

QUESTION BANK
STD- VIII SUB- CHEMISTRY

CHAPTER 3
ELEMENTS, COMPOUNDS AND MIXTURES

A)NAME THE FOLLOWING

- 1)The insoluble solid material which settles down when a suspension is allowed to stand undisturbed is called -sediment.
- 2)The clear liquid above the sediment, when a suspension is allowed to stand undisturbed is called -supernatant liquid.
- 3)The clear liquid obtained from a mixture of an insoluble solid and a liquid by the process of filtration is called -filtrate.
- 4)The insoluble solid constituent left on the filter paper when a mixture of an insoluble solid and a liquid is filtered is called- residue
- 5)Name the process of changing a liquid into gaseous state below its boiling point-Evaporation.
- 6)Name the type of mixture in which constituents are not mixed uniformly-Heterogeneous mixture.
- 7)Name the process of pouring out the clear liquid above the sediment. -Decantation.
- 8)Name the method used to separate ammonium chloride and common salt. -Sublimation.
- 9)The constituents of a mixture are present in any ratio- variable composition
- 10)Name the smallest unit of an element-atom.

B)GIVE REASON

- 1)Q: Give reason why a pure substance has definite physical properties like fixed melting and boiling points.
A: A pure substance contains only one kind of particles or particles in



fixed proportion, resulting in uniform and definite physical properties.

2)Q: Give reason why most mixtures are heterogeneous while some are homogeneous.

A: In most mixtures, the constituents are not uniformly distributed (e.g., sand + salt), but in some cases like solutions or alloys, the constituents are uniformly mixed at the molecular level.

3)Q: Give reason why a separating funnel is used to separate kerosene oil from water.

A: Kerosene oil and water are immiscible liquids with different densities. They form two distinct layers in a separating funnel, allowing separation based on density difference.

4)Q: Give reason why ammonium chloride can be separated from common salt by sublimation.

A: Ammonium chloride sublimes (changes directly from solid to vapour on heating and back to solid on cooling) while common salt does not. This difference in physical property allows their separation.

5)Q: Give reason why no energy change takes place during the formation of a mixture.

A: A mixture is formed by physical mixing of substances. No new chemical bonds are formed or broken, so there is neither absorption nor release of energy.

6)Q: Give reason why filtration is preferred over sedimentation and decantation for separating insoluble solids from liquids.

A: Filtration is faster and completely removes the insoluble solid (residue), whereas sedimentation and decantation may leave some fine particles behind in the liquid.

7)Q: Give reason why evaporation is used to recover salt from sea water.

A: Salt is a non-volatile solid. When sea water is heated, water (volatile solvent) evaporates, leaving behind the non-volatile salt.

8)Q: Give reason why an atom is considered the smallest unit of an element that shows all its properties.

A: An atom is the smallest particle of an element that can take part in a chemical reaction and exhibits all the characteristic properties of that element.



9) Give reason why sodium chloride is a pure substance.

Answer:

Sodium chloride is a pure substance because it is a compound in which sodium and chlorine are chemically combined in a fixed proportion by weight. It has uniform composition and definite properties throughout.

10) Q: Give reason why sand bath is used in evaporation.

A: It provides gentle, uniform heating to evaporate the liquid without spurting.

C.CASED BASED QUESTION

1. Riya had a mixture containing ammonium chloride and common salt. She heated the mixture in a china dish with an inverted funnel. A white powder collected on the cooler sides of the funnel, while some solid remained in the dish.

1. Name the separation technique used by Riya in the experiment.

Answer: Sublimation.

2. What is the solid that remained in the china dish?

Answer: Common salt (sodium chloride), because it is non-sublimable and does not change into vapour on heating.

3. Why did a white powder collect on the cooler sides of the inverted funnel?

Answer: Ammonium chloride sublimes on heating (changes directly from solid to vapour). The vapours rise and condense back to solid on the cooler sides of the funnel.

4. If Riya had used a mixture of sand and common salt instead, which separation technique would she have used? Why?

Answer: She would have used the dissolution and filtration method because sand is insoluble in water while common salt is soluble. The salt can be recovered by evaporation of the filtrate.

5. State one advantage of using an inverted funnel in this experiment.

Answer: The inverted funnel helps collect the sublimed ammonium chloride vapours and allows them to condense on its cooler inner walls, preventing loss of the substance.

2. A student was given muddy water. He first allowed it to stand for some time and then poured the clear liquid into another beaker. Later, he used filter paper for better results.



Q1. Name the two separation techniques used by the student in the experiment.

Answer: Sedimentation and Decantation (first part), followed by Filtration (later part).

Q2. What happened when the muddy water was allowed to stand for some time?

Answer: The insoluble heavier particles (mud) settled down at the bottom due to sedimentation, leaving clearer water (supernatant liquid) above.

Q3. Why did the student pour the clear liquid into another beaker?

Answer: This process is called decantation. It helps in separating the clear supernatant liquid from the settled sediment (mud) without disturbing the solid particles.

Q4. State one advantage of filtration over sedimentation and decantation.

Answer: Filtration is a quicker process and completely removes the insoluble solid, whereas sedimentation and decantation may leave some fine particles behind in the liquid.

Q5. Give reason why the student later used filter paper for better results.

Answer: Filtration is more effective than sedimentation and decantation because it completely removes even the fine insoluble particles that may remain suspended, giving clearer water.

3.

Arjun learned that 118 elements have been discovered so far. He also studied that mercury(II) oxide on heating gives mercury and oxygen gas.

Q1. What type of substance is mercury(II) oxide? Give reason.

Answer: Mercury(II) oxide is a compound. It is made up of two elements (mercury and oxygen) chemically combined in a fixed proportion.

Q2. Why is mercury considered an element?

Answer: Mercury is made up of only one kind of atoms and cannot be broken down into simpler substances by chemical methods.

Q3. Give reason why mercury(II) oxide can be broken down into



mercury and oxygen on heating.

