

UNIT – 8

PERIODIC CLASSIFICATION OF ELEMENTS

I. Choose the best answer

- The number of periods and groups in the periodic table are _____. [AUG - 2022]
 - 6, 16
 - 7, 17
 - 8, 18
 - 7, 18**
- The basis of modern periodic law is _____.
 - atomic number**
 - atomic mass
 - isotopic mass
 - number of neutrons
- _____ group contains the member of halogen family. [PTA – 1]
 - 17th**
 - 15th
 - 18th
 - 16th
- _____ is a relative periodic property
 - atomic radii
 - ionic radii
 - electron affinity
 - electronegativity**
- Chemical formula of rust is _____.
 - FeO.xH₂O
 - FeO₄.xH₂O
 - Fe₂O₃.xH₂O**
 - FeO
- In the aluminothermic process the role of Al is _____.
 - oxidizing agent
 - reducing agent**
 - hydrogenating agent
 - sulphurising agent
- The process of coating the surface of metal with a thin layer of zinc is called _____.
 - Painting
 - thinning
 - galvanization**
 - electroplating
- Which of the following inert gases have 2 electrons in the outermost shell.
 - He**
 - Ne
 - Ar
 - Kr
- Neon shows zero electron affinity due to _____.
 - stable arrangement of neutrons
 - stable configuration of electrons**
 - reduced size
 - increased density
- _____ is an important metal to form amalgam. [AUG – 2022, MDL – 19]
 - Ag
 - Hg**
 - Mg
 - Al

II. Fill in the blanks

- If the electronegativity difference between two bonded atoms in a molecule is greater than 1.7, the nature of bonding is **ionic**. [PTA – 5]
- Sixth period** is the longest period in the periodical table.
- Atomic number** forms the basis of modern periodic table.
- If the distance between two Cl atoms in Cl₂ molecule is 1.98Å, then the radius of Cl atom is **0.99 Å**.
- Among the given species A⁻, A⁺, and A, the smallest one in size is **A⁺**.
- The scientist who propounded the modern periodic law is **Henry Moseley**.
- Across the period, ionic radii **decreases**. (increases, decreases).
- Lanthanides** and **actinides** are called inner transition elements.
- The chief ore of Aluminium is **bauxite**.
- The chemical name of rust is **hydrated ferric oxide (Fe₂O₃.xH₂O)**.

III. Match the following

[PTA – 6]

Column I	Column II	Answer
1. Galvanisation	Noble gas elements	1. Coating with Zn
2. Calcination	Coating with Zn	2. Heating in the absence of air
3. Redox reaction	Silver - tin amalgam	3. Aluminothermic process
4. Dental filling	Aluminothermic process	4. Silver - tin amalgam
5. Group 18 elements	Heating in the absence of air	5. Noble gas elements

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

- Moseley's periodic table is based on atomic mass. [False]
*Moseley's periodic table is based on **Atomic number**.
- Ionic radius increases across the period from left to right. [False]
*Ionic radius **decreases** across the period from left to right.
- All ores are minerals; but all minerals cannot be called as ores. [True]
- Al wires are used as electric cables due to their silvery white colour. [False]
*Al wires are used as electric cables due to their **electrical conductivity**.
- An alloy is a heterogenous mixture of metals. [False]
*An alloy is a **homogeneous** mixture of metals.

V. Assertion & Reason

Answer the following questions using the data given below:

- i) A and R are correct, R explains the A. ii) A is correct, R is wrong.
 iii) A is wrong, R is correct. iv) A and R are correct, R doesn't explain A.

1. **Assertion (A)** : The nature of bond in HF molecule is ionic. [PTA – 2]

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

Ans. (i) *A and R are correct, R explains the A.*

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

Reason (R) : Magnesium is more reactive than iron.

Ans. (i) *A and R are correct, R explains the A.*

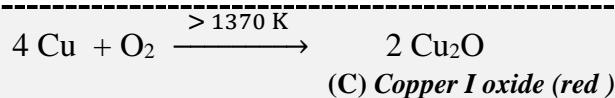
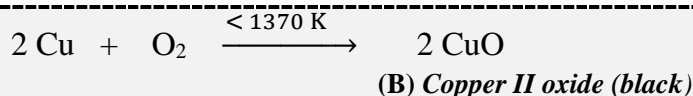
3. **Assertion (A)** : An uncleaned copper vessel is covered with greenish layer. [PTA – 5]

Reason (R) : copper is not attacked by alkali.

