

Time: 60min

Science 1 Ch 2 and 3

Marks: 20

Q.1(A) Choose the correct alternative. (2)

i **An inert gas element placed in period 6 is used in the treatment of cancer. Identify the element.**

☐ (A) Xenon

☒ (B) Radon

☐ (C) Argon

☐ (D) Krypton

ii **Which of the following is an example of combination reaction?**

☐ (A) $C_{12}H_{22}O_{11} \xrightarrow{\Delta} 12C + 11H_2O$

☒ (B) $NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$

☐ (C) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

☐ (D) $CH_3-CH_3 \rightarrow CH_2=CH_2 + H_2$

Ans:

Explanation:

A combination reaction is a reaction where two or more reactants combine to form a single product. In the given options, only $NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$ fits this definition as ammonia (NH_3) and hydrogen chloride (HCl) combine to form a single product, ammonium chloride (NH_4Cl).

Q.1(B) Answer the following. (3)

i **Valency of potassium atom : one :: Valency of argon atom : _____**

Ans: Zero

Explanation:

Valency of potassium atom is one whereas the valency of argon atom is zero.

ii **Heat is released : Exothermic process :: Heat is absorbed : _____**

Ans: Endothermic process

Explanation:

In an exothermic reaction heat is released while in an endothermic reaction heat is absorbed.

iii **Find the odd one out**

Zinc, iron, phosphorus, sodium

Ans: (C)

Explanation:

Phosphorus is a nonmetal while others are metals.

Q.2(A) Give scientific reasons. (Attempt any 1) (2)

i **It takes time for pieces of Shahabad tile to disappear in HCl, but its powder disappears rapidly.**

i. The rate of a chemical reaction depends upon the size of the reactant particles taking part in the reaction.

- ii. Smaller the size of the reactant particles, higher is the rate of reaction.
- iii. The size of reactant particles is more in pieces of Shahabad tile as compared to powder of Shahabad tile.
- iv. When HCl is added to pieces of Shahabad tile, the CO₂ effervescence is formed slowly. However, when HCl is added to Shahabad powder, the CO₂ effervescence is formed at a faster rate.

Hence, it takes time for pieces of Shahabad tile to disappear in HCl, but its powder disappears rapidly.

ii It is recommended to use air tight container for storing oil for long time.

- i. When edible oil is left aside for long time, it undergoes air oxidation.
- ii. Due to this, the taste and smell of oil changes and it becomes rancid. If food is cooked in this oil, its taste also changes.
- iii. Thus, the oil will become unfit for consumption.
- iv. The process of oxidation reaction of oil can be slowed down by storing it in air tight container.

Hence, it is recommended to use air tight container for storing oil for long time.

Q.2(B) Answer the following. (Attempt any 1)

(2)

i Complete the following table.

Triad	Elements	Atomic mass
A	Lithium (Li)	6.9
	Sodium (Na)	—
	Potassium (K)	39
B	Calcium (Ca)	40.1
	Strontium (Sr)	—
	Barium (Ba)	137.3

Triad	Elements	Atomic mass
A	Lithium (Li)	6.9
	Sodium (Na)	23
	Potassium (K)	39
B	Calcium (Ca)	40.1

Strontium (Sr)	88.7
Barium (Ba)	137.3

ii(a) **What is meant by the term electropositivity of an element?**

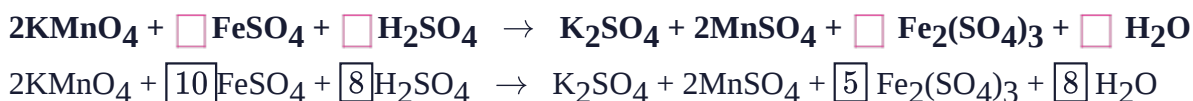
The tendency of an atom of an element to form cation by losing its valence electrons is called electropositivity of that element.

(b) **Write the name and symbol of the element from the description.**

The most reactive nonmetal.