Answer: It is a compound. Compounds can be decomposed into their constituent elements by chemical methods.

Q4. Differentiate between an element and a compound with reference to mercury and mercury(II) oxide. (Give one point)

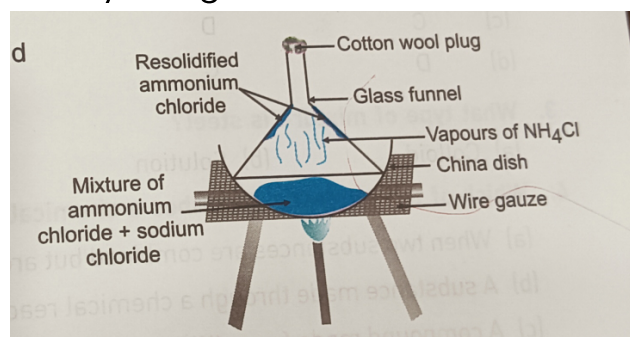
Answer: Mercury is an element (made of only one kind of atoms), while mercury(II) oxide is a compound (made of two or more elements chemically combined)

Q5. State one important characteristic of an element.

Answer: An element cannot be broken down into two or more simpler substances except during nuclear reactions.

D. PICTURE BASED QUESTIONS

1)The picture shows separation of ammonium chloride and common salt by using Sublimation method:-



Q1. Identify the fundamental physical process being demonstrated in the given experimental setup

.Answer: Sublimation, followed by deposition

Q2)What is the specific purpose of inserting a cotton wool plug at the narrow stem of the glass funnel?

Answer: To prevent the escape of sublimable vapours into the surrounding atmosphere.

Q3)State the property difference between the two constituents that makes this separation technique possible

.Answer: One constituent sublimes upon heating, while the other is non-sublimable.

Q4)What term is used to describe the solidified substance collected on the cool upper walls of the funnel?

Answer: Sublimate.

Q5). Why is a wire gauze placed underneath the China dish instead of heating it directly over the flame?

Answer: To ensure uniform distribution of heat and prevent the China dish from cracking.

Q6)Name two other common chemical compounds, besides the one shown, that can be separated using this identical setup.

Answer: Camphor and Naphthalene (or Iodine).

Q7)What type of mixture is a combination of ammonium chloride and sodium chloride—homogeneous or heterogeneous?

Answer: Heterogeneous mixture.

Q8)Suppose the mixture contains sand instead of sodium chloride. Can this same setup be used to separate ammonium chloride?

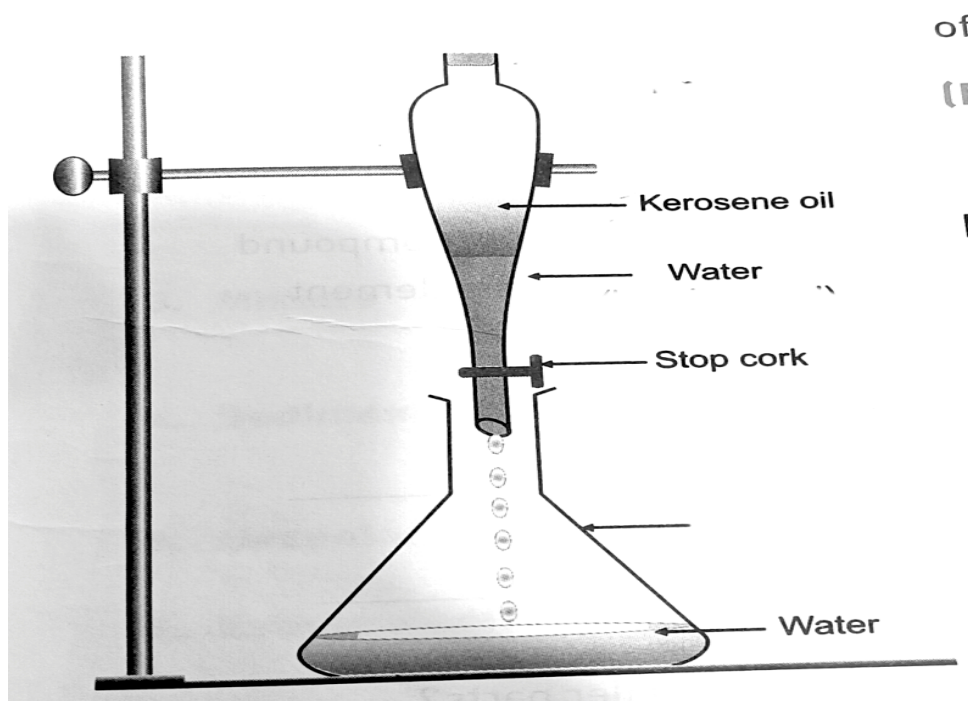
Answer: Yes, because sand is non-sublimable while ammonium chloride remains sublimable.

Q9)Name the laboratory tool used to support the wire gauze and the China dish above the burner. Answer: A tripod stand.

Q10)If the cotton wool plug is accidentally omitted, how will it impact the quantitative recovery of the sublimable component? Answer: The recovery will be much lower because vapours will escape into the air.

2.The picture shows separation of kerosene oil and water(, liquid -liquid) mixture.





Q1) Name the specific laboratory apparatus used to contain and separate the liquid mixture in the figure. Answer: Separating funnel.

Q2) What is the primary physical property that allows these two liquids to separate into distinct layers? Answer: Difference in densities.

Q3) Why does kerosene oil form the upper layer inside the apparatus? Answer: Kerosene oil is less dense (lighter) than water.

Q4) Identify the part of the apparatus used to control or regulate the flow of the liquid into the conical flask. Answer: Stop cork (stopcock).

Q5) Which liquid will be completely drained out and collected first in the conical flask? Answer: Water.

Q6) Name the apparatus placed at the bottom to collect the separated water. Answer: Conical flask.

Q7) Can this identical setup be used to separate a mixture of water and ethanol? Explain your answer. Answer: No, because water and ethanol are miscible liquids and do not form separate layers.

