium in air according to the equation. $4Na + O_2 \text{------} > 2 Na_2O$
A. 156g
B. 78g
C. 94g

UT-1
Subject - Chemistry
Class -1X

General instructions:

- **Please ensure that you have submitted the Undertaking for the unit test before beginning the paper.**
- **The writing time is from 10:00am to 10:35 am.**
- **Use an A-4 sheet to write your answers.**
- **From 10:35am-10:45 am, the pdf file of the answer sheets needs to be created, attached and submitted. Once submitted, it can't be resubmitted.**
- **The Answer sheets need to be scanned and uploaded as a pdf file in portrait mode. Make sure that you turn in the work in the time frame assigned.**
- **No image to be uploaded.**
- **Children who avail extra time, may submit the answer sheets by 11:00am**
- **All questions are compulsory.There are 9 questions in all in the paper.**
- **For Questions 1-6,write the complete correct option with the assigned numbering for it to be awarded marks. Only writing the number will not fetch you complete marks.**
- **This paper has 2 printed sides.**

Time-40 min **MM-13**

Q.1	Which of the following properties does not describe a compound? (a) It is composed of two or more elements (b)It is a pure substance (c)It cannot be separated into constituents by physical methods (d)It is mixed in any proportion by mass	1
Q.2	A pure substance that is made up of one type of atoms and cannot be broken into two or more substances by physical or chemical means is referred to as (a)A compound (b)An element (c) a molecule (d)a mixture	1

Q.3	Which of the following element is liquid at room temperature? (a)Sodium (b)Iron (c)Copper (d)Mercury	1
Q.4	Which of the following is a pure substance? a) Air (b)Graphite (c)22 carat gold (d)Unadulterated milk	1
Q.5	Which of the following is not a compound? (a)Marble (b)Diamond (c)Quick lime (d)Baking soda	1
Q.6	Which of the following is neither a metal nor a nonmetal? (a)Gold (b)Hydrogen (c)Chlorine (d)Silicon	1
Q.7	Under which category of mixtures will you classify alloys and why?	2
Q.8	Trace out two differences between homogeneous and heterogeneous mixtures(one difference and one explicit example)	2
Q.9	Classify the substances given below into Elements ,Compounds and Mixtures: Copper, NaCl,Wood,$CaCO_3$,Lead,Tap water,	3

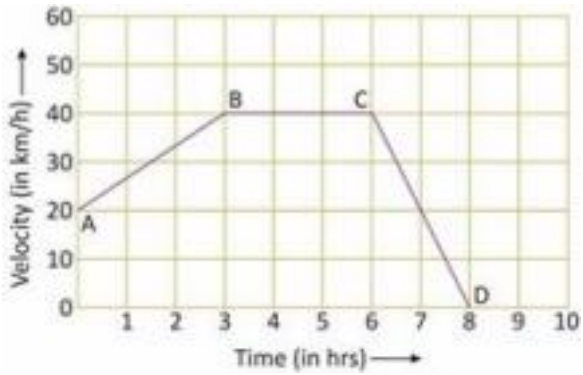
Academic session- 2020-21
First Term Examination
Class IX

Time-2h **M.M= 30**

Instruction

1. **This paper contains 4 sides.**
2. **Q 1 to 30 are to be attempted through Google form and Q 31 to 39 are in the pdf Question paper.**
3. **Attempt all questions of the a section together. Each section should begin on a new page. The paper has to be attempted on A4 sheets only.**
4. **All questions are compulsory.**
5. **Please attach one single pdf file in portrait mode titled as (your name_ class _ section) 6. Do not forget to turn in the assignment.**
7. **Number each page and mention the total no. of sheets used on the first page with your name, class and section.**

	Section A Physics	**M.M=10**
Q31.	(a) Establish the position – time relation for an object moving with uniform acceleration using graphical method. (b) The brakes applied to a car produce an acceleration of 6 m/s^2 in the opposite direction of motion. If the car takes 2 s to stop after the application of brakes, find the distance travelled by the car in the 2 s. (c) An artificial weather forecasting satellite is revolving around the earth. (i) What is the direction of motion of the satellite at any instant of time? (ii) Is the motion accelerated? Justify your answer.	5
Q32.	(I) A motorcyclist drives from A to B with a uniform speed of 30 km h^{-1} and returns back with a speed of 20 km h^{-1}. Find its average speed and average velocity. (II) Amit drives a car for 8 hours. Observe the velocity-time graph for the car and answer the following questions:-	5