Fluorine (F₂)

iii **Fill in the correct factors in the boxes provided to balance the chemical equation.**



Q.3

Answer the following. (Attempt any 2)

(6)

i(a) **Explain Newlands' octaves.**

Newlands' octaves:

- Newlands correlated the atomic masses of elements to their properties in a different way.
- He arranged the elements known at that time in an increasing order of their atomic masses.
- This arrangement started with the lightest element hydrogen and ended up with thorium.
- He found that every eighth element had properties similar to those of the first element as observed in octaves of music.

Example: Sodium is the eighth element from lithium and both have similar properties.

[Note: Newlands' octaves are based on the seven main notes of music system. The seven notes in Indian music system are Sa, Re, Ga, Ma, Pa, Dha, Ni and the seven notes in western music system are Do, Re, Mi, Fa, So, La, Ti. The frequency of the notes goes on increasing from one note to the other. The note 'Sa' or 'Do' having double the original frequency comes again at the eighth place. This forms the octave of musical notes.]

(b) **What is the cause of nonmetallic character of elements?**

The tendency to form anion by accepting outside electrons into its valence shell or electronegativity is the cause of nonmetallic character of an element.

ii **Explain the similarity and difference in two events, namely adding NaOH to water and adding CaO to water.**

	Adding NaOH to water	Adding CaO to water
Similarity	Heat is given away during this process. So, it is an exothermic process.	Heat is given away during this reaction. So, it is an exothermic reaction.

Difference	No new substances are formed as the process involves only dissolution. The aqueous solution of NaOH is strong base.	New substance (calcium hydroxide) is formed which is less soluble and its aqueous solution is weak base.
------------	---	--

iii(a) **Write the names from the description.**

The metalloids in the second and third periods.

Boron and silicon

(b) **On which side of the period did you find the nonmetals?**

Nonmetals lie on the right side of the period.

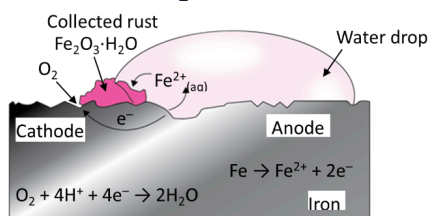
(c) **The inert gas which contains electrons in K and L shells only**

Neon (Ne)

Q.4 Answer the following. (Attempt any 1)

(5)

i **Observe the picture and answer the following questions:**



i. **What is a rust?**

ii. **Write the chemical formula of rust.**

iii. **Write the reaction of oxidation of iron at anode.**

iv. **Write the reaction of oxidation of iron at cathode.**

v. **What is corrosion?**

i. Rust is a reddish brown coloured hydrated ferric oxide layer deposited on the surface of iron objects that are exposed to moist air.

ii. Chemical formula of rust is $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$.

iii. Anode region: $\text{Fe}_{(s)} \rightarrow \text{Fe}^{2+}_{(aq)} + 2e^-$

iv. Cathode region: $\text{Fe}^{2+}_{(aq)} \rightarrow \text{Fe}^{3+}_{(aq)} + e^-$

v. Metals get attacked by substances around it such as moisture, acids, etc. Metal is said to 'corrode' due to this attack and the process is called corrosion.

ii(a) **Atomic radius goes on decreasing while going from left to right in a period.**

i. While going from left to right in a period, atomic number increases one by one. So, positive charge on the nucleus increases by one unit at a time. However, electrons get added in the same outermost shell.

ii. This increases effective nuclear charge. As a result, the electrons are pulled towards the nucleus to a greater extent and as a result, the size of the atom decreases.

Thus, atomic radius goes on decreasing while going from left to right in a period.

- (b) Write down the electronic configuration of the following elements from the given atomic numbers. Answer the following question with explanation.

$_{13}\text{Al}$, $_{14}\text{Si}$, $_{11}\text{Na}$, $_{12}\text{Mg}$, $_{16}\text{S}$

Which of the above elements has the highest metallic character?

Element	Electronic configuration
$_{13}\text{Al}$	2, 8, 3
$_{14}\text{Si}$	2, 8, 4
$_{11}\text{Na}$	2, 8, 1
$_{12}\text{Mg}$	2, 8, 2
$_{16}\text{S}$	2, 8, 6

The element with the highest metallic character is $_{11}\text{Na}$ as metallic character decreases moving across a period from left to the right.

- (c) The element having atomic number 92

Uranium (U)

ECC