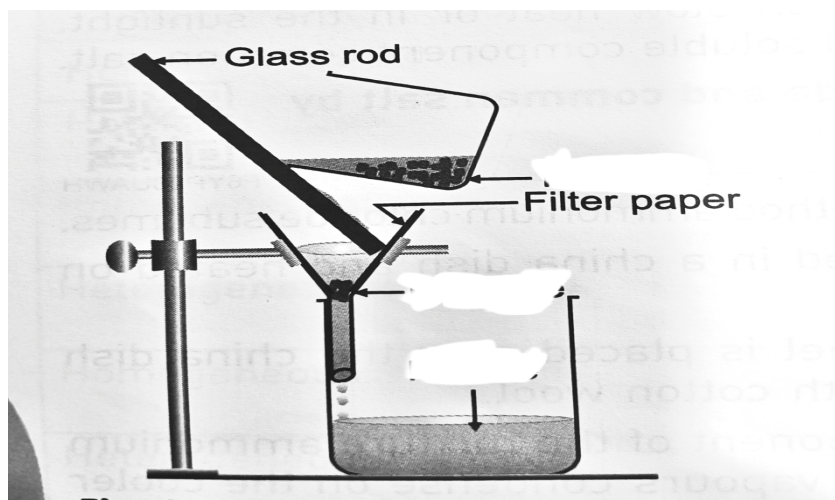
Q8) If a mixture contains chloroform (density 1.49 g/cm^3) and water (density 1.0 g/cm^3), which liquid would occupy the position labeled "Kerosene oil"? Answer: Water, because it is less dense than chloroform.

Q9) Based on the labels, what type of mixture is formed by kerosene oil

and water? Answer: An immiscible mixture.

Q10) If you replace kerosene oil with mustard oil, which liquid will form the bottom layer? Answer: Water, because it remains denser than mustard oil.

3.



Q1) What is the technical term for the heavy, insoluble sand layer settled at the bottom? Answer: Sediment.

Q2) What is the clear liquid poured out into the upper beaker called before it is transferred? Answer: Supernatant liquid.

Q3) State one major limitation of the separation method shown in the image. Answer: It cannot completely separate very fine, light suspended particles.

Q4) Why is a glass rod sometimes used during the pouring step in decantation? Answer: To prevent the liquid from spilling down the side of the container.

Q5) What type of mixture cannot be separated using the filter paper setup shown? Answer: Homogeneous mixtures (like a true solution of salt in water).

Q6) Identify the substance that remains trapped on the filter paper in the image. Answer: Residue.

Q7) Identify the clear liquid collected in the beaker below the

funnel. Answer: Filtrate.

Q8) Name an industry or real-life application that uses a larger-scale version of the image. Answer: Water purification plants

Q9) What physical feature of the filter paper determines the size of particles it can trap? Answer: Pore size.

Q10) Why is filtration considered a physical separation method rather than a chemical change? Answer: No new chemical substances are formed during the process.

E. WRITE DIFFERENCE ON BASIS OF.

1.

Criteria	Filtrate	Residue
Definition	Clear liquid obtained from a mixture of an insoluble solid and a liquid after filtration.	The insoluble solid constituent left on the filter paper when a mixture of an insoluble solid and a liquid is filtered
State	Liquid	Solid
Location after filtration	Collected in the beaker or flask below the funnel.	Remains on the filter paper inside the funnel
Composition	Contains the solvent and dissolved substances	Contains insoluble solid particles.

2.

Criteria	Homogeneous mixture	Heterogeneous mixture
Visibility of Components	Components are not visible to the naked eye.	Components are visible to the naked eye.
Distribution of Particles	Particles are evenly distributed.	Particles are unevenly distributed.
Separation	Components cannot usually be separated by simple filtration.	Components can often be separated by simple physical methods like filtration



		or handpicking.
Definition	A mixture with a uniform composition throughout.	A mixture with a non-uniform composition.

F.APPLICATION BASED QUESTIONS.

PRINCIPLE INVOLVED IN SEPARATION	EXAMPLES
Density of constituents	Sedimentation Example: Separating mud from water. Principle: Mud particles are denser than water, so they settle at the bottom. Decantation Example: Separating clear water from settled sand or mud. Principle: The denser solid settles, and the lighter liquid is carefully poured off. Separating Funnel Example: Separating oil and water. Principle: Water is denser than oil, so it forms the lower layer and is drained first.
Difference in Melting Point	Wax and sand-Wax melts while sand remains solid. Paraffin wax and sawdust-Wax melts while sawdust remains unchanged.
Difference in Boiling Point	Alcohol and water, Acetone and water (Distillation)-Alcohol /Acetone has a lower boiling point than water. Petrol and kerosene (Fractional distillation) Petrol and kerosene have different boiling points



Volatility	Water and common salt Ink and water Starch and water Washing soda solution
Solubility	i)Solvent extraction → Filtration → Evaporation Common salt and marble powder (calcium carbonate) Sugar and sand Sugar and chalk powder Salt and sawdust Sugar and marble powder (calcium carbonate) ii)Solvent extraction → Filtration → Crystallisation Alum and sand Potassium nitrate and sand Copper sulphate and sand
SUBLIMATION	Ammonium chloride and common salt,Ammonium chloride and sand(Sublimation)Ammonium chloride sublimes Other Sublimable substances- IODINE, NAPHTHALENE ,CAMPHOR,DRY ICE(SOLID CO ₂)
MAGNETIC PROPERTY	Iron filings + marble powder (calcium carbonate) Iron filings + chalk powder Iron filings + common salt Iron filings + sulphur powder The following substances are magnetic and can be attracted by a magnet: Iron Steel Nickel Cobalt Magnetite (Magnetic iron ore,

	Fe_3O_4 Iron nails Iron filings Steel pins
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CHAPTER-5

LANGUAGE OF CHEMISTRY

SOLUTIONS :

A: Fill in the blank spaces by choosing the correct words from the given list :

1. A symbol represents one atom of an element.
2. The molecular formula of compound is the number of atoms of each element in its one molecule.
3. The valency of all non-metals (except hydrogen) is considered negative.
4. A group of atoms having negative or positive charge is called radical.
5. [Chemical](#) compound is always electrically neutral.