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

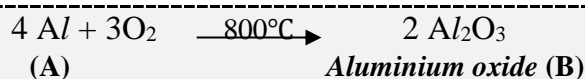
VI. Short answer questions

1. A is a reddish brown metal, which combines with O₂ 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 the reaction. [PTA – 4]



A → **Copper (Cu);**
 B → **Copper II oxide (CuO)**
 C → **Copper I oxide (Cu₂O)**

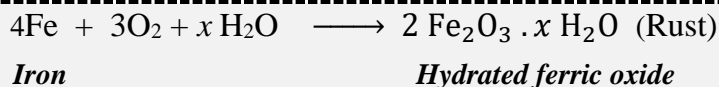
2. A is a silvery white metal. A combines with O₂ to form B at 800°C, the alloy of A is used in making the aircraft. Find A and B. [PTA – 1]



A → **Aluminium (Al)**
 B → **Aluminium oxide (Al₂O₃)**

3. What is rust? Give the (chemical) equation for formation of rust. [SEP – 2021, PTA – 4]

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.



4. State two conditions necessary for rusting of iron.

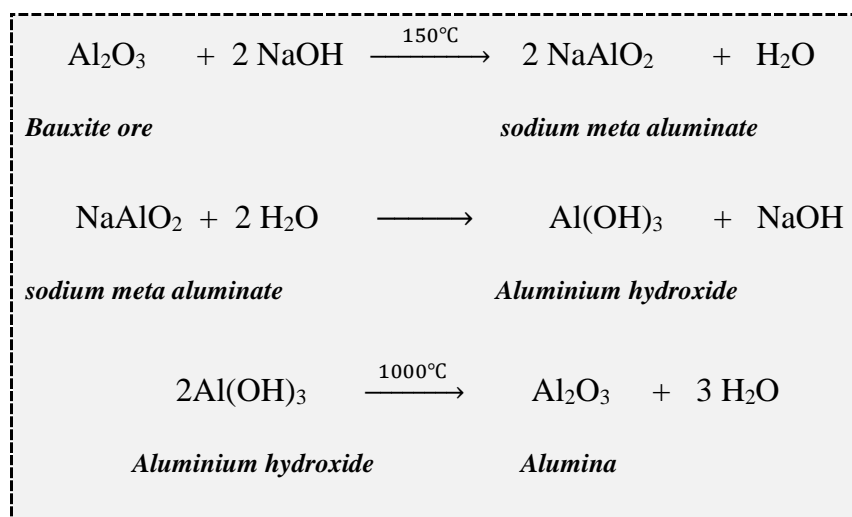
Air and moisture are the two necessary conditions for rusting of iron.

VII. Long answer questions

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

Caustic alkali dissolves Al_2O_3 forming soluble sodium meta aluminate while the impurities remain insoluble. The filtered solution processed to get back its pure form.

Thus, caustic alkali is added to bauxite ore during its purification.

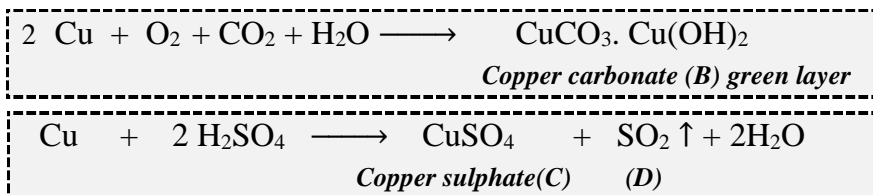


- b) Along with cryolite and alumina, another substance is added to the electrolyte mixture. Name the substance and give one reason for the addition.

❖ *Fluorspar* is the another substance.

Reason : It lowers the fusion temperature of electrolyte.

