

NAAHAR PUBLIC SCHOOL (CBSE) SENIOR SECONDARY
ACADEMIC YEAR(2022-2023)

CLASS:XI

DATE:31.10.22

SUBJECT:CHEMISTRY

MARKS:25

TEACHER'S INITIAL:Mrs.UMADURATION:40 Mins

I) MULTIPLE CHOICE QUESTIONS . 3x1=3

1) Isotopes of an element have _____

(a) Different chemical and physical properties

(b) Similar chemical and physical properties

(c) Similar chemical but different physical properties

(d) Similar physical but different chemical properties

Ans: (c) Similar chemical but different physical properties

2)The electronic configuration of chromium (Z=24) is:

(a) [Ne] $3s^2 3p^6 3d^4 4s^2$

(b) [Ne] $3s^2 3p^6 3d^5 4s^1$

(c) [Ne] $3s^2 3p^6 3d^1 4s^2$

(d) [Ne] $3s^2 3p^6 4s^2 4p^4$

Ans: (b) [Ne] $3s^2 3p^6 3d^5 4s^1$

3))Which of the following pairs represents isobars?

(a) $^3\text{He}_2$ and $^4\text{He}_2$

(b) $^{24}\text{Mg}_{12}$ and $^{25}\text{Mg}_{12}$

(c) $^{40}\text{K}_{19}$ and $^{40}\text{Ca}_{20}$

(d) $^{40}\text{K}_{19}$ and $^{39}\text{K}_{19}$

Ans: (c) $^{40}\text{K}_{19}$ and $^{40}\text{Ca}_{20}$

II) ASSERTION REASONING 2x1=2

Directions : Each of these questions contain two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion

(c) Assertion is correct, reason is incorrect

(d) Assertion is incorrect, reason is correct.

1. **Assertion :** All isotopes of a given element show the same type of chemical behaviour.

Reason : The chemical properties of an atom are controlled by the number of electrons in the atom

Answer: (a)

Q.2. Assertion : It is impossible to determine the exact position and exact momentum of an electron simultaneously.

Reason : The path of an electron in an atom is clearly defined.

Answer:C

III) ANSWER THE FOLLOWING IN SHORT 2x2=4

1)An atom having atomic mass number 13 has 7 neutrons. What is the atomic number of the atom?

Sol: Atomic mass number = $A = 13$. $n = 7$

As $A = n + p$ $p = A - n = 13 - 7 = 6$

Hence $Z = p = 6$

2) State Aufbau principle

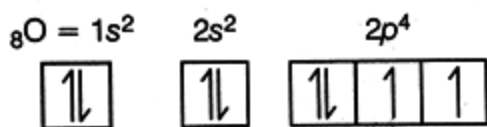
The Aufbau principle states that **electrons fill lower-energy atomic orbitals before filling higher-energy ones**

IV) ANSWER THE FOLLOWING IN BRIEF 2x3=6

1) Show the distribution of electrons in an oxygen atom (atomic number 8) using an orbital diagram.

Answer.

The distribution of electrons in an oxygen atom using an orbital diagram is-



From the above diagram, it can be concluded that oxygen has two unpaired electrons.

2) State Pauli's exclusion principle and Hund's rule

Pauli's Exclusion Principle : No two electrons in an atom can have same four quantum number equal.

Hund's rule : Electron pairing in orbitals of same energy will not take place until each available orbital of a given subshell is singly occupied

V) ANSWER THE FOLLOWING IN DETAIL 2x5=10

1) Write the postulates of Bohr's model of hydrogen atom.

Ans- Bohr's model for hydrogen atom is based on the following postulates:

- The electron in the hydrogen atom can move around the nucleus in a circular path of fixed radius and energy. These paths are called orbits, stationary states or allowed energy states. These orbits are arranged concentrically around the nucleus.
- The energy of an electron in the orbit does not change with time. However, the electron will move from a lower stationary state to a higher stationary state when required amount of energy is absorbed by the electron or energy is emitted when electron moves from higher stationary state to lower stationary state. The energy change does not take place in a continuous manner.
- The frequency of radiation absorbed or emitted when transition occurs between two stationary states that differ in energy by ΔE , is given by:

$$\nu = \frac{\Delta E}{h} = \frac{E_2 - E_1}{h}$$

Where E_1 and E_2 are the energies of the lower and higher allowed energy states respectively. This expression is commonly known as Bohr's frequency rule.

iv) The angular momentum of an electron is quantised. In a given stationary state it can be expressed as in equation

$$m_e v r = n \cdot \frac{h}{2\pi} \quad n = 1, 2, 3, \dots$$

2) What information do the Quantum numbers provide?

Ans- The four quantum numbers provide the following information :

- n defines the shell, determines the size of the orbital and also to a large extent the energy of the orbital.
- There are n subshells in the n th shell. It identifies the subshell and determines the shape of the orbital (see section 2.6.2). There are $(2l+1)$ orbitals of each type in a subshell, that is, one s orbital ($l = 0$), three p orbitals ($l = 1$) and five d orbitals ($l = 2$) per subshell. To some extent l also determines the energy of the orbital in a multi-electron atom.
- ml designates the orientation of the orbital. For a given value of l , ml has $(2l+1)$ values, the same as the number of orbitals per subshell. It means that the number of orbitals is equal to the number of ways in which they are oriented.
- ms refers to orientation of the spin of the electron.

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