B. Statements given below are incorrect. Write the correct statements :

1. Chemical formula of aluminum sulphate is $\text{Al}_3(\text{SO}_4)_2$.
2. When magnesium is placed in contact with oxygen, it forms magnesium hydroxide.

Answer: When magnesium is placed in contact with oxygen, it forms magnesium oxide.

: 3. The substance/substance which take part in a [chemical](#) reaction is are known as active substance/substances.

Answer: The substance/substance which take part in a chemical reaction is are known as reactant.

4. When a chemical equation is made concise by using symbols and formulae, then it is called balanced equation.

Answer: When a chemical equation is made concise by using symbols and formulae, then it is called balanced reaction.

5. When wood burns in air, then this reaction is violated the law of conservation of mass.



Answer: When wood burns in air, then this reaction is obeyed the law of conservation of mass.

C. Match the statements in Column A, with those in Column B :

Column A	Column B
1. Short form of an element.	(a) Chemical equation
2. Symbolic representation of a compound.	(b) Valency
3. The number of hydrogen atoms which combine directly or indirectly with one atom of an element, so as to form a compound.	(c) Symbol
4. Mass of reactants = Mass of products.	(d) Chemical formula
5. A statement that describes a chemical reaction in terms of symbols and formulae.	(e) Law of conservation of mass

Answer:

Column A	Column B
1. Short form of an element.	(a) Symbol
2. Symbolic representation of a compound.	(b) Chemical formula
3. The number of hydrogen atoms which combine directly or indirectly with one atom of an element, so as to form a compound.	(c) Valency
4. Mass of reactants = Mass of products.	(d) Law of conservation of mass
5. A statement that describes a chemical	(e) Chemical



reaction in terms of symbols and formulae.	equation
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D. Write 'True' or 'False' for the following statements :

Statements	True/False
1. A chemical equation that represents a chemical reaction briefly in words is called word equation.	F
2. The products are always written on the right hand side in a chemical equation.	T
3. Law of conservation of mass is always violated in a chemical reaction in which gas is evolved.	F
4. Chemical equation does not state about the number of molecules of each reactant taking part in a chemical reaction.	F
5. If a catalyst slows down the rate of chemical reaction, it is called negative catalyst.	T

E. Tick (✓) the most appropriate answer :

1. Symbol represents the short form of a/an

(a) molecule

Chemistry

(b) element

(c) compound

(d) radical

Answer: option (b) element is correct.

2. Chemical formula is the symbolic representation of actual number of atoms present in one of a substance.

(a) compound

Mathematics

(b) element

(c) molecule

(d) radical

Answer: option (c) molecule is correct.



3. When an element exists as a molecule which consists two or more

- (a) ions
- (b) radicals
- (c) atoms
- (d) valency

Answer: option **(b) radicals** is correct.

4. The chemical formula of calcium chloride is

- (a) CaCl
- (b) Ca_2Cl
- (c) CaCl_2
- (d) Ca_2Cl_2

Answer: option **(c) CaCl_2** is correct.

5. A substance which does not take part in a chemical reaction, but change the rate of chemical reaction, is called :

- (a) reactant
- (b) active element
- (c) excited element
- (d) catalyst

Answer: option **(d) catalyst** is correct.

STUDY QUESTIONS

Language of [Chemistry](#) Class-8th Goyal Brothers ICSE Chemistry
Solutions ch-5 unit-1

Social Sciences

Question: 1. (a) What is a symbol?

Answer: A chemical symbol is a representation of chemical elements using one or two letters. Every element of the periodic table is represented by a different symbol.

(b) What qualitative and quantitative information is conveyed by a symbol?

Answer: The major qualitative information conveyed by a symbol is the identification of the element. Quantitative information: Each element in the periodic table is associated with a mass number and the atomic number which is the most important quantitative information conveyed by a symbol.

Question: 2. (a) What do you understand by the



term chemical formula?

Answer: The chemical formula of a compound means the symbolic representation of the composition of a compound. A chemical formula for a molecule is represented by the group of symbols of the elements that constitute the molecule, and the number of atoms of each element present in one molecule.

(b) What qualitative information is given by the formula HCl?

Answer: HCl is the formula of hydrogen chloride gas. This is the qualitative information of the symbol.

Standardized & Admissions Tests

Question: 3. (a) What do you understand by the term variable valency?

Answer: The element exhibits more than one electropositive valency. Such elements are said to have variable valency.

(b) How are the elements having variable valency named?

Answer: The suffix “ous” is used to indicate lower valency, and the suffix “ic” is used to indicate the higher valency. Example: Iron(), for the lower valency, the suffix “ous” is added- Ferrous (). For the higher valency “-ic” is added- Ferric.

Question: 4. Write the chemical formulae of the following compounds :

(a) Magnesium sulphate

Answer: MgSO_4

(b) Aluminum sulphate

Answer: $\text{Al}_2(\text{SO}_4)_3$

(c) Aluminum phosphate

Answer: AlPO_4

(d) Potassium chlorate

Answer: KClO_3

(e) Potassium nitrate

Answer: KNO_3

Question: 5. What do you understand by the term chemical equation?

Answer: A chemical equation is a brief representation of a chemical change in terms of symbols and formulae.

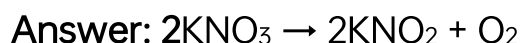
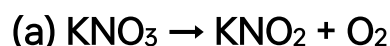
(b) Why should a chemical equation be always balanced?

