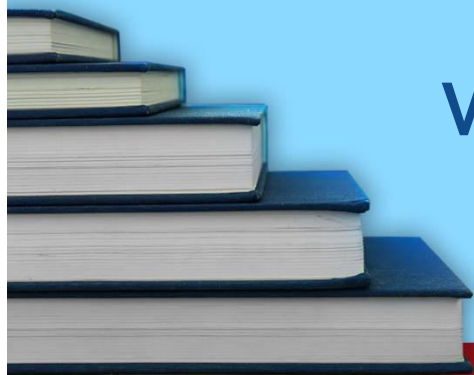


# CHEMISTRY



## WORKSHEET-7



**STP**

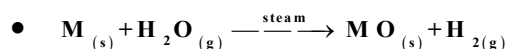
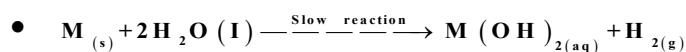
A PROJECT BY PUNJAB GROUP

**Worksheet-7****(B. Inorganic Chemistry)****GROUPS (s and p block elements)**

**Q.1** Which of the following elements of IIA group does not react with water even at red hot temperature?

- A) Mg  
B) Be  
C) Ca  
D) Ba

**Q.2** Which of the following elements reacts with cold water slowly but reacts with steam vigorously? General reaction of a metal is shown in the given equations?



- A) Mg  
B) Ca  
C) Sr  
D) Ba

**Q.3** Which of the following is correct electronic configuration of  ${}_{19}\text{K}$ ?

- A)  $1s^2, 2s^2, 2p^6, 3s^1, 3p^6, 4s^2$   
B)  $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2$   
C)  $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1$   
D)  $1s^2, 2s^2, 2p^6, 3s^2, 3p^5, 4s^1$

**Q.4** Which of the following elements of IIA forms amphoteric oxide when treated with oxygen at  $800^\circ\text{C}$ ?

- A) Be  
B) Ca  
C) Sr  
D) Mg

**Q.5** When a mixture of white solids Z, is treated with an excess of dilute hydrochloric acid, a colourless gas is evolved and some, (but not all) of the mixture dissolves.

- A)  $\text{Ba}(\text{NO}_3)_2$  and  $\text{Ca}(\text{OH})_2$   
B)  $\text{BaSO}_4$  and  $\text{CaCO}_3$   
C)  $\text{CaCO}_3$  and  $\text{MgSO}_4$   
D)  $\text{Ca}(\text{OH})_2$  and  $\text{MgCO}_3$

**Q.6** The word alkali means:

- A) Base  
B) Basic salt  
C) Ashes  
D) Spirit

**Q.7** Which one of the following properties of IIA group elements increases down the group?

- A) Melting points and boiling points  
B)  $\Delta H_{\text{hyd}}$   
C) Electropositive character  
D) Electron affinity

**USE THIS SPACE FOR  
SCRATCH WORK**

- Q.8** Elements of IA and IIA group are known as:  
A) Reducing agent                      C) Both A and B  
B) Oxidizing agent                      D) Neither A nor B
- Q.9** Consider the following general characteristics of alkali metal down the groups:  
**I.** The atomic and ionic radii increase from Li to Cs with the increasing atomic number due to the addition of new shells.  
**II.** Hardness of alkali metals decreases from Li to Cs with decreasing interatomic interactions.  
**III.** Melting and boiling points generally decrease from Li to Cs with the decreasing interatomic interactions.  
**IV.** Electropositive character increases from Li to Cs with decreasing I.E values.  
Which of the above statement is/are correct?  
A) I only                                      C) III and IV only  
B) II only                                      D) I, II, III and IV
- Q.10** The density  $\text{gcm}^{-3}$  at  $20^\circ\text{C}$  of alkaline earth metals down the group:  
A) First increases then decreases  
B) First decreases then increases  
C) Continuously decreases  
D) Continuously increases
- Q.11** Which of the following elements of IIA group is so reactive that it must be stored under oil to keep it out of contact with air?  
A) Mg    C) Sr  
B) Ca    D) Ba
- Q.12** Which of the following alkali metal has greater density?  
A) Na    C) K  
B) Rb    D) Cs
- Q.13** Which of the following statements is incorrect about general characteristic of alkaline earth metals down the group?  
A) The atomic and ionic radii increase from Be to Ra  
B) Hardness of alkaline earth metals decreases from Be to Ra  
C) Electropositive character decreases from Be to Ra  
D) Melting and boiling points generally decrease from Be to Ra