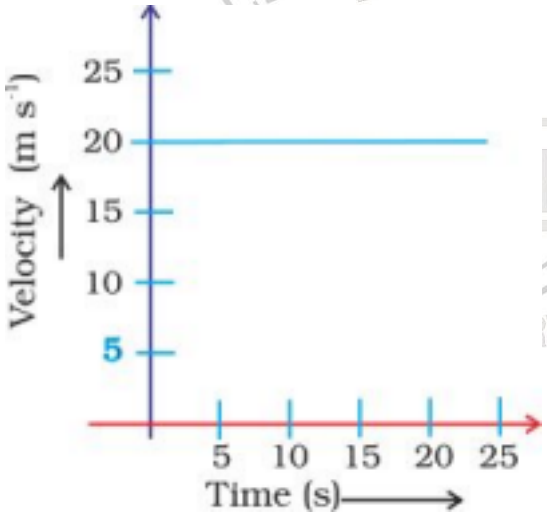
(a) Which parts represent uniform acceleration and uniform retardation? (b) During which time interval, the car moves with uniform motion?

(c) Find the displacement of the car during time interval 3h – 8h [in SI units]

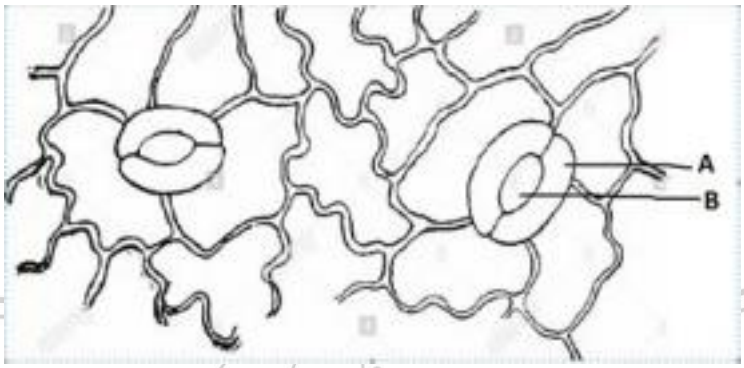
OR

(I) An athlete travels around a rectangular track with length 50 m and width 20 m. He completes two rounds of the track in 100 s. Determine his average speed and average velocity.

(II) The velocity-time graph shows the motion of a cyclist. Observe the graph and answer the following questions:-



	Find (i) its acceleration (ii) its velocity and (iii) the distance covered by the cyclist in 15 seconds.	
	Section B Chemistry	**M.M=10**
Q33.	Differentiate between a true solution and a suspension on the basis of the size of particles, tyndall effect, appearance and filterability.	2
Q34.	a. What is a saturated solution? b. How can you change a saturated solution to an unsaturated solution without adding any more solvent to it?	2 (1+1)
Q35.	a. Define concentration of a solution. b. 45 g salt is dissolved in 465 g of water. Calculate the concentration of the solution as mass percentage.	3 (1+2)
Q36.	a. Differentiate between the following changes stating two points Rusting of iron and heating an iron rod to bend it? b. A solution is always a liquid. Do you agree with the statement? Justify your answer with the help of an example.	3 (2+1)

	Section C Biology	**MM= 10**
Q37.	Observe the diagram of surface view of a leaf given below  (a) Label parts A and B (b) State two functions performed by B.	2(1+1)
Q38.	Answer the following questions (a) Why is the inner membrane of mitochondria deeply folded? (b) A bacterial cell does not burst even when placed in a hypotonic solution. Explain (c) What happens to a cell when there is a disturbance in cellular metabolism?	3(1x3)
Q39.	(a) Tabulate two differences between Xylem and Phloem (b) Give reasons for the following (i) Cells of sclerenchyma tissue are hard and provide mechanical support (ii) Epidermal cells of roots have long hair like structures present on them. (iii) Some aquatic plants like *Hydrilla* can float on the surface of water	5(2+3)

Academic session 2020-21
Unit test 2
Class IX

Time: 30 min M.M= 13

Instructions

1. All questions are compulsory.
2. Attempt the questions in correct serial order.
3. Write your name, class and section, roll no. and number of sheets used on the first sheet.
4. Make a single pdf of the answer sheet in portrait mode and scan and attach the same with this assignment.
5. Do not forget to turn in your paper.

