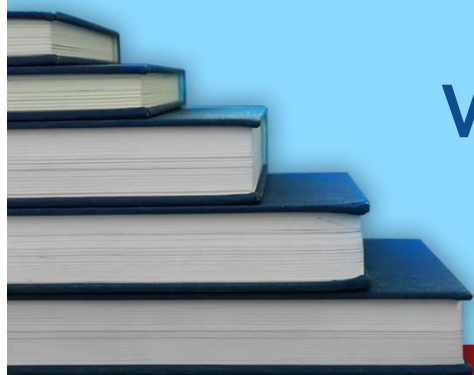


CHEMISTRY



WORKSHEET-8



STP

A PROJECT BY PUNJAB GROUP

Worksheet-08**(B. Inorganic Chemistry)****Groups**

Q.1 Which one of the following properties of IIA group elements increases down the group?

- A) Melting points and boiling points C) Reducing power
B) ΔH_{hyd} D) Electron affinity

Q.2 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

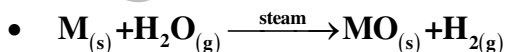
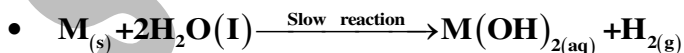
Q.3 Which of the following statements is incorrect about IIA and VIIA group elements?

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

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

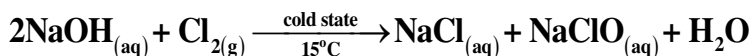
Q.5 Which of the following elements reacts with cold water slowly but reacts with steam vigorously. General reaction of a metal is shown in the given equations?



- A) Mg C) Sr

USE THIS SPACE FOR
SCRATCH WORK

Q.13 Consider the following reaction of chlorine with aqueous sodium hydroxide in the cold state:



Which of the following is type of above reaction?

- A) Acid base reaction
- B) Disproportionation reaction
- C) Elimination reaction
- D) Double displacement reaction

Q.14 Which of the following halogens acts as a bleaching agent?

- A) F_2
- B) Cl_2
- C) Br_2
- D) I_2

Q.15 Which one of the following is use of radon?

- A) It is used in radiotherapy for cancer treatment
- B) It is used in electric light bulb
- C) It is used in bactericidal lamps
- D) It is used in making advertising sign

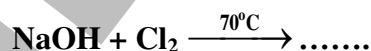
Q.16 Which of the following oxides is unlikely to be dissolved in sodium hydroxide?

- A) MgO
- B) SiO_2
- C) Al_2O_3
- D) NO_2

Q.17 Which of the following properties decreases down the group in case of halogens?

- A) Covalent and ionic radii
- B) Van der waal's forces
- C) Electronegativity
- D) Melting points and boiling points

Q.18 When chlorine (Cl_2) is heated with hot concentrated aqueous NaOH solution at 70°C , a disproportionation reaction takes place as shown below?



Which of the following products are formed?

- A) NaCl , NaClO
- B) NaClO_3 , H_2O
- C) NaClO_3 , NaCl , H_2O
- D) NaClO_3 , NaClO

Q.19 Identify the incorrect statements about IIA group

USE THIS SPACE FOR
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STEP ENTRY TEST 2020

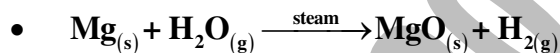
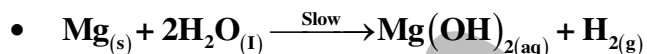
ANSWER KEY (Worksheet-08)

1	C	11	C	21	D
2	D	12	A	22	B
3	B	13	B	23	D
4	B	14	B		
5	A	15	A		
6	A	16	A		
7	D	17	C		
8	A	18	C		
9	B	19	D		
10	D	20	C		

ANSWERS EXPLAINED

- Q.1 (C)** Reducing power 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.2 (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.3 (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. Cl₂O₇.
- Q.4 (B)** This is because Be has smaller size, stronger nucleus hold on the valence shell electrons and thus has less chemical reactivity.

Q.5 (A) Mg reacts with cold water slowly but reacts vigorously with steam as shown in the reaction:

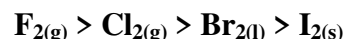


Q.6 (A) In IIA group, beryllium is the least reactive metal. It is resistant to complete oxidation and stable in air at ordinary temperature but oxidizes rapidly at about 800°C and forms amphoteric oxide as shown in the reaction:



- BeO is amphoteric in nature

Q.7 (D) I₂ is the weakest oxidizing agent among all the halogens because it has smaller standard reduction potential (+0.54V) value and smaller electronegativity (2.5). So it cannot displace all the halogens such as F₂, Cl₂ and Br₂ in the redox reactions. Order of decreasing oxidizing power of halogens is as follow:



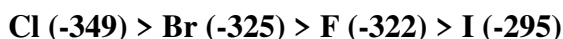
Q.8 (A) There are only weak van der waal's forces between their diatomic halogen molecules. These forces increase as the number of electrons in the molecules increases with increasing atomic number. Greater is the number of electrons greater are the opportunities for instantaneous dipole arising within molecules, and for induced dipole to be produced on neighboring molecules. So the larger the molecular size, stronger the van der waal's forces between molecules and thus making iodine the least volatile and fluorine the most volatile of the halogens.