Answer: The chemical equation needs to be balanced so that it follows the law of conservation of mass. A balanced chemical equation occurs

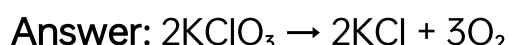
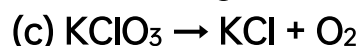
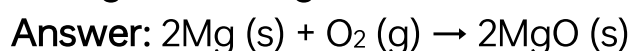
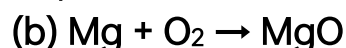


when the number of the different atoms of elements in the reactants side is equal to that of the products side.

Question: 6. Balance the following equations:



Physics



Question: 7. (a) State law of conservation of mass.

Answer: The law of conservation of mass states that mass is neither created nor destroyed in a chemical reaction .

(b) What information is conveyed by a balanced chemical equation?

Answer: The physical states of reactants and products, relative amounts of reactants and products and the specific reaction conditions under which the reaction undergoes.

QUESTION BANK

1. Multiple Choice Questions

(i)

The formula of a compound represents:

1. an atom
2. a molecule
3. an ion
4. all of these

Answer

a molecule

Reason — A molecular formula of a compound is the symbolic representation of its (one) molecule. It shows the number of atoms of each element present in it. These atoms combine in whole numbers to form the molecule.

(ii)



The symbol of sulphite ion is:

1. SO_4^{2-}
2. HSO_4^-
3. SO_3^{2-}
4. S^{2-}

Answer



Reason — The symbol of sulphite ion is SO_3^{2-} .

(iii)

Which of the following sets of elements show variable valencies?

1. Iron and calcium
2. Copper and sodium
3. Lead and mercury
4. Silver and potassium

Answer

Lead and mercury

Reason — Lead has a variable valency of 2 and 4, while mercury has a variable valency of 1 and 2.

(iv)

Which of the following has zero valency?

1. Hydrogen
2. Chlorine
3. Carbon
4. Neon

Answer

Neon

Reason — Neon is the element with zero valency, as it doesn't form bonds under normal conditions.

(v)

The valencies shown by copper is:



1. 1 and 2
2. 2 and 3
3. 2 and 4
4. 1 and 3

Answer

1 and 2

Reason — The valencies shown by copper are 1 and 2.

(vi)

Which of the following represents the correct symbol of potassium ion ?

1. K
2. K^+
3. K^{2+}
4. K^{3+}

Answer

K^+

Reason — The correct symbol for the potassium ion is K^+ .

2.Assertion-Reason Based Questions

(i)

Assertion (A): When an atom gains one or more electrons, it becomes negatively charged.

Reason (R): The number of electrons in an atom exceeds the number of protons upon gaining electrons.

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is true but R is false.
4. A is false but R is true.

Answer

Both A and R are true and R is the correct explanation of A.

Explanation — In a neutral atom, the number of electrons and protons are equal, so they are electrically neutral. However, when an atom



gains one or more electrons, the number of electrons in an atom exceeds the number of protons, and the atom becomes negatively charged.

(ii)

Assertion (A): Each element has its own unique symbol, which is a short hand representation of its atom.

Reason (R): The symbol of some elements is the same as the first letter of their names.

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is true but R is false.
4. A is false but R is true.

Answer

Both A and R are true but R is not the correct explanation of A.

Explanation — The symbol can be based on the Latin or Greek name of the element, or a combination of letters, but it's not strictly the first letter. For example, Helium has the symbol He, Sodium has Na, and Iron has Fe, which are not simply the first letter of the element's name.

(iii)

Assertion (A): Magnesium burns in oxygen to produce a compound magnesium oxide with the molecular formula MgO .

Reason (R): Magnesium oxide is a white amorphous solid.

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is true but R is false.
4. A is false but R is true.

Answer

Both A and R are true but R is not the correct explanation of A.

Explanation — Magnesium burns in oxygen to form magnesium oxide, whose molecular formula is MgO . Magnesium oxide is a white amorphous solid. However, the fact that magnesium oxide is a white amorphous solid does not explain why magnesium burns in oxygen to



form MgO.

(iv)

Assertion (A): The valency of inert gases, helium, neon and argon is zero.

Reason (R): The outermost shell of inert gases is complete.

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is true but R is false.
4. A is false but R is true.

Answer

Both A and R are true and R is the correct explanation of A.

Explanation — The valency of inert gases, helium, neon and argon is zero as the outermost shell of inert gases is complete.

(v)

Assertion (A): A chemical equation is the symbolic representation of a chemical reaction using symbols and formulae of the substances involved in the reaction.

Reason (R): Every chemical equation needs to be balanced to follow the law of conservation of mass.

1. Both A and R are true and R is the correct explanation of A.
2. Both A and R are true but R is not the correct explanation of A.
3. A is true but R is false.
4. A is false but R is true.

Answer

Both A and R are true but R is not the correct explanation of A.

Explanation — A chemical equation is the symbolic representation of a chemical reaction using symbols and formulae of the substances involved in the reaction, and every chemical equation needs to be balanced to follow the law of conservation of mass. However, they are two separate facts.

3 :Fill in the blanks:

(a) A symbol represents of an element.



- (b) An atom is neither created nor destroyed during a
- (c) are positively charged ions.
- (d) Total number of atoms of all the elements present in Al_2O_3 is
- (e) A is the symbolic representation of a chemical reaction using symbols and formulae of the substances taking part in the reaction.

Answer

- (a) atom
- (b) chemical reaction
- (c) Cations
- (d) five
- (e) chemical equation

4. Write 'true' or 'false' for the following and correct the false statements.

- (a) When an atom gains one or more electrons, it becomes positively charged.
- (b) The valency of nitrogen in ammonia gas is 3.
- (c) The sulphide ion is a polyatomic ion.
- (d) The nitrate ion is represented as NO_2^- .
- (e) The element cobalt is represented as CO.

Answer

- (a) False

Correct Statement — When an atom gains one or more electrons, it becomes negatively charged.

- (b) True

- (c) False

Correct Statement — The sulphide ion (S^{2-}) is a monoatomic ion.

- (d) False

Correct Statement — The nitrate ion is represented as NO_3^- .