Q1.	Write the chemical names of the following compounds: a) K_2SO_4 b) $Mg_3(PO_4)_2$	1
Q2.	A sample of NH_3 molecule irrespective of source contains 82.35% Nitrogen and 17.65% of Hydrogen by mass. This data supports: (a) Law of Conservation of Mass (b) Law of Multiple Proportions (c) Law of Definite Proportions (d) Avogadro's Law	1
Q3.	2.8g of Nitrogen gas was allowed to react with 0.6 g of Hydrogen gas to produce 3.4g of Ammonia. Show that these observations are in agreement with law of conservation of mass.	1
Q4.	Write down the formula of the following by criss - cross method (i) Sodium oxide (ii) Aluminium chloride	2

Q5.	How would you differentiate between a molecule of an element and a molecule of a compound ? Write one example of each type.	2

Q6.	Calculate molecular mass of sulphuric acid and Magnesium chloride. [Atomic mass of Mg= 24u, Cl=35.5u, S = 32u, O =16u, H= 1u]	2
Q7.	Give two drawbacks of Dalton's atomic theory.	2
Q8.	Give one example each of (i) Monovalent cation (ii) Trivalent cation (iii) Monovalent anion (iv) Bivalent anion	2

4

Academic Session 2019 -20

Annual Examination
Subject – Science

Time: 3Hrs. ***MM-80***

General Instructions:

1. The question paper comprises three sections – A, B and C. Attempt all the sections.
2. All questions are compulsory.
3. Internal choice is given in each section.
4. All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion- reason type questions. They are to be answered in one word or in one sentence.
5. All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50 - 60 words each.
6. All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80 – 90 words each.
7. This question paper consists of a total of 30questions.

SECTIONA

Q1 If the initial velocity of an object is equal to final velocity, the value of acceleration is 1
(a) positive
(b) negative
(c) zero
(d) infinite.

Q2 If a body is moving with a constant speed, it may be assumed that 1
(a) a net force is pushing it forward
(b) the sum of only vertical forces is zero
(c) the buoyant force is greater than gravity
(d) the sum of all forces is zero.

Q3 In case of transverse waves the particles of a medium vibrate 1
(a) in the direction of wave propagation
(b) opposite to the direction of wave propagation
(c) at the right angles to the direction of wave propagation
(d) none of the above

Q4 Alok is travelling to Vaishnodevi on foot. He starts from the base of the mountain and the temple is at a distance of 5 km from the base and at a vertical height of 500 m. He also notes his uniform speed, distance and height from the base at regular intervals (shown in table). Alok 's mass is 50 kg. 1+1+ 1+1

Distance (m)	Height above the base of the	Uniform speed(m/s)

	mountain(m)	
0-500	100	2
500-2000	250	3
2000-4000	450	1.5
4000-5000	500	0.5

1. Find the kinetic energy in the 500-2000 interval
2. Find his potential energy at the end of 2000-4000 interval.
3. How much work has Alok done against the gravity when he reaches the summit
4. State the law of conservation of energy.

Q5 The atomic number of sodium is 11 and mass number is 23 .It has 1
a) 11 neutrons and 12 protons
b) 12 protons and 11 electrons
c) 11electrons and 12 neutrons
d) 12 electrons and 11neutrons

Q6 The atomicity of $K_2Cr_2O_7$ is 1
a) 9
b) 11
c) 10
d) 12

Q7 On suffering from high fever, which will lower your body temperature more, ice or ice cold water? 1

Q8 How will you check the purity of a pure chemical compound in the solid state? 1

Q9 Which of the following does not undergo sublimation? 1
a) Camphor
b) Dry ice
c) Silica
d) Iodine

DIRECTION : For question numbers 10 and 11, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below 1
(a) Both A and R are true and R is correct explanation of the A.
(b) Both A and R are true but R is not the correct explanation of the A.

(c) A is true but R is false.
(d) Both A and R are false.

Q10 Assertion (A) : The value of acceleration due to gravity experienced by a freely falling body on earth does not depend upon the mass of the body.
Reason (R) : Acceleration due to gravity is a constant quantity. 1

Q11 Assertion (A): The molecular mass of Oxygen is 32u.
Reason (R) : The atomic mass of Oxygen is 16 u and oxygen is diatomic molecule.