**USE THIS SPACE FOR  
SCRATCH WORK**

**Q.14 Identify the incorrect statement:**

- A) Alkaline earth metals are less reactive than alkali metals
- B) Alkaline earth metals except Mg react with dilute acid to give hydrogen gas
- C) Alkaline earth metals are less basic than alkali metals
- D) Alkaline earth metals form ionic bond with electronegative elements

**Q.15 Which of the following alkali metal forms peroxide when treated with excess oxygen?**

- A) Li
- B) Na
- C) K
- D) Cs

**Q.16 Which of the following oxides is unlikely to be dissolved in sodium hydroxide?**

- A) MgO
- B) SiO<sub>2</sub>
- C) Al<sub>2</sub>O<sub>3</sub>
- D) NO<sub>2</sub>

**Q.17 Which of the following statements is incorrect about IIA and VIIA group elements?**

Opt.	IIA group elements	VIIA group elements
A)	They are metals	They are non-metals
B)	They form acidic oxide	They form basic oxides
C)	They have tendency to lose electrons	They have tendency to gain electrons
D)	They have general electronic configuration in the valence shell $ns^2$	They have general electronic configuration in the valence shell $ns^2, np^5$

**Q.18 All the alkali and alkaline earth metals show similar properties EXCEPT?**

- A) The elements of both the families are strongly electropositive
- B) All the elements of the two families are highly reactive
- C) None of the elements of the two families occur in the free state in nature.
- D) The bicarbonates of all the elements of the two families are insoluble in water

**Q.19 Which of the following group of elements react violently with hydrogen at room temperature?**

- A) Na and K
- B) Li and Na
- C) K and Rb
- D) Rb and Cs

**USE THIS SPACE FOR SCRATCH WORK**

**Q.20 All the alkali and alkaline earth metals show similar properties EXCEPT?**

- A) The alkali metals have one electron in their valence shells whereas the alkaline earth metals have two electrons
- B) The alkaline earth metals are harder and heavier than alkali metals
- C) The carbonates and sulphates of alkali metals except  $\text{Li}_2\text{CO}_3$  are soluble in water, whereas those of alkaline earth metals are insoluble
- D) Reactions of alkaline earth metal are more vigorous than those of alkali metals

**Q.21 Consider the following property of Li:**

**I. It is much harder and lighter than the other alkali metal**

**II. It form stable complex compound**

**III. It react with water very slowly**

**IV. It is less reactive than other alkali metal**

**Which of the above statement is/are correct?**

- A) I only
- B) II only
- C) III and IV only
- D) I, II, III and IV

**Q.22 Identify the incorrect statements about IIA group elements:**

- A) They are known as alkaline earth metals
- B) They have two electrons in the outermost shell and occupy s sub-shell
- C) Their atomic radii increase down the group
- D) Ionization energy of Ca is higher than that of Mg

**Q.23 Beryllium becomes passive on reaction with conc.  $\text{HNO}_3$  because:**

- A) It is non-reactive metal
- B) It forms stable layer of oxide
- C) It has non-reactive nature with the acid
- D) It has small size

**Q.24 Which of the following is not peculiar behaviour of Be?**

- A) It is as hard as iron
- B) It is not resistant towards complete oxidation
- C) Its melting and boiling points are higher than other alkaline earth metal
- D) It is the only member of alkaline earth metals which react with sodium hydroxide to produce hydrogen gas

**USE THIS SPACE FOR SCRATCH WORK**

- Q.25** Which of the following elements only reacts with nitrogen and carbon?  
 A) Li C) K  
 B) Na D) Cs
- Q.26** Consider the following statements:  
 I. Elements with similar properties is placed in a vertical column called group  
 II. Groups are usually numbered by Roman numerals (I to VIII)  
 III. The sub-groups containing normal elements are labelled as A sub-group  
 IV. The sub-groups containing transition elements are labelled as B sub-groups  
 Which of the above statement is/are correct?  
 A) I only C) III and IV  
 B) II only D) I, II, III and IV
- Q.27** Which of the following elements is known as bridge element?  
 A) Be C) Cl  
 B) K D) P
- Q.28** All of the following elements form amphoteric oxides EXCEPT?  
 A) Be C) Al  
 B) Zn D) Ca
- Q.29** Which of the following hydroxides of IIA group elements is insoluble in water?  
 A)  $\text{Be}(\text{OH})_2$  C)  $\text{Sr}(\text{OH})_2$   
 B)  $\text{Ca}(\text{OH})_2$  D)  $\text{Ba}(\text{OH})_2$
- Q.30** Which of the following pair of elements of IIA group form peroxide when treated with oxygen?  
 A) Be and Mg C) Ba and Sr  
 B) Ca and Ba D) Sr and Ca
- Q.31** Which one of the following sets of solid elements, A, B, C or D includes a giant metallic structure a macromolecular structure and a simple molecular structure?  
 A) Na, Mg, Al C) C, Si, Sn  
 B) Mg, Al, Si D) Al, Si, S
- Q.32** The alkali metals are highly reactive elements. The reactivity of alkali metals is due to:  
 A) Low value of ionization enthalpies  
 B) Low enthalpy of atomization  
 C) Both A and B  
 D) Neither A nor B

