# Chapter 8 Periodic Classification of Elements

## I. Choose the best Answer:

#### Question 1.

The number of periods and groups in the periodic table are:

(a) 6, 16

(b) 7, 17

(c) 8, 18

(d) 7, 18

Answer:

(d) 7, 18

## Question 2.

The basis of modem periodic law is \_\_\_\_.

- (a) atomic number
- (b) atomic mass
- (c) isotopic mass
- (d) number of neutrons.

#### Answer:

(a) atomic number

## Question 3.

...... group contains the member of the halogen family.

- (a) 17th
- (b) 15th
- (c) 18th
- (d) 16th

## Answer:

(a) 17th

## Question 4.

\_\_\_\_\_ is a relative periodic property.

- (a) atomic radii
- (b) ionic radii
- (c) electron affinity
- (d) electronegativity.

## Answer:

(b) ionic radii

## Question 5.

Chemical formula of rust is:

(a) Fe0.xH<sub>2</sub>O
(b) Fe04.xH<sub>2</sub>O
(c) Fe<sub>2</sub>O<sub>3</sub>. xH<sub>2</sub>O
(d) FeO
Answer:
(c) Fe<sub>2</sub>O<sub>3</sub>. xH<sub>2</sub>O

#### Question 6.

In the aluminothermic process the role of Al is:

- (a) oxidizing agent
- (b) reducing agent
- (c) hydrogenating agent
- (d) sulphurising agent

#### Answer:

(b) reducing agent

#### Question 7.

The process of coating the surface of the metal with a thin layer of zinc is called \_\_\_\_\_.

- (a) painting
- (b) thinning
- (c) galvanization
- (d) electroplating.

#### Answer:

(c) galvanization

#### Question 8.

Which of the following inert gas has electrons in the outermost shell?

- (a) He
- (b) Ne
- (c) Ar

(d) Kr

#### Answer:

(a) He

#### Question 9.

Neon shows zero electron affinity due to \_\_\_\_.

- (a) stable arrangement of neutrons
- (b) stable configuration of electrons
- (c) reduced size
- (d) increased density.

#### Answer:

(b) stable configuration of electrons

#### Question 10.

..... is an important metal to form amalgam. (a) Ag

(b) Hg
(c) Mg
(d) Al
Answer:
(b) Hg

# II. Fill in the blanks:

1. If the electronegativity difference between two bonded atoms in a molecule is greater than 1.7, the nature of bonding is ......

2. ..... is the longest period in the periodical table.

3. ..... forms the basis of modern periodic table.

4. If the distance between two Cl atoms in  $Cl_2$  molecule is 1.98 Å, then the radius of Cl atom is .....

5. Among the given species A<sup>-</sup> A<sup>+</sup>, and A, the smallest one in size is ......

6. The scientist who propounded the modern periodic law is .....

7. Across the period, ionic radii ..... (increases, decreases).

8. .... and ..... are called inner transition elements.

9. The chief ore of Aluminium is .....

10. The chemical name of rust is .....

## Answer:

1. ionic

- 2. 6th (sixth) period
- 3. Atomic number
- 4. 0.99 Å
- 5. A+
- 6. Dimitri Mendeleev
- 7. decreases
- 8. Lanthanides, Actinides

9. bauxite

10. hydrated ferric oxide

# III. Match the following:

Column - I		Column - II	
Α	Galvanisation	(i)	Noble gas elements
В	Calcination	(ii)	Coating with Zn
С	Redox reaction	(iii)	Silver-tin amalgam

D	Dental filling	(iv)	Alumino thermic process
E	Group 18 elements	(v)	Heating in the absence of air

#### Answer:

A. (ii) B. (v)

C. (iv)

D. (iii)

E. (i)

# IV. True or False: (If false give the correct statement)

1. Moseley's periodic table is based on atomic mass.

- 2. Ionic radius increases across the period from left to right.
- 3. All ores are minerals; but all minerals cannot be called as ores.
- 4. Aluminium wires are used as electric cables due to their silvery white colour.

5. An alloy is a heterogenous mixture of metals.

#### Answer:

1. False – Moseley's periodic table is based on atomic number.

2. True

3. True

4. False – Aluminium wires are used as electric cables because it is a good conductor of heat and electricity.

5. False – An alloy is an homogeneous mixture of metals.

# V. Assertion and Reason:

Answer the following Questions using the data given below:

Question 1.

Assertion: The nature of bond in HF molecule is ionic.

Reason: The electronegativity difference between H and F is 1.9.

(a) Assertion and Reason are correct, Reason explains the Assertion.

(b) Assertion is correct, Reason is wrong.

(c) Assertion is wrong, Reason is correct.

(d) Assertion and Reason are correct, Reason doesn't explains Assertion.

## Answer:

(a) Assertion and Reason are correct, Reason explains the Assertion.

## Question 2.

Assertion: Magnesium is used to protect steel from rusting.

Reason: Magnesium is more reactive than iron.

(a) Assertion and Reason are correct, Reason explains the Assertion.

- (b) Assertion is correct, Reason is wrong.
- (c) Assertion is wrong, Reason is correct.

(d) Assertion and Reason are correct, Reason doesn't explains Assertion. **Answer**:

(a) Assertion and Reason are correct, Reason explains the Assertion.

## **Question** 3.

Assertion: An uncleaned copper vessel is covered with greenish layer. Reason: copper is not attacked by alkali.

(a) Assertion and Reason are correct, Reason explains the Assertion.

(b) Assertion is correct, Reason is wrong.

(c) Assertion is wrong, Reason is correct.

(d) Assertion and Reason are correct, Reason doesn't explains Assertion.