Q12 The electronic distribution of nitrogen is 1
a) 2,5,
b) 2,2,3
c) 1, 2,4
d) none of the above

Q13 Name the tissue that helps to increase the length of stem and root of the plant. 1

Q14 Choose the correct option and write the complete statement in your answer script 1+1+ 1+1

1. Which of the following is not a macro-nutrient
    a) Phosphorus
    b) Boron
    c) Nitrogen
    d) Carbon
2. Which of the following causes sleeping sickness
    a) *Ascaris*
    b) *Leishmania*
    c) *Trypanosoma*
    d) *Bacteria*
3. Five kingdom classification is given by
    a) Morgan
    b) Linnaeus
    c) R.Whittaker
    d) Haeckel
4. The basic unit of classification is
    a) Species
    b) Order
    c) Genus
    d) Kingdom

SECTION - B

Q15 a) How much work is done in moving an object by a force of 10N through a distance of 400cm in the direction of force? 3
b) A rocket is moving up with velocity v. If the velocity of the rocket is tripled suddenly, what will be the ratio of two Kinetic Energies.

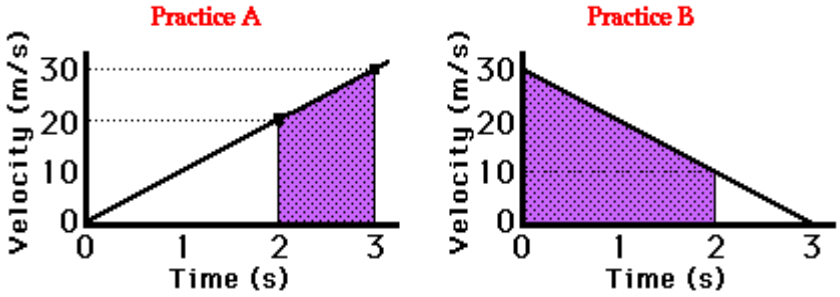
Q16 a) Why you get hurt while kicking a stone whereas when you kick a football it flies away. 3
b) How are seatbelts helpful while driving?
c) Why does a ball rebound after striking a floor?

OR

a) Why does a passenger jumping out of a rapidly moving bus fall forward with his face downwards?
b) Why is it difficult for a fireman to hose, which ejects large amount of water at a high velocity?
c) Fruits fall off the tree when strong wind blows.

Q17 Give reasons 3
a) Ink spreads faster than honey in a beaker of water.
b) Tyndall effect is shown by colloids.
c) Crystallisation technique is better than Evaporation to separate the solid substances from their solutions.

Q18 a) Determine the displacement of the object during the time interval from 2 to 3 seconds (Practice A) and during the first 2 second (Practice B). 3



Q19 A flask contains 4.4 g of CO_2 gas. Calculate 3
a) How many moles of CO_2 does it contain?
b) How many molecules of CO_2 gas are present in the sample?
(C= 12u,O= 16u)

Q20 Explain in detail what happens when water gets polluted? 3

OR

'Atmosphere is essential for life'. List three reasons in support of this statement.

Q21 **Read the following passage and answer the questions that follow –** 3

Process A involves the division of body cells, while **Process B** involves the division of sex cells. The division of a cell occurs once in **Process A** but twice in **Process B**.

a. Name process A and process B.
b. Mention **two** important functions of process A.
c. What is the number of cells formed after Process A and Process B?

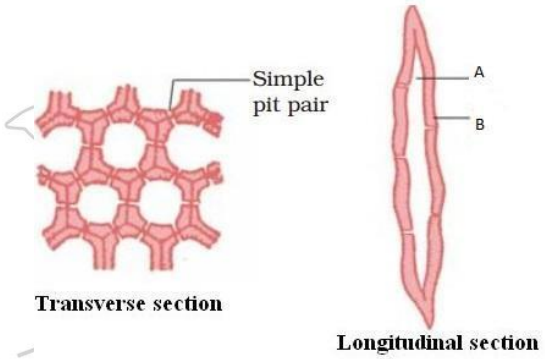
Q22 a) Define weathering. How does water help in weathering? 3

b) State the factors that decide

i. the soil structure

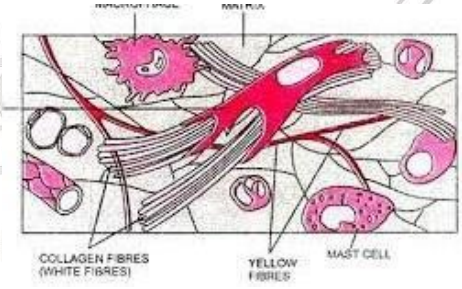
ii. mineral nutrients present in soil.