**USE THIS SPACE FOR  
SCRATCH WORK**

**Q.33** Consider the following statements about illustrate the anomalous properties of lithium and its diagonal relationship with magnesium:

**I.** The melting point and boiling point of lithium are comparatively high like Mg.

**II.** Lithium is much harder than the other alkali metals. Magnesium is also a hard metal.

**III.** Lithium reacts with oxygen least readily to form normal oxide whereas other alkali metals form peroxides and super-oxides. Magnesium also forms normal oxide.

**IV.** LiOH like Mg(OH)<sub>2</sub> is a weak base. Hydroxides of other alkali metals are strong bases.

Which of the above statements is/are correct?

- A) I only  
B) II only

- C) III and IV only  
D) I, II, III and IV

**Q.34** Which of the following elements of group IIA has greater metallic radius (pm)?

- A) Be  
B) Mg

- C) Ca  
D) Sr

**Q.35** Which of the following oxides of elements is more basic in nature?

- A) K<sub>2</sub>O  
B) MgO

- C) CaO  
D) Al<sub>2</sub>O<sub>3</sub>

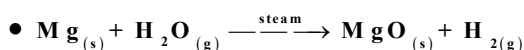
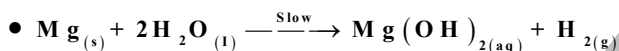
## ANSWER KEY (Worksheet-7)

1	B	11	D	21	D	31	D
2	A	12	D	22	D	32	C
3	C	13	C	23	B	33	D
4	A	14	B	24	B	34	D
5	B	15	B	25	A	35	A
6	C	16	A	26	D		
7	C	17	B	27	A		
8	A	18	D	28	D		
9	D	19	D	29	A		
10	B	20	D	30	C		

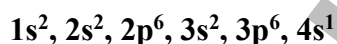
## ANSWERS EXPLAINED

**Q.1 (B)** This is because Be has **smaller size, stronger nucleus** hold on the valence shell electrons and thus has **less** chemical reactivity.

**Q.2 (A)** Mg reacts with cold water slowly but reacts vigorously with steam as shown in the reaction:



**Q.3 (C)** The correct electronic configuration of  ${}_{19}\text{K}$  is:



**Q.4 (A)** In IIA group, beryllium is the least reactive metal. It is resistant to complete oxidation and stable in air at ordinary temperature but oxidizes rapidly at about  $800^\circ\text{C}$  and forms amphoteric oxide as shown in the reaction:



- BeO is amphoteric in nature

**Q.5 (B)**

- When a mixture of white solids Z, is treated with an excess of dilute hydrochloric acid, a colourless gas is evolved and some, (but not all) of the mixture dissolves.

- Statement (B) fulfills the above conditions.  $\text{CaCO}_3$  produces  $\text{CO}_2$  as a result of decomposition on heating.

- $\text{CaCO}_{3(s)} \xrightarrow{\text{heat}} \text{CaO} + \text{CO}_{2(g)}$  while in the mixture  $\text{BaSO}_4$  is insoluble in water.

- $\text{CaCO}_3 + \text{HCl}_{(aq)} \longrightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$

**Q.6 (C)** The word alkali means ashes.

**Q.7 (C)** Electropositive character of IIA group elements increases down the group because down the group number of inner shells increase, atomic radii increase, and shielding effect increases. As a result ionization energy decreases and metallic character increases and thus reducing power of IIA group elements increases.

**Q.8 (A)** Element of IA and IIA group are known as reducing agent.

**Q.9 (D)** All the given statements are correct about characteristics of alkali metals:

**I.** The atomic and ionic radii increase from Li to Cs with the increasing of atomic number due to the addition of new shells.

**II.** Hardness of alkali metals decreases from Li to Cs with decreasing interatomic interactions.

**III.** Melting and boiling points generally decrease from Li to Cs with the decreasing interatomic interactions.

**IV.** Electropositive character increases from Li to Cs with decreasing I.E values.

**Q.10 (B)** The density  $\text{gcm}^{-3}$  at  $20^\circ\text{C}$  of alkaline earth metals down the group first decreases then increases as shown in the tabular form.