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. [PTA – 1]



A → Copper (Cu)
 B → Copper carbonate ($\text{CuCO}_3 \cdot \text{Cu(OH)}_2$)
 C → Copper sulphate (CuSO_4)
 D → Sulphur dioxide (SO_2) gas

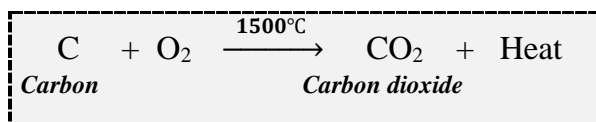
3. Explain Smelting Process.

Smelting Process: It is the process of reducing roasted metallic oxide into molten metal.

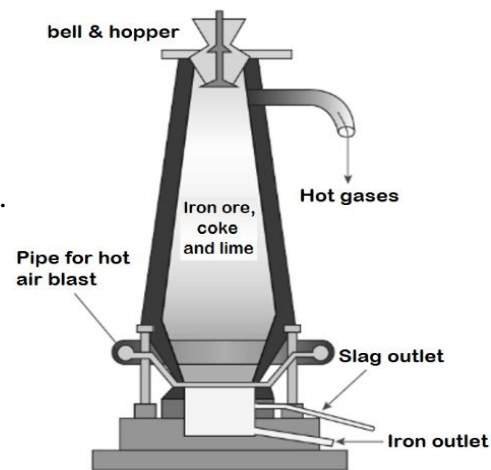
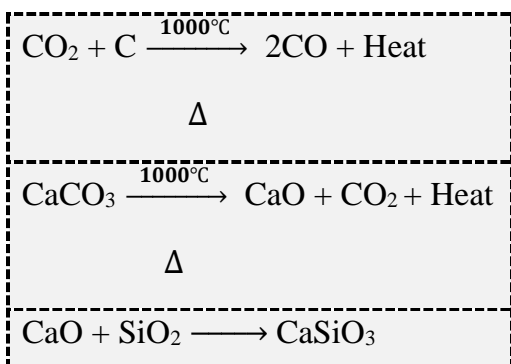
Smelting of iron: Charge consisting of roasted ore, coke and limestone in the ratio 8:4:1 is smelted in a blast furnace.

(a) Lower Region (Combustion Zone) :

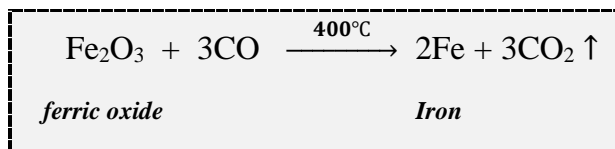
- ❖ Temperature is at 1500°C.
- ❖ In this region, coke burns with O₂ to form CO₂



(b) Middle Region (Fusion Zone) – Temperature is 1000°C.



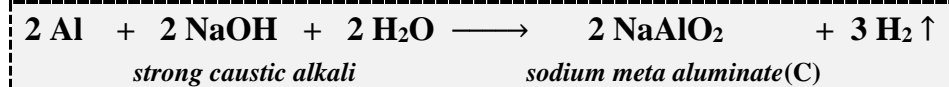
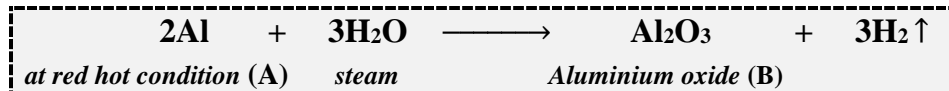
(c) Upper Region (Reduction Zone) – Temperature is 400°C.



Molten iron collected at the bottom after removing slag is called **pig iron**. It is remelted and casted into different moulds called **cast iron**.

VIII. Hot Questions

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. [PTA – 3]



A → Aluminium (Al)
 B → Aluminium oxide (Al₂O₃)
 C → Sodium meta aluminate (NaAlO₂)

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

- ❖ Dilute or Concentrated nitric acid renders aluminium passive.
- ❖ It is due to formation of oxide film on its surface.

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

Electronegativity of H = 2.1 and F = 4.0

Difference in electronegativity = $4.0 - 2.1 = 1.9$ which is >1.7

∴ The bond between H and F in HF molecule is **ionic**.

b) What property forms the basis of identification?

Electronegativity

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

- ❖ Across the *period*, from left to right, electronegativity *increases*.
- ❖ Down a *group*, from top to bottom, electronegativity *decreases*.