Q23 3



a) Identify the plant tissue and mention its location.
b) What is B made up of and what function does it perform?
c) Which permanent tissue is responsible for flexibility in plants?

OR



a) Identify the type and name the tissue shown in the diagram above.
b) What function does the above tissue perform?
c) Which connective tissue has great strength but limited flexibility?

Q24 Differentiate between the following(Give one point of difference) 3

a) mixed cropping and inter cropping
b) capture fisheries and culture fisheries
c) milch and draught animals

SECTION C

Q25 a) What do you mean by relative density? If relative density of Mercury is 13.6, find its density in S.I. Units. (Given density of water 1 g/cm^3). 5
b) A sealed can of mass 600g has volume 500cm^3, Will it float or sink in water if density of water is 1000kg/m^3. Also find the mass of the water displaced by this can.

OR

a) Derive a relationship between G and g.
b)A ball is thrown up is caught by the thrower after 4 seconds.
i) With what velocity it was thrown?
ii) Find the maximum height reached? (g=9.8m/s^2)

Q26 a) What is SONAR? Write its working in brief. 5

b) A person fires a gun standing at a distance of 55m from a wall. If the speed of sound is 330 m/s, find the time after which its echo will be heard.

Q27 a) Why is oxygen not taken as standard for assigning the atomic mass to an element? 5
b) Write the chemical formula of Ammonium phosphate and calculate its molecular mass. (N=14u,H=1u, P=31u ,O= 16u)
c) Lithium has an elemental atomic mass of 6.9 u and has two naturally occurring isotopes, $^6Li_3$ and $^7Li_3$. Their masses are 6.01 u and 7.01 u respectively. What are the natural abundances (to 2 decimal places in percentage) of the isotopes of Lithium?

Q28 a) What are the postulates of Bohr's model of an atom . 5
b) Calculate the number of protons and neutrons present in the nucleus of an element 'X 'which is represented as $^{31}X_{15}$.
c) Give the schematic atomic structure of Chlorine atom.

OR

a) What are the observations and conclusions drawn from Rutherford's alpha rays scattering experiment?
b) For aluminium, Z =13, A= 27 What are the number of protons and neutrons present in its nucleus.
c) Give the schematic atomic structure of fluorine atom.

Q29 a) What is notocord ? 1+2+2
b) Give two characteristic feature of the phylum Arthropoda.
c) Out of the various phyla under the animal kingdom, choose the one that fits the given description
i. Have dorsiventrally flattened body
ii. Holes are present all over the body

iii. Water driven tube system
iv. Mostly with shells , some are without shells

OR

a) What is the binomial system of nomenclature?
b) Give two characteristic feature of the Division Pteridophyta .
c) Out of the various divisions under the plant kingdom, choose the one that fits the given description

i Amphibians of the plant kingdom
ii Plants bear naked seeds
iii Appearance of specialized conducting tissue
iv Seeds have two cotyledons

Q30 a) Why are overcrowded and poorly ventilated areas major factors in the spread of air borne diseases? 1+2+2
b) An active immune system sends many cells to the affected tissue to kill off the disease causing microbes. Identify the process and mention its local and general effects?
c) State one difference between infectious and non-infectious diseases. Give one example of each.

SANSKRITI SCHOOL
Dr. S. Radhakrishnan Marg,
New Delhi

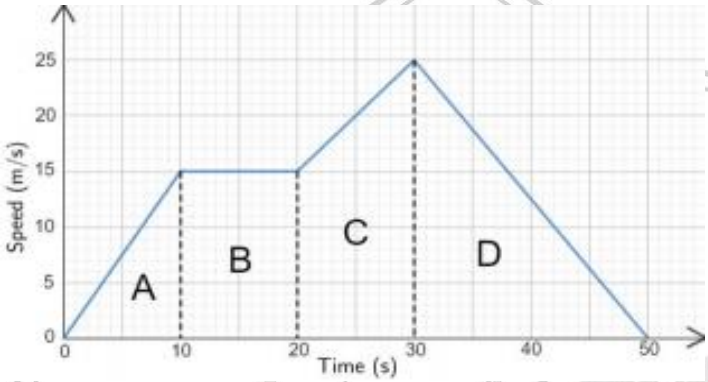
Academic Session: 2020-21
Annual Examination
Subject: Science
Class -IX

Time: 3 Hours **Max marks: 80**

EXT General Instructions:

- The reading time is from 7:45 am to 8:00 am.
- The writing time is from 8:00 am to 11:00 am.
- By 11:20 am, the PDF file of the answer sheets needs to be created, attached and submitted. Once submitted, it can't be resubmitted.
- Children who avail extra time, may submit the answer sheets by 12:20 pm.
- The Answer sheets need to be scanned and uploaded as a single pdf file in portrait mode. Make sure that you turn in the work in the time frame assigned.
- No image to be uploaded.
- The question paper comprises three sections A, B, and C. There are 36 questions in the question paper. All questions are compulsory.
- There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- Wherever necessary, neat and properly labeled diagrams should be drawn.
- This paper has 11 printed sides.

