
	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	DEPARTMENT OF SCIENCE 2023-24 SUBJECT: CHEMISTRY	Date of completion: 05.06.2023
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

- Identify the correct statement from the following
 - First ionisation energy of Na is less than that of Mg but second ionisation energy of Na is more than that of Mg
 - First ionisation energy of Mg is less than that of Na but second ionisation energy of Mg is more than that of Na
 - Both first and second ionisation energies of Na are less than that of Mg
 - Both first and second ionisation energies of Na are less than that of Mg
- 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^-

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.
6. 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
7. 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.
8. 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.

Very Short Answer Type Questions (2 marks)

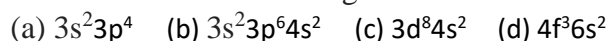
9. Identify the element whose outermost electron has the following quantum numbers

$$n = 3 \quad l = 1 \quad m_l = -1 \quad m_s = -\frac{1}{2}$$

Also identify the group number and period number

10. Give the main features of d-block elements.

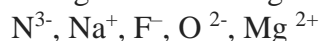
11. The outer electronic configuration of some elements are



In which Block of the periodic table do these elements belong to?

12. Why does the ionization enthalpy gradually decrease in a group?

13.(a) Arrange the following in increasing order of size.



- (b) What is common in the above given species

Short Answer Type Questions (3 marks)

14. (a) Write the subshell electronic configuration of Cr. In which block of the periodic table does it belong to
(b) Why does the first ionisation enthalpy increase as we go from left to right in the given period of the periodic table?
- 15.(a) Write the IUPAC name and symbol of the element with atomic number 118
(b) Which among the following has higher value of the property mentioned? Explain
(i) O or S (Electron gain enthalpy)
(ii) O or F (Electronegativity)

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 ($\Delta_{eg}H$). 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⁻¹) 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

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

Elements	ΔH_1	ΔH_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:

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

17. (a) Write the IUPAC name and symbol of the element with the atomic number 112

- How is electron gain enthalpy different from electronegativity?
- What is the effect of screening effect on Ionisation enthalpy?
- The first ionisation enthalpy of Oxygen is lower than Nitrogen. Give reason.
- Which of the two have more electron gain enthalpy Oxygen or Fluorine? Give reason

18. Give reasons for the following:

- Ionisation energy decreases on moving down the group
- The size of anion is larger than the parent atom
- Even though the valency of Al is 3 its covalency is 6
- Electronegativity decreases on moving down the group

Answers

1.	a
2.	c
3.	d
4.	b
5.	a
6	a
7	c
8	b
9	Al Group no 13 and period no 3
10	1.The transition elements have very high densities compared to the metal of groups I and II(s-block). 2. d-block elements form compounds that are generally paramagnetic. 3.d-block elements are used to make alloys with other metals. 4 They show variable valencies
11	(a) P block (b) s block (c) d block (d) f block
12	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.
13	(a) $\text{Mg}^{2+} < \text{Na}^+ < \text{F}^- < \text{O}^{2-} < \text{N}^{3-}$ (b) Isoelectronic species
14	(a) $[\text{Ar}] 3d^5 4s^1$ d block (b) due to increasing nuclear charge, which results in the outermost electron being more strongly bound to the nucleus as we move across a period

15	a) Ununoctium Uuo (b) (i) Electron gain enthalpy of Oxygen is less than that of Sulphur due to electron-electron repulsion (ii) Electronegativity of Fluorine is higher than that of Oxygen due to smaller size and effective nuclear charge
	Case study-based Questions
1	d
2	A
3	Greater effective nuclear charge of Helium due to its small size and stable electronic configuration
16	a. V b. II c. III and IV d. VI e. I
17	(a) Ununbium (b) Electron gain enthalpy is the tendency of an isolated gaseous atom to accept an additional electron to form a negative ion. Electronegativity is the tendency of the atom of an element in a chemical compound to attract a shared pair of electrons towards it in a covalent bond. (c) When the screening effect increases ionisation enthalpy decreases (d) Nitrogen has extra stability due to half filled electrons (e) More negative electron gain enthalpy is in Oxygen because in Fluorine the electrons experiences electron electron repulsion
18	(a) Moving down the group the shell number increases the electrons are more far away from the nucleus the effective nuclear charge decreases and hence easier to remove the electrons or Ionisation enthalpy decreases (b) Effective nuclear charge decreases and the electron cloud is spread more (c) Availability of d orbitals for bonding (d) Down the group the size increases and the effective nuclear charge decreases and hence the electronegativity decreases

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