Q.9 (B) Mg and Cl have only common property that they belong to the same period i.e. **3rd period** as shown by their electronic configuration:

- $_{12}\text{Mg}$ ($1s^2, 2s^2, 2p^6, 3s^2$)
- $_{17}\text{Cl}$ ($1s^2, 2s^2, 2p^6, 3s^2, 3p^5$)

This configuration clearly shows that these two elements belong to same period (i.e. 3rd period).

Q.10 (D) In fact, among the halogens, **chlorine** element has **greater electron affinity**. **Order of decreasing** electron affinity in halogens is as follow (unit of electron affinity kJmol^{-1}).



Q.11 (C) In fact, flame-retardant plastics often contain **bromine and chlorine**.

Q.12 (A) In fact, **Krypton (Kr)** is used to fill fluorescent tubes and in flash lamps for high speed photography not **Helium (He)**.

Q.13 (B) It is self-oxidation reduction reaction. One Cl-atom is reduced from Cl^0 to Cl^- (such as in Na^+Cl^-) and other atom of Cl is oxidized from Cl^0 to Cl^+ (such as in $\text{Na}^+\text{Cl}^+\text{O}^{2-}$) in the redox reaction.

Q.14 (B) Cl_2 gas acts as a **bleaching agent**.

- **Other bleaching agents** are O_3 , ClO_2 , H_2O_2 , NaOCl and SO_2 (temporary bleaching agent)

Q.15 (A) **Radon being radioactive is used in radiotherapy for cancer and for earth quake prediction.**

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 .

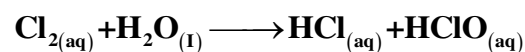
Q.17 (C) **Electronegativity of halogens decreases down the group, because atomic size and shielding effect increase.**

Property	F	Cl	Br	I
Electronegativity	4.0	3.0	2.8	2.5

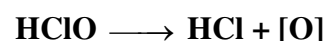
Q.18 (C) $6\text{NaOH} + 3\text{Cl}_2 \xrightarrow{70^\circ\text{C}} 5\text{NaCl} + \text{NaClO}_3 + \text{H}_2\text{O}$. The reaction **clearly shows** that the **product formed** are NaCl , NaClO_3 , H_2O .

Q.19 (D) Ionization energy of Ca is **lower** than that of Mg (**first ionization energy 738kJmol^{-1}**) because the size of Ca (**first ionization energy 595kJmol^{-1}**) is **greater** than that of Mg. **Greater** is the **size**, **smaller** is the **ionization energy**.

Q.20 (C) When Cl_2 is added in water then as a result of reaction HCl and HOCl are produced as shown in the equation

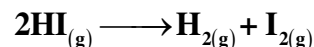


HOCl is **unstable and decomposes slowly in solution**. One theory suggests that it produces **reactive oxygen atoms that can kill bacteria in water** as shown in the equation.



Q.21 (D) The halogen acids get less thermally stable going down the group as explained below.

- The hydrogen halides formed differ in their thermal stability.
- Hydrogen iodide can be decomposed by inserting a red-hot wire into a sample of hydrogen iodide gas. The purple fumes seen are iodine vapour:



- By contrast, HF and HCl are not decomposed in temperatures upto 1500°C .

- Hydrogen bromide is not as stable as HF and HCl, but it is more resistant to decomposition than hydrogen iodide. At 430°C in a closed container, 10% of a sample of HBr will decompose, whereas around 20% of HI decompose at that temperature.
- Order of thermal stability of hydrides of halogens (halogen acids):**
- HF > HCl > HBr > HI**
- We can explain this by looking at the bond energies of the hydrogen-halogen bonds as shown in the tabular form.

Halogen acids	Bond energy (kJmol ⁻¹)
HF	566
HCl	431
HBr	366
HI	299

- Conclusion:**
From the bond energy value it is clear thermal stability decreases downward.
- Reason: HI** decomposes because of low bond energy
- On the other hand **HF** and **HCl** have high bond energy so they **cannot** decompose easily.

	Most thermally stable	HF
Bond energy decreases downward	↓	HCl
		HBr
		HI
	Least thermally stable	

- Q.22 (B) Beryllium becomes passive on reaction with conc. HNO₃ because it forms stable layer of oxide.

Q.23 (D) If a halogen has a low energy of dissociation, a high electron affinity and a higher hydration energy of its ions, it will have a high oxidizing power.

- Oxidizing power of halogens does not depend upon density.

STOP

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