	Section A PHYSICS	**MM-27**
Q1.	A man jumping out of a moving train falls with his head forward. Why?	1
Q2.	Name and define the physical quantity whose unit is $kg.m/s^2$	1
Q3.	Which is having a higher value of momentum - A bullet of mass 10 gram moving with a velocity of 400 m/s or a cricket ball of mass 400 gram moving with a velocity of 90 km/h?	1
Q4.	A bird hits the windscreen of a fast moving car and falls on the bonnet. Which of the two, car or bird suffers greater change in momentum? Why?	1
Q5.	Gravitational force between two small spheres is F. What will be the new force, if masses of the two spheres as well as the distance between them is doubled?	1

Q6.	Why are bone china crockeries wrapped in thermocol/bubble sheets during transportation?	1
Q7.	A ball thrown up vertically returns to the thrower after 6s. Find the velocity with which it was thrown up.	1
Q8.	**Answer any 4 subparts** Observe the speed - time graph of an object moving along a straight line and answer the questions given below.  (i) The accelerations during first 10 seconds is a) 0 m/s^2 b) 1 m/s^2 c) 1.5 m/s^2 d) 2 m/s^2 (ii) The time interval during which the object moves with uniform speed a) 0-10 seconds b) 10-20 seconds c) 20-30 seconds d) 30 - 40 seconds (iii) The retardation is a) 1.0 m/s^2 b) 1.25 m/s^2 c) 1.5 m/s^2 d) 1.75 m/s^2 (iv) The distance covered during the time interval 20-30 seconds is a) 100 m b) 200 m c) 300 m d) 400 m (v) The maximum acceleration is during a) 0-10 seconds b) 10-20 seconds c) 20 -30 seconds d) 30 - 40 seconds	1X4=4

Q9.	**Answer any 4 subparts** The word energy is often used in our daily life but in science we give it a definite and precise meaning. Energy possessed by a body by the virtue of its motion is called kinetic energy and the energy possessed by the body by the virtue of its position or configuration is called potential energy. The law of conservation of energy states that energy can neither be created nor destroyed. It can only be transformed from one form to another. 9. (i) The SI unit of energy is _____. a) Newton b) Joule c) Pascal d) Metre 9. (ii) What will be the change in the kinetic energy of a body if its velocity is tripled? a) Kinetic energy becomes three times b) Kinetic energy becomes one third c) Kinetic energy becomes nine times d) Kinetic energy becomes 1/9 th. 9. (iii) A gun fires a bullet with a muzzle speed v. The kinetic energy, E, of the bullet is given by a) $E = mv^2$ b) $E = 2mv$ c) $E = v^2/2m$ d) $E = ½ mv^2$ 9. (iv) A body of mass 4kg is dropped from a height of 10m. Its kinetic energy just before it touches the ground is a) zero b) 400J c) 40J d) 0.4J 9. (v) A light and a heavy body possess equal kinetic energy. Which of the following statements is true? a) Both bodies will have the same velocity. b) Both will also have the same momentum. c) The heavier body will have more velocity than the lighter one. d)The lighter body will have more velocity than the heavier one	1X4= 4

Q10.	Observe the data given below for a body of mass 100kg that starts from rest and answer the following questions. **Time (s) Distance (m)** 0 0 1 1 2 4 3 9 4 16 5 25 6 36 i. Find the acceleration of the body? ii. Is the force acting on the body balanced or unbalanced? Give reason.	2
Q11	a) A particle moves over three quarters of a circle of radius r. What is the magnitude of its displacement? b) Is uniform circular motion an accelerated motion? If yes how? If no, why?	2
Q12	(a) State Newton's second law of motion and derive its mathematical relationship. (b) A bullet of mass 10 gram is fired with a rifle. The bullet takes 0.004 seconds to move through the barrel and leaves it with a velocity of 400 metre per second. Calculate the force exerted on the bullet by the rifle.	3

