
	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	DEPARTMENT: SCIENCE 2022-23 SUBJECT: CHEMISTRY	Date of completion: 05.11.2022
Worksheet No: 03 with answers	TOPIC: CLASSIFICATION OF ELEMENTS AND PERIODICITY IN PROPERTIES	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

### Objective Type Questions

- IUPAC name and symbol of an element with atomic number 107 is
  - Unnilheptium, Unh
  - Unnilseptium, Uns
  - Nilunennium, Nue
  - Unnilennium, Une
- The element with atomic number 35 belongs to
  - d – Block
  - f – Block
  - p – Block
  - s – Block
- The general outer electronic configuration of f block elements is .....
  - $(n-2) f^{1-14} (n-1) d^{1-10} ns^2$
  - $(n-1) f^{1-14} (n-1) d^{0-1} ns^2$
  - $(n-2) f^{1-14} (n-1) d^{0-1} ns^{0 \text{ to } 2}$
  - $(n-2) f^{1-14} (n-1) d^{0-1} ns^2$
- The group number, number of valence electrons, and valency of an element with the atomic number 15, respectively, are:
  - 16, 5 and 2
  - 15, 5 and 3
  - 16, 6 and 3
  - 15, 6 and 2
- Which of the following species will have the largest and the smallest size?
 
$$S^{2-}, Cl^-, K^+, Ca^{2+}$$
  - largest species is  $S^{2-}$  and the smallest species is  $Ca^{2+}$
  - largest species is  $Cl^-$  and the smallest species is  $K^+$
  - largest species is  $Ca^{2+}$  and the smallest species is  $S^{2-}$
  - largest species is  $K^+$  and the smallest species is  $Cl^-$

## Short Answer Type Questions

6. What are isoelectronic species? Give any 4 examples
7. Give the main features of d-block elements.
8. Explain why cations are smaller and anions are larger in radii than their parent atom?
9. Why does the ionization enthalpy gradually decrease in a group?
10. Arrange the following in increasing order of size.  
 $\text{N}^{3-}$ ,  $\text{Na}^+$ ,  $\text{F}^-$ ,  $\text{O}^{2-}$ ,  $\text{Mg}^{2+}$

## Assertion Reason type questions

- a. If both *Assertion* and *Reason* are correct and *Reason* is the correct explanation of *Assertion*.
  - b. If both *Assertion* and *Reason* are correct but *Reason* is not the correct explanation of *Assertion*.
  - c. If *Assertion* is correct and *Reason* is wrong.
  - d. If *Assertion* is wrong and *Reason* is correct.
11. Assertion: Boron has a smaller first ionisation enthalpy than beryllium.  
Reason: The penetration of a 2s electron to the nucleus is more than the 2p electron hence 2p electron is more shielded by the inner core of electrons than the 2s electrons.
    - a) Both A and R are correct statements, and reason is the correct explanation of the assertion.
    - b) Both A and R are correct statements, but reason is not the correct explanation of the assertion.
    - c) A is correct, but R is wrong statement.
    - d) A is wrong, but R is correct statement
  12. Assertion: Electron gain enthalpy of iodine is less negative than that of bromine.  
Reason: Iodine is more electronegative than bromine.
    - (a) Both A and R are correct and R is the correct explanation of A.
    - (b) Both A and R are correct but R is not the correct explanation of A.
    - (c) A is correct, but R is wrong statement
    - (d) A is not correct but R is correct.
  13. Assertion: On moving down the group, first ionisation enthalpy decreases  
Reason: On moving down the group, number of protons increases in the nucleus.
    - (a) Both A and R are correct and R is the correct explanation of A.
    - (b) Both A and R are correct but R is not the correct explanation of A.
    - (c) Both A and R are not correct.
    - (d) A is not correct but R is correct.

## Case study-based Questions

A quantitative measure of the tendency of an element to lose electron is given by its Ionization Enthalpy. It represents the energy required to remove an electron from an isolated gaseous atom in its ground state. When an electron is added to a neutral gaseous atom to convert it into a negative ion, the enthalpy change accompanying the process is defined as the electron gain enthalpy ( $\Delta_{\text{eg}}H$ ). Electron gain enthalpy provides a measure of the ease with which an atom adds an electron to form anion.

1. Which quantity is exothermic?
  - a) First ionisation enthalpy of sodium

- b) Second ionisation enthalpy of sodium
- c) First electron gain enthalpy of oxygen
- d) Second electron gain enthalpy of oxygen

2. Successive ionisation enthalpies (in kJ mol<sup>-1</sup>) of elements are shown below:

A	590	1150	4900	6500	8150
B	520	3000	4700	6350	7900
C	630	700	950	1500	2130
D	1200	2200	3600	5000	6300

The sequence showing the first five ionisation energies of a group 2 metal is

- a) A
- b) B
- c) C
- d) D

3.. Helium has a higher first ionization enthalpy than hydrogen because of:

### Long Answer Questions

14. The first ( $\Delta_i H_1$ ) and the second ( $\Delta_i H_2$ ) ionization enthalpies (in kJ mol<sup>-1</sup>) and the ( $\Delta_{eg} H$ ) electron gain enthalpy (in kJ mol<sup>-1</sup>) of a few elements are given below:

Elements	$\Delta H_1$	$\Delta H_2$	$\Delta_{eg} H$
I	520	7300	-60
II	419	3051	-48
III	1681	3374	-328
IV	1008	1846	-295
V	2372	5251	+48
VI	738	1451	-40

Which of the above elements is/are likely to be:

- (a) the least reactive element.
- (b) the more reactive group one metal.
- (c) the reactive non-metals.
- (d) the metal which can form a stable binary halide of the formula  $MX_2$  (X=halogen).
- (e) the metal which can form a predominantly stable covalent halide of the formula  $MX$  (X=halogen)?

### Answers

1.	b
2.	c
3.	d
4.	b
5.	a
6.	Atoms and ions which contain the same number of electrons are called isoelectronic species. Eg: - O <sup>2-</sup> , F <sup>-</sup> , Na <sup>+</sup> , Mg <sup>2+</sup> etc.

7.	1. They show variable oxidation states. 2. They form coloured ions. 3. They are used as catalyst. 4. They form alloys.
8.	Cations are always smaller than their parent atoms this is because they have lesser electrons, while their nuclear charge remains the same. The remaining electrons are, therefore held more tightly by the protons in the nucleus and thus their radii are smaller than the parent atoms. This is opposite in case of anions. Anions are always larger than their parent atoms because the addition of 1 or more electrons would result in increased repulsion among the electrons and a decrease in the effective nuclear charge.
9.	Ionization enthalpy decreases down the group due to increase in atomic size and the outermost electron being increasingly farther from the nucleus, there is an increased shielding of the nuclear charge by the electrons in the inner levels.
10	$Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$
11	a
12	a
13	b
	Case study-based Questions
1	d
2	A
3	Greater effective nuclear charge of Helium due to its small size
14	a. V    b. II    c. III and IV    d. VI    e. I

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