- (e) False

Correct Statement — The element cobalt is represented as Co.

Question 5

Match the following:

Column A	Column B
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Column A	Column B
(a) Combining capacity of an element	(i) Silicon dioxide
(b) The radical/ion formed due to the loss of electrons	(ii) Molecular formula
(c) Symbolic representation of a compound	(iii) Calcium carbonate
(d) Marble	(iv) Valency
(e) Sand	(v) Cation

Answer

Column A	Column B
(a) Combining capacity of an element	(iv) Valency
(b) The radical/ion formed due to the loss of electrons	(v) Cation
(c) Symbolic representation of a compound	(ii) Molecular formula
(d) Marble	(iii) Calcium carbonate
(e) Sand	(i) Silicon dioxide

6. Name the following

- (a) A polyatomic positive ion.
- (b) The substances written on the left side of an arrow in an equation.
- (c) The substances which are formed during a chemical reaction.
- (d) An unbalanced chemical equation.
- (e) An atom or group of atoms that behave as a single charged unit.
- (f) A substance used to increase the rate of reaction.

Answer

- (a) Ammonium ion, NH_4^+
- (b) Reactants
- (c) Products
- (d) Skeletal equation



- (e) Radical
- (f) Catalyst

7. Write the names of the following ions:

- (a) HCO_3^-
- (b) MnO_4^-
- (c) N^{3-}
- (d) $\text{Cr}_2\text{O}_7^{2-}$

Answer

- (a) Bicarbonate
- (b) Permanganate
- (c) Nitride
- (d) Dichromate

8. Write the names of the compounds represented by the following formulae :

- (a) K_2CO_3
- (b) P_2O_5
- (c) H_2S
- (d) $\text{Ca}(\text{OH})_2$
- (e) CuSO_4
- (f) SiO_2

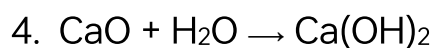
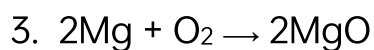
9. Write balanced chemical equations using symbols and formulae for the following word equations:

1. Iron + Chlorine $\rightarrow$ Iron(III) chloride
2. Magnesium + dil. sulphuric acid $\rightarrow$ Magnesium sulphate + hydrogen
3. Magnesium + oxygen $\rightarrow$ Magnesium oxide
4. Calcium oxide + water $\rightarrow$ Calcium hydroxide
5. Sodium + Chlorine $\rightarrow$ Sodium chloride

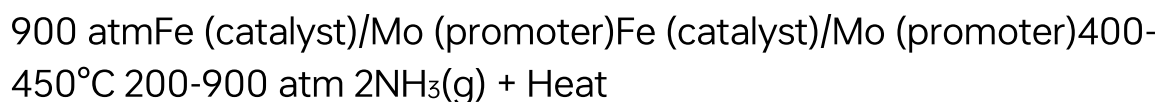
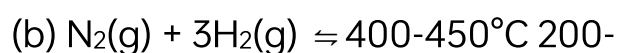
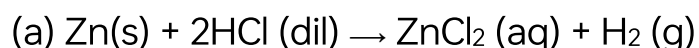
Answer

1. $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$
2. $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$





10. What information do you get from the following chemical equations?



Answer

(a) We get the following information from the given chemical equation:

1. Zinc and Hydrochloric acid are reactants. Zinc is in solid state that reacts with dilute HCl.
2. The reaction is irreversible.
3. The products formed are an aqueous solution of zinc chloride and hydrogen gas.
4. The equation is balanced i.e., number of atoms of each element on the reactant side and the product side are equal.

(b) We get the following information from the given chemical equation:

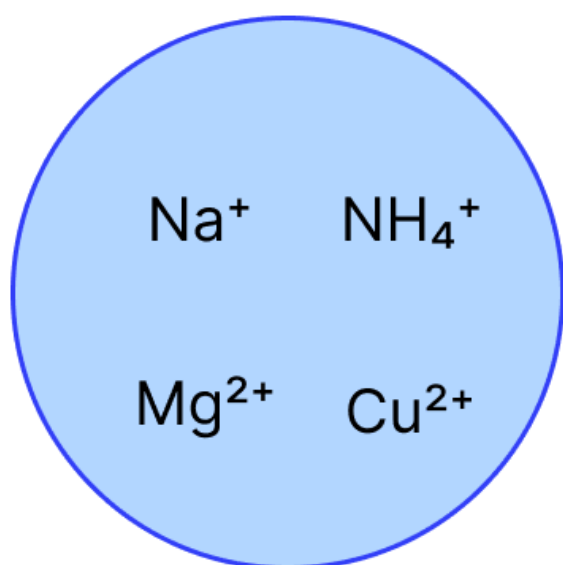
1. The reactants, nitrogen and hydrogen, and the product, ammonia, are all gases.
2. The reaction is reversible and exothermic.
3. The reaction takes place at a temperature between 400-450°C and at a high pressure between 200-900 atmosphere.
4. The catalyst is iron and molybdenum acts as a promoter, which increases the efficiency of the catalyst.
5. The equation is balanced i.e., number of atoms of each element on the reactant side and the product side are equal.

11. Case Study

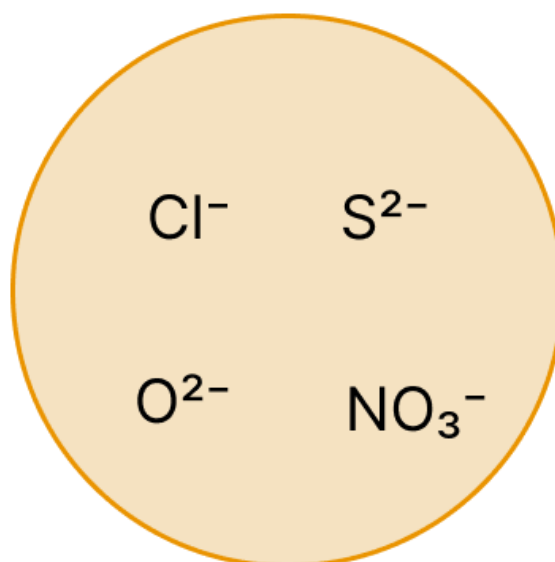
Given below are two groups showing basic and acid radicals. Based



on these two groups, answer the questions that follow :



Basic radicals (cations)



Acid radicals (anions)

- (a) Which basic radical or cation exhibits variable valency ?
(b) How is NH₄⁺ ion different from other basic radicals in the group ?
(c) Which acid radical or anion is the odd one out in the group ? Justify your answer.
(d) Using one radical from each group, form a compound that is commonly used in daily life. Write its name and chemical formula.

