

PETIT SEMINAIRE HIGHER SECONDARY SCHOOL – PUDUCHERRY

UNIT – 8 PERIODIC CLASSIFICATIONS OF ELEMENTS

STD: X

SELF – EVALUATION

I. Choose the best answer:

1. The number of periods and groups in the periodic table are (D) 7,18
2. The basis of modern periodic law is (A)Atomic number
3. ---- group contains the member of halogen family (A)17th
4. ----- is a relative periodic property (D)Electro negativity
5. Chemical formula of rust is ---- (C)Fe₂O₃.xH₂O
6. In the alumino thermic process the role of Al is -- (B) Reducing agent
7. The process of coating the surface of metal with a thin layer of zinc is called (C)Galvanization
8. Which of the following have inert gases 2 electrons in the outermost shell? (A)He
9. Neon shows zero electron affinity due to ---- (B) Stable configuration of electrons.
- 10.----- is an important metal to form amalgam. (B) Hg

II. Fill in the blanks:

1. If the electro negativity difference between two bonded atoms in a molecule is greater than 1.7, the nature of bonding is **Ionic**
2. **Sixth and seventh** period is the longest period in the periodic table.
3. **Atomic number** forms the basis of modern periodic table.
4. If the distance between two Cl atoms in Cl₂ molecule is 1.98 Å, then the radius of Cl atom is **0.99Å**
5. Among the given species A⁻, A⁺, and A, the smallest one in size is A⁺
6. The scientist who propounded the modern periodic law is **Henry Moseley**
7. Across the period, ionic radii **Decreases**
8. **Lanthanides and Actinides** are called inner transition elements.
9. The chief ore of Aluminium is **Bauxite (Al₂O₃.2H₂O)**
10. The chemical name of rust is **Hydrated ferric oxide**



III. Match the following:

S.No	Column 1	Column 2
1	Galvanisation	Coating with Zn
2	Calcination	Heating in the absence of air
3	Redox Reaction	Alumino thermic process
4	Dental filling	Silver – tin amalgam
5	Group 18 elements	Noble gas elements

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

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

Correct statement: Moseley's periodic table is based on atomic numbers.

2. Ionic radius increases across the period from left to right. - **False**

Correct statement: Ionic radius decreases across the period from left to right.

3. All ores are minerals; but all minerals cannot be called as ores. - **True**

4. Al wires are used as electric cables due to their silvery white colour. -

False

Correct statement: Aluminium wires are used as electric cables due to their good conductor of heat and electricity. (or) Cu wires are used as electric cables due to their reddish brown colour.

5. An alloy is a heterogenous mixture of metals. - **False**

Correct statement: An alloy is a homogeneous mixture of metals.

V. Assertion & Reasoning:

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

Reason: The electro negativity difference between H and F is 1.9

(i) A and R are correct, R explains A.

2. **Assertion:** Magnesium is used to protect steel from rusting.

Reason: Magnesium is more reactive than iron.

(i) A and R are correct, R explains A.

3. **Assertion:** An uncleaned copper vessel is covered with greenish layer.

Reason: Copper is not attacked by alkali



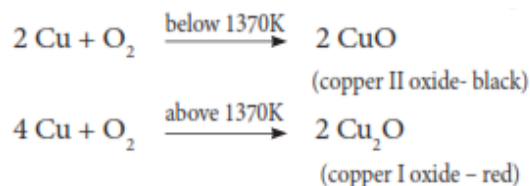
(iv) A and R are correct, R doesn't explain A.

VI. Short answers questions:

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

Action of heat:

On heating at different temperatures in the presence of oxygen, copper forms two types of oxides CuO , Cu_2O .



Result:

Compound	Molecular formula	Name
A	Cu	Copper
B	CuO	Copper (II)oxide (Black)
C	Cu_2O	Copper (I) oxide (Red)

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?
It is not affected by dry air. On heating at 800°C , aluminium burns very brightly forming its oxide and nitride.



Compound	Molecular formula	Name
A	Al	Aluminium
B	Al_2O_3	Aluminium oxide

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

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.



4. State two conditions necessary for rusting of iron?

- (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 carbon dioxide hastens rusting. (Air and moisture).

VII. Long Answers Questions:

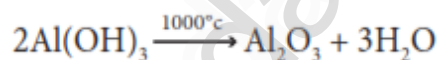
1. (a) State the reason for addition of caustic alkali to bauxite ore during purification of bauxite.

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

(a) Bauxite ore is finely ground and heated under pressure with a solution of concentrated caustic soda solution at 150°C to obtain sodium meta aluminate.

On diluting sodium meta aluminate with water, a precipitate of aluminium hydroxide is formed.

The precipitate is filtered, washed, dried and ignited at 1000°C to get alumina.