Physical Property	Be	Mg	Ca	Sr	Ba
Densities ( $\text{g cm}^{-3}$ at $20^\circ\text{C}$ )	1.85	1.74	1.55	2.6	3.62



- Q.11 (D)** In IIA group chemical reactivity of elements increases because atomic size increases with the increase of shielding effect. As a result, nucleus hold on the valence electrons decreases. That is why Ba element of IIA group is so reactive that it must be stored under oil to keep it out of contact with air.
- Q.12 (D)** Among alkali metals Cs has greater density.
- Q.13 (C)** It is incorrect statement: the correct statement is as follow:
- Electropositive character increase from Be to Ra
- Q.14 (B)** It is incorrect statement: the correct statement is as follow:
- Alkaline earth metals except Be react with dilute acid to give hydrogen gas
- Q.15 (B)** Among alkali metals Na forms peroxide when treated with excess oxygen.
- Q.16 (A)** MgO is basic in nature and it does not dissolve in NaOH solution. A is amphoteric while B and D are acidic in nature. They (A, B and D) can react with NaOH except MgO.
- Q.17 (B)** It is incorrect statement. In fact,
- The elements of IIA group form basic oxide e.g. MgO, CaO.
  - The elements of VIIA group form acidic oxide e.g. Cl<sub>2</sub>O<sub>7</sub>.
- Q.18 (D)** It is incorrect statement. The correct statement is as follow:
- The bicarbonates of all the elements of IA and IIA groups are soluble in water.
- Q.19 (D)** Rb and Cs elements of IA group react violently with hydrogen at room temperature.
- Q.20 (D)** It is incorrect statement. The correct statement is as follow:
- Reaction of alkali metals are more vigorous than those of alkaline earth metal.
- Q.21 (D)** All the given statements are correct of Li:
- I. It is much harder and lighter than the other alkali metals
  - II. It forms stable complex compounds
  - III. It reacts with water very slowly
  - IV. It is less reactive than other alkali metal.
- Q.22 (D)** Ionization energy of Ca is lower than that of Mg (first ionization energy 738kJmol<sup>-1</sup>) because the size of Ca (first ionization energy 595kJmol<sup>-1</sup>) is greater than that of Mg. Greater is the size, smaller is the ionization energy.
- Q.23 (B)** Beryllium becomes passive on reaction with conc. HNO<sub>3</sub> because it forms stable layer of oxide.
- Q.24 (B)** Peculiar behaviour of Be is that it is resistant towards complete oxidation.
- Q.25 (A)** Li is the only element of alkali metals which react with nitrogen and carbon to form nitride and carbide.
- Q.26 (D)** All the given statements are correct:
- I. Elements with similar properties is placed in a vertical column called group.
  - II. Groups are usually numbered by Roman numerals (I to VIII).
  - III. The sub-groups containing normal elements are labelled as A sub-group.
  - IV. The sub-groups containing transition elements are labelled as B sub-groups.
- Q.27 (A)** Be is known as bridge element.

**Q.28 (D)** Be, Al and Zn forms amphoteric oxides.

**Q.29 (A)**  $\text{Be}(\text{OH})_2$  hydroxide of IIA group elements is insoluble in water.

**Q.30 (C)** Be and Sr elements of IIA group form peroxide when treated with oxygen.

**Q.31 (D)** Al has giant metallic structure, Si has a giant molecular structure and S has a simple molecular structure.

**Q.32 (C)** The alkali metals are highly reactive elements. The reactivity of alkali metals is due to:

- Low value of ionization enthalpies
- Low enthalpy of atomization

**Q.33 (D)** All the given statements are correct:

- The melting point and boiling point of lithium are comparatively high like Mg.
- Lithium is much harder than the other alkali metals. Magnesium is also a hard metal.
- Lithium reacts with oxygen least readily to form normal oxide whereas other alkali metals form peroxides and superoxides. Magnesium also forms normal oxide.
- $\text{LiOH}$  like  $\text{Mg}(\text{OH})_2$  is a weak base. Hydroxides of other alkali metals are strong bases.

**Q.34 (D)**

Element of Group IIA	Metallic Radius (pm)
Be	122
Mg	160
Ca	197
Sr	215

**Q.35 (A)** The oxides of IA group elements is more basic in nature as compared to than that of IIA and IIIA group.

# STOP

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