Q13	(a) State Universal law of gravitation and derive the expression for 'G' in terms of 'F' (b) Why does the weight of an object become very less on the moon as compared to Earth? By what factor does it decrease on the moon? (c) The ratio of gravitational force on Neptune to the gravitational force of the Earth is 9 : 8. Aarav weighs 792 N on earth. What will be his mass and weight on Neptune? OR (a) Define power and derive its expression in terms of force and velocity	5

	(b) How is kilowatt different from kilowatt hour. (c) A bulb consumes 500J of electrical energy in 20 seconds. Find the cost of electrical energy consumption for the month of March if the bulb is used for 4 hours everyday and the cost of electrical energy is Rs 10 per unit.	
	Section B CHEMISTRY	**MM-27**
Q14	Clouds, must and fog are colloidal solutions of a: a.liquid in a gas b. gas in a solid c. solid in a gas d.gas in a liquid	1

Q15	The ion of an element has 2 negative charges. Mass number of the atom is 32 and the number of neutrons is 16. What is the number of electrons in the ion? (a) 16 (b) 32 (c) 18 (d) 14	1
Q16	Which of the following statement is correct? a) An atom has equal number of electrons and neutrons. b) An atom has equal number of electrons and protons. c) An atom has equal number of neutrons and protons. d) An atom has equal number of electrons, protons and neutrons.	1
Q17	Assertion: An atom of Argon is stable. Reason: In argon, all the shells are completely filled. (a) Both the A and R are correct and the R is the correct explanation of the assertion (b) Both A and the R are correct but the R is not the correct explanation of the assertion (c) A is true but the R is false (d) A is false but the R is true.	1

Q18	Give one point of difference between a pure substance and a mixture.	1

Q19	Read the following and answer **any four** parts. A solution is a homogeneous mixture of two or more substances. In a solution,solute is a substance dissolved in another substance, known as a solvent. You come across various types of solutions in your daily life. Lemonade, soda water etc. are all examples of solutions. Usually we think of a solution as a liquid that contains either a solid, liquid or a gas dissolved in it. But, we can also have solid solutions (alloys) and gaseous solutions (air). In a solution there is homogeneity at the particle level. For example, lemonade tastes the same throughout. This shows that particles of sugar or salt are evenly distributed in the solution. The components of a colloidal solution are the dispersed phase and the dispersion medium. The solute-like component or the dispersed particles in a colloid form the dispersed phase, and the component in which the dispersed phase is suspended is known as the dispersing medium.A suspension is a mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Particles of a suspension are visible to the naked eye. a) Give two examples of Colloid. b) What are the components of a solution . c)Why are alloys considered to be solutions . d) What is the dispersion medium and dispersed phase in emulsion?Give an example of an emulsion from your daily life? e) Why are True solutions considered to be stable ?	1x4
Q20	Sulphuric acid has molecular formula H_2SO_4 (S-32u,H -1u.O-16u) i) Calculate the molecular mass of H_2SO_4 . ii) Calculate the number of moles present in 14g of sulphuric acid. OR Calculate the number of atoms present in 14g of sulphuric acid.	2
Q21	Write the steps showing the chemical formula for the following compounds. (a) Ammonium nitrite (b)Aluminium sulphate	2

Q22	(i) Two elements X and Y combine to form XY in the ratio of 1:35.5 by mass, The mass of Y that combines with 2g of X will be (a)7.1g (b)3.55g (c)71g (d)35.5g	3
	(ii) One mole of nitrogen gas is equal to(N- 14u) (a)28g (b)14g (c)42g (d)7g (iii)The balancing of chemical equations is based on (a) law of constant proportion (b) law of conservation of mass (c) law of multiple proportions (d) all of these	
Q23	The atomic number of Al is 13 and that of Cl is 17. How many electrons, protons and neutrons are present in Al^{+3} and Cl^{-} ions? (Al - 27 u & Cl- 35u)	3
Q24	(a)Define law of definite proportion. (b)A thin strip of iron with a mass of 7g is placed into a solution containing 21.0g of copper (II) sulfate and copper begins to form. After some time, the reaction stops because all the copper (II) sulfate has reacted. The mass of copper formed is found to be 8.60g. What mass of iron (II) sulfate has been formed in the reaction?	3
Q25	a) Give any two examples of isotopes used in medicine. b) Why do isotopes have similar chemical properties? c) If an element 'X' exists as two isotopes $_{35}X^{79}$ (49.7%) and $_{35}X^{81}$ (50.35 %)Calculate the average atomic mass of the element 'X'? (d) Define isobars. Give an example .	5
	Section C BIOLOGY	**MM- 26**
Q26	How is nucleoid different from nucleus?	1