(b) Substance: Fluorspar is the substance which is added to cryolite and alumina

Reason: It lowers the fusion temperature of electrolyte.

Aluminium is produced by the electrolytic reduction of fused alumina (Al_2O_3) in the electrolytic cell.

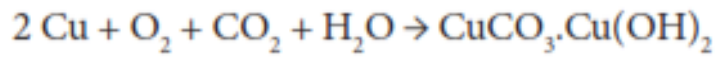
2. The electronic configuration of metal A is 2, 8, 18, 1.

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.

(i) Metal A is Copper.

(ii) Action of air and moisture: Copper gets covered with a green layer of basic copper carbonate in the presence of CO_2 and moisture.





(iii) Metal A Copper reacts with Conc. H_2SO_4 with liberation of Sulphur dioxide gas.

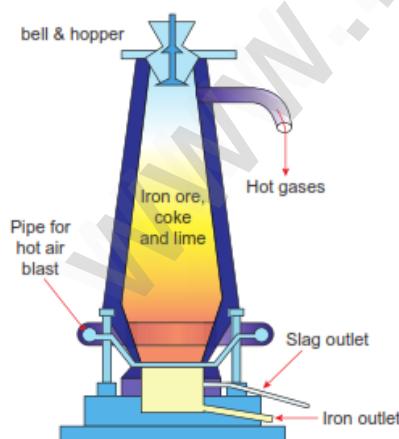


Compound	Molecular formula	Name
A	Cu	Copper
B	$\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$	Malachite green (Basic copper carbonate)
C	CuSO_4	Copper sulphate
D	SO_2	Sulphur dioxide

3. Explain smelting process?

Chief ore: Haematite (Fe_2O_3)

Concentration: Gravity Separation

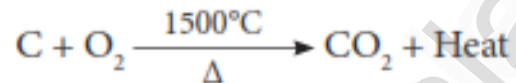


Smelting:

- Furnace – Blast furnace
- Charge – Roasted ore, coke and lime stone
- Ratio – 8:4:1
- Introduced through cup and cone arrangement at the top
- Important regions in the furnace – 3

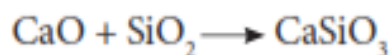
a) The lower Region (Combustion Zone)

- Temperature = 1500°C
- Charge comes in contact with a hot, blast of air
- Coke burns with oxygen to form CO₂
- Heat is liberated; hence it is an exothermic reaction.



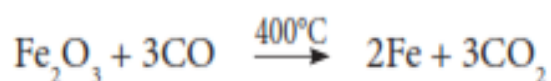
b) The middle Region (Fusion zone)

- Temperature = 1000°C
- Carbon dioxide is reduced to CO
- Limestone decomposes to calcium oxide and carbon dioxide
- In these two reactions heat is absorbed hence they are endothermic reaction.
- Calcium oxide combines with silica to form calcium silicate as slag.



c) The upper Region (Reduction zone)

- Temperature = 400°C
- Carbon monoxide reduces ferric oxide to a fairly pure spongy iron.
- The molten iron is collected at the bottom of the furnace after removing the slag.
- The iron formed is called pig iron
- Pig iron is remelted and cast into different moulds. This is called cast iron.

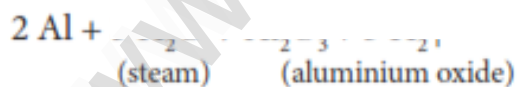


VIII. HOT Question:

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.

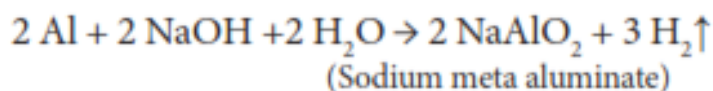
Reaction with water:

Water does not react with aluminium due to the layer of oxide on it. When steam is passed over red hot aluminium, hydrogen is produced.



Reaction with alkalis:

It reacts with strong caustic alkalis forming aluminates.



Compound	Molecular formula	Name
A	Al	Aluminium



B	Al_2O_3	Aluminium oxide
C	NaAlO_2	Sodium meta aluminate

2. Name the acid that renders aluminium passive. Why?

(i) Dilute or concentrated nitric acid.

(ii) It does not attack aluminium, but it renders aluminium passive due to the formation of an oxide film on its surface.

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

(b) What property forms the basis of identification?

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

(a) The bond between H and F is ionic bond. Because the electro negativity difference between H and F is 1.9. so it prefers ionic bond.

(b) Electro negativity difference

- If the difference is less than 1.7, the bond is considered to be covalent.
- If the difference is greater than 1.7, the bond is considered to be ionic.

(c) Along the period, from left to right in the periodic table, the electro negativity increases because of the increase in the nuclear charge which in turn attracts the electrons more strongly.

On moving down a group, the electro negativity of the elements decreases because of the increased number of energy levels.