Answer

- (a) Copper exhibits variable valency. It shows valencies 1 and 2.
(b) NH₄⁺ ion is different from the other basic radicals because it is a polyatomic ion, whereas the others are simple metal ions.
(c) NO₃⁻ is the odd one out because it is the only polyatomic acid radical in the group. Cl⁻, S²⁻ and O²⁻ are monoatomic ions.
(d) Using Na⁺ from basic radicals and Cl⁻ from acid radicals, the compound formed is sodium chloride. Its chemical formula is NaCl.

CHAPTER- 4

ATOMIC STRUCTURE

Q1. MCQs

1. Which particle has no charge?
a) Electron b) Proton c) Neutron d) Nucleus
Answer: c
2. The atomic number is equal to the number of:
a) Neutrons b) Protons c) Nucleons d) Shells
Answer: b
3. The maximum number of electrons in the K-shell is:
a) 2 b) 8 c) 18 d) 32
Answer: a
4. Which scientist discovered the nucleus?
a) J.J. Thomson b) Rutherford c) Bohr d) Chadwick
Answer: b
5. Isotopes have the same:
a) Mass number b) Number of neutrons c) Atomic number d) Atomic mass
Answer: c
6. The charge on an electron is:
a) +1 b) -1 c) 0 d) +2
Answer: b
7. Electronic configuration of oxide ion is:
a) 2,6 b) 2,8 c) 2,5 d) 2,7
Answer: b
8. Mass number is the sum of:
a) Protons and electrons b) Electrons and neutrons c) Protons and neutrons



d) Electrons only

Answer: c

Q2. Assertion–Reason

Read the statements and choose the correct option.

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

1. A: Atoms are electrically neutral. R: Number of protons equals number of electrons.

Ans- a

2. A: Isotopes have similar chemical properties. R: They have the same electronic configuration.

Ans- a

3. A: Electrons revolve around the nucleus. R: The nucleus is positively charged.

Ans- b

4. A: Neutrons do not affect atomic number. R: Atomic number depends only on protons.

Ans- a

5. A: Carbon-12 and Carbon-14 are isotopes. R: They have different numbers of neutrons.

Ans- b

6. A: Noble gases are chemically inert. R: Their outermost shell is completely filled.

Ans- a

7. A: Rutherford's model could not explain atomic stability. R: Revolving electrons should lose energy continuously.

Ans- c

8. A: An atom becomes a cation by losing electrons. R: Loss of



electrons increases positive charge.

Ans- a

Q3.Name the Following.

1. The negatively charged subatomic particle.

Answer: Electron

2. The central, dense part of an atom.

Answer: Nucleus

3. The scientist who discovered the electron.

Answer: J. J. Thomson

4. Number that represents the total number of protons in an atom.

Answer: Atomic number

5. Number that is equal to the total number of protons and neutrons in an atom.

Answer: Mass number

6. Arrangement of electrons in different shells of an atom.

Answer: Electronic configuration

7. Shell closest to the nucleus.

Answer: K-shell

8. Electrons present in the outermost shell of an atom.

Answer: Valence electrons

9. The atoms of the same element have the same atomic number but different mass numbers.

Answer: Isotopes

10. Particles present inside the nucleus.

Answer: Protons and neutrons (nucleons)

11. The shell that can accommodate a maximum of 8 electrons.

Answer: L-shell

12. Force that keeps electrons attracted to the nucleus.

Answer: Electrostatic force of attraction



Q4. Fill in the Blanks

1. Rutherford used a thin ____ foil for the experiment.
Ans- Gold
2. The first shell is represented by the letter ____.
Ans-K
3. A neutron carries a ____ charge.
Ans- No
4. The electrons present in the innermost shell are called ____ electrons.
Ans- Bound
5. When a nitrogen atom gains 3 electrons, it becomes ____.
Ans- Nitride ion
6. Magnesium ions are formed by the ____ of ____ electrons.
Ans- loss, 2
7. During the formation of a chemical bond ,the energy between the combining atoms ____.
Ans- Decreases
8. ____ is a non metal who forms cation.
Ans- Hydrogen.

Q5. Give Reasons

1. Atoms are electrically neutral.
Answer: Atoms are electrically neutral because they contain an equal number of protons (positive charge) and electrons (negative charge), so the charges cancel each other.
2. Most of the mass of an atom is concentrated in the nucleus.
Answer: The nucleus contains protons and neutrons, which are much heavier than electrons. Therefore, almost the entire mass of an atom is concentrated in the nucleus.
3. Rutherford concluded that most of the atom is empty space.
Answer: During the gold foil experiment, most alpha particles



passed straight through the foil without any deflection, indicating that most of the atom is empty space.

4. Isotopes of an element have similar chemical properties.

Answer: Isotopes have the same atomic number and identical electronic configuration, so they have the same chemical properties.

5. Isotopes of an element have different mass numbers.

Answer: Isotopes have different mass numbers due to different (more or less) numbers of neutrons present in the nucleus.

6. The atomic number determines the identity of an element.

Answer: The atomic number is equal to the number of protons in the nucleus, and every element has a unique number of protons.

7. Noble gases are chemically inert.

Answer: Noble gases have completely filled outermost electron shells, making them stable and unreactive.