Q27	If you live in an overcrowded and poorly ventilated house, then you may suffer from which of the following diseases? i. Cholera ii. Typhoid iii. COVID-19 iv. Chicken Pox Choose the correct option among the following: (a) (i) and (iii) (b) (ii) and (iii) (c) only(iii) (d) only (iv)	1

Q28	**Assertion (A)**: Chromosomes are responsible for the transfer of characteristics from parents to offspring. **Reason (R)**: Chromosomes are present in the nucleus. a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion. b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion. c) Assertion is true but the Reason is false. d) The statement of the Assertion is false but the Reason is true.	1
Q29	**Assertion (A) :** The inner lining of the intestine has tall epithelial cells. **Reason (R):** Columnar epithelium facilitates absorption and secretion a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion. b) The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion. c) Assertion is true but the Reason is false. d) The statement of the Assertion is false but the Reason is true.	1

Q30	Read the passage given below and attempt any 4 out of question 30A-E The cell membrane is the outermost covering of the cell that separates the contents of the cell from its external environment.It is made up of protein and lipid. It allows or permits the entry and exit of some materials in and out of the cell. Some substances like carbon dioxide or oxygen can move across the cell membrane by a process called diffusion. Osmosis is a special type of diffusion through a selectively permeable membrane. Membrane bound structures called organelles are also found in the cytoplasm. Some organelles like mitochondria and chloroplast are bounded by two membranes. Ribosomes synthesize proteins. 30 A) The cell membrane is made up of substances prepared by : a. RER and Nucleus b. SER and Plastids c. RER and SER d. Cellulose and SER 30 B) Which of these options are not a function of Ribosomes? i) It helps in manufacture of protein molecules ii) It helps in manufacture of enzymes iii) It helps in manufacture of Lipid iv) It helps in manufacture of starch molecules a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (i) and (iv) 30 C) What would happen when a plant cell is placed in plain water for 10 minutes? a). It will swell b) It will shrink c) It gets plasmolysed d) It remains the same 30 D) Which of these have a cell wall? a. Bacteria *b. Amoeba* c. Cheek cells d. Viruses	1x4

	30 E) **Assertion (A)**: De-shelled eggs swell up in hypotonic solution. **Reason (R):** An egg is rich in protein.	

	a. Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion. b. The Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion. c. Assertion is true but the Reason is false. d. The statement of the Assertion is false but the Reason is true.	
Q31	BCG vaccine is given to a baby at the time of birth to prevent tuberculosis. a) Is this a general or specific method of prevention of disease? b) Explain how the vaccine helps to prevent infection.	2
Q32	a) Name the target organs of the following diseases i) Japanese encephalitis ii) Jaundice b) Give two local effects of immune response to infectious disease.	2(1+1)
Q33	a) Scientists find it difficult to make anti- viral medicines as compared to anti- bacterial medicines? Explain. **b)** List two means of spread of AIDS virus.	3(2+1)
Q34	Give reasons for the following: a) Skin is made up of stratified squamous epithelium. b) Muscles are able to contract and relax to bring about movements. c) Cells of sclerenchymatous tissue are thick walled.	3

Q35	Answer the following questions : a) Elephantiasis, common in some parts of India is classified as a chronic disease. Justify b) Why is penicillin used for treatment of acne? Explain. c) A baby is suffering from loose motions. Identify the immediate and contributory cause of the infection.	3

Q36	a) Draw a neat diagram of parenchyma tissue as seen in the longitudinal section and label any two parts. b) Identify the following : i) Tissue present in the veins of leaves. ii) Tissue that increases the girth of the stem or root. iii) Thick waxy coating present on the epidermis of desert plants. iv) The living tissue that provides mechanical support in plants. c) Why do branches of a plant not grow in length if they are cut from the tip? **OR** a) Draw a neat diagram of a cardiac muscle fibre and label any two parts. b) Identify the type of tissue: i) Tissue found in the inner lining of oesophagus. ii) Which helps in receiving and transmitting the stimulus from brain to spinal cord. iii) Flexible connective tissue present in the nose. iv) Fills the space inside the organs and supports internal organs. c) Why is a special type of epithelial tissue present in the respiratory tract	(2+2+1)