#### Answer:

(d) Assertion and Reason are correct, Reason doesn't explains Assertion.

# VI. Short Answer Questions:

## Question 1.

A is a reddish brown metal, which combines with  $O_2$  at < 1370 K gives B, a black coloured compound. At a temperature > 1370 K, A gives C which is red in colour. Find A, B and C with reaction.

Answer:

(A) is a reddish brown metal – Copper

 $2Cu + O_2 \xrightarrow{< 1370K} 2CuO (B)$ Cupric Oxide(Black)

 $4Cu + O_2 \xrightarrow{> 1370K} 2Cu_2O(C)$ Cuprous oxide (Red)

A – Copper; B – Cupric oxide; C – Cuprous oxide.

## Question 2.

A is a silvery white metal. A combines with  $O_2$  to form B at 800°C, the alloy of A is used in making the aircraft. Find A and B.

## Answer:

A - Silvery white metal - Aluminium

 $4 \text{Al} + 3\text{O}_2 \longrightarrow 2\text{Al}_2\text{O}_3 (B)$ Aluminium oxide

The alloys of aluminium, Duralumin and Magnalium are used in making the aircraft. A – Aluminium; B – Aluminium oxide.

## **Question** 3.

What is rust? Give the equation for the formation of rust.

## Answer:

When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust and the phenomenon of formation of rust is known as rusting.

 $4Fe + 3O_2 + xH_2O \rightarrow 2Fe_2O_3$ . xH<sub>2</sub>O (Rust).

#### Question 4.

State two conditions necessary for rusting of iron.

#### Answer:

(i) The presence of water and oxygen is essential for the rusting of iron.

(ii) Impurities in the iron, the presence of water vapour, acids, salts and  $CO_2$  speeds up rusting.

# **VII. Long Answer Questions:**

## Question 1.

(a) State the reason for addition of caustic alkali to bauxite ore during purification of bauxite.

## Answer:

Caustic alkali is added to bauxite, to dissolve bauxite ore and obtain a solution of sodium aluminate.

(b) Along with cryolite and alumina, another substance is added to the electrolyte mixture. Name the substance and give one reason for the addition.

## Answer:

CaF<sub>2</sub> (Fluorspar) is added along with cryolite and alumina. It is added to reduce the high melting point of the electrolyte.

## Question 2.

The electronic configuration of metal A is 2, 8, 18, 1.

The metal A when exposed to air and moisture forms B a green layered compound. A with con.  $H_2SO_4$  forms C and D along with water. D is a gaseous compound. Find A, B, C and D. **Answer**:

Metal (A) with electronic configuration- 2, 8, 18, 1 is copper.

 $2Cu + O_2 + CO_2 + H_2O \rightarrow CuCO_3. Cu(OH)_2 (B)$ 

Copper carbonate (Green layer)

 $2Cu + O_2 + CO_2 + H_2O \longrightarrow CuCO_3.Cu(OH)_2$  (B)

Copper carbonate (Green layer)

 $Cu + 2H_2SO_4 \longrightarrow CuSO_4 + SO_2\uparrow + 2H_2O$ 

Copper Sulphur

sulphate dioxide

(C) (D)

(A) – Copper (Cu)

- (B) Copper Carbonate (CuCO<sub>3</sub>. Cu(OH)<sub>2</sub>)
- (C) Copper Sulphate (CuSO<sub>4</sub>)
- (D) Sulphur dioxide  $(SO_2)$

## Question 3.

Explain the smelting process.

#### Answer:

The roasted ore of copper is mixed with powdered coke and sand and is heated in a blast furnace to obtain matte ( $Cu_2S + FeS$ ) and slag. The slag is removed as waste. 2 FeS +  $3O_2 \rightarrow 2$  FeO + 2 SO<sub>2</sub> 2 Cu<sub>2</sub>S +  $3O_2 \rightarrow 2$  Cu<sub>2</sub>O + 2SO<sub>2</sub> Cu<sub>2</sub>O + FeS  $\rightarrow$  Cu<sub>2</sub>S + FeO FeO + SiO<sub>2</sub>  $\rightarrow$  FeSiO<sub>2</sub> (slag)

# **VIII. HOT Questions:**

## Question 1.

Metal A belongs to period 3 and group 13. A in red hot condition reacts with steam to form B. A with strong alkali forms C. Find A, B and C with reactions.

## Answer:

Metal A belongs to Period 3 and Group 13. So metal 'A' is aluminium. (A) in red hot condition reacts with steam to form 'B'.

 $2A_1 + 3H_2O \longrightarrow Al_2O_3 + 3H_2$ steam Aluminium oxide (B)

'A' with strong alkali forms 'C'

 $2 \text{ Al} + 2 \text{ NaOH} + 2 \text{ H}_2\text{O} \longrightarrow 2\text{NaAlO}_2 + 3\text{H}_2\uparrow$ 

Sodium meta aluminate (C)

(A) – Aluminium

(B) – Aluminium oxide

(C) – Sodium meta aluminate

## Question 2.

Name the acid that renders aluminium passive. Why?

## Answer:

Dilute or concentrated nitric acid (HNO<sub>3</sub>) renders aluminium passive. Because nitric acid does not attack aluminium but it renders aluminium passive due to the formation of an oxide film on its surface.

## Question 3.

(a) Identify the bond between H and F in HF molecule.

## Answer:

Ionic, because the electronegativity difference is more than 1.7.

(b) What property forms the basis of identification? **Answer**:

Electronegativity.

(c) How does the property vary in periods and in groups? **Answer**:

In a period, from left to right the electronegativity increases because of the increase in the nuclear charge.

In a Group, from top to bottom, the electronegativity decreases because of the increase in size of the elements.