8. Electrons are not considered as nucleons.

Answer: Electrons revolve around the nucleus on fixed orbits, while the nucleus contains only protons and neutrons which are called nucleons.

9. An atom becomes a positively charged ion when it loses electrons.

Answer: On losing electrons, the number of protons becomes greater than the number of electrons, giving the atom a net positive charge.

Q6. Correct the sentence by changing the underlined word. Rewrite the correct sentence.

1. Most of the nuclear energy is obtained by nuclear fusion.
2. Alpha particles are the nuclei of hydrogen atoms.
3. Sulphate radicals have 3 (or trivalent) valency.
4. The particle having 11 positive charges and 10 negative charges is a magnesium ion.



5. The isotope of Hydrogen which has 2 neutrons is protium.

ANSWERS-

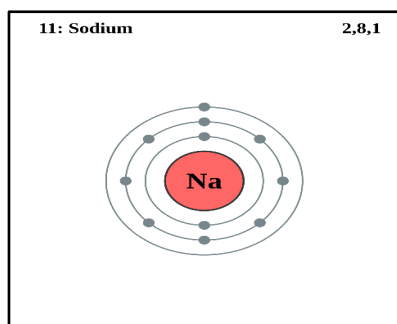
1. Most of the nuclear energy is obtained by nuclear fission.
2. Alpha particles are the nuclei of helium atoms.
3. Sulphate radicals have 2 (or divalent) valency.
4. The particle having 11 positive charges and 10 negative charges is a sodium ion.
5. The isotope of Hydrogen which has 2 neutrons is tritium.

Q7. Define

1. Bound electrons-The electrons in the shells close to the nucleus are called bound electrons.
2. Isotopes -The atoms of the same element, having the same atomic number but different mass numbers, are called isotopes.
3. Ions-The electrically charged particle formed by the loss or gain of electrons to get the nearest noble gas configuration is called an ion.
4. Radioactive elements -The elements which emit high-energy radiations on their own are called radioactive elements.
5. Nuclear fission-The process of splitting of the nucleus of heavy atoms to form lighter nuclei (atoms) is called nuclear fission.

Q8. Answer the following questions from the given diagram.





1. Identify the element shown in the diagram.
Answer: Sodium (Na)
2. What is the atomic number of the element?
Answer: 11
3. What is the electronic configuration of the element?
Answer: 2,8,1
4. How many electron shells are present?
Answer: Three (K, L and M shells)
5. How many electrons are present in the outermost shell?
Answer: One
6. What is the valency of the atom?
Answer: 1
7. What type of element is it—metal, non-metal or metalloid?
Answer: Metal
8. Which is the nearest noble gas to the atom?
Answer: Neon
9. It forms a ion.
Ans- Electropositive or Cation
10. How many neutrons are present in this atom if its atomic mass is 23?
Ans- 12

Q9. Case Study based question.

CASE-1

A metal burns in oxygen which forms white ash and produces dazzling white flame.

Answer the following questions based on the data.



Questions:

1. Magnesium has the electronic configuration __
2. How many valence electrons does magnesium have?
3. What is its valency?
4. Will magnesium gain or lose electrons?
5. Write the formula of the ion formed.

Answers:

1. 2,8,2
2. Two
3. Two
4. Lose two electrons
5. Mg^{2+}

CASE-2

A patient receives iodine-131 for treating thyroid disorders.

Questions:

1. Iodine-131 belongs to which class of atoms?
2. Why does it have chemical properties similar to ordinary iodine?
3. Which particle is different in iodine-131?
4. Mention one medical use of isotopes.

Answers:

1. Isotope
2. Same electronic configuration
3. Neutrons
4. Diagnosis or treatment of diseases

Q10. Differentiate Between the following on the basis of given criteria.

1. Proton and Electron (Position in atom)

Proton

Present in the nucleus of the atom.
around the nucleus.

Electron

Present in shells (orbits)

2. Proton and Neutron (Charge, Mass)

Proton

Neutron



Charge: +1

(neutral)

Mass: 1 u (approximately)
greater than proton)

Charge: 0

Mass: 1 u (slightly

3. Atomic Number and Mass Number (Definition)

Atomic Number (Z)

Number (A)

Number of protons present in the

protons and neutrons present in the nucleus of an atom.

Present in the nucleus of an atom

Mass

Total number of

4. Atom and Ion (Electrical charge)

Atom

Electrically neutral.

(positive or negative).

Ion

Electrically charged

7. Cation and Anion (Charge, Formation, Number of electrons and protons)

Cation

Positive charge.

Formed by loss of electrons.
electrons.

Electrons are less than protons
number of protons.

Anion

Negative charge.

Formed by gain of

Electrons is more than

8. Nucleus and Electron Shell(Particles present)

Nucleus

Contains protons and neutrons.
electrons only.

Electron Shell

Contains

10. Valence Electrons and Bound Electrons (Position)

Valence Electrons

Present in the outermost shell.
shells of the atom.

Bound Electrons

Present in the inner



11. K-shell and N-shell (Maximum electron capacity, Distance from nucleus)

K-shell

Maximum capacity: 2 electrons.
32 electrons.
Nearest to the nucleus.
than the K-shell.

N-shell

Maximum capacity:
Farther from the nucleus

12. Sodium Atom and Sodium Ion (Number of electrons and protons, Electronic configuration, Symbol)

Sodium Atom

Electrons: 11
Protons: 11
Electronic configuration: 2,8,1
configuration: 2,8
Symbol: Na

Sodium Ion

Electrons: 10
Protons: 11
Electronic
Symbol: Na⁺

16. Chlorine Atom and Chloride Ion (Number of electrons, Charge, Symbol)

Chlorine Atom

Electrons: 17
Charge: 0
-1
Symbol: Cl

Chloride Ion

Electrons: 18
Charge:
Symbol: Cl⁻

17. Deuterium and Tritium (Number of neutrons, Mass number)

Deuterium

Number of neutrons: 1
neutrons: 2
Mass number: 2
number: 3

Tritium

Number of
Mass

