QB365 Question Bank Software Study Materials

Atomic Structure Important 2,3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 75

2 Marks

10 x 2 = 20

1) Name an element which has the same number of electrons in its first and second shell

   Answer : Beryllium.

2) Write the electronic configuration of K and Cl

   Answer :

	KLMN
Electronic configuration of K -	2 88 1
Electronic configuration of Cl -	2 87

3) For an atom 'X', K, L and M shells are completely filled. How many electrons will be present in it?

   Answer : 28 Electrons.

4) Write down the names of the particles represented by the following symbols and explain the meaning of superscript and subscript numbers attached.

   $_1H^1$, $_0n^1$, $_{-1}e^0$

   Answer :

Particles	Name	Superscript Number	Subscript Number
$_1H^1$	Proton (Isotope)	Mass number = 1	Atomic number = 1
$_0n^1$	Neutron	Mass number = 1	Atomic number = 0
$_{-1}e^0$	Electron	Mass number = 0	Atomic number = -1

5) What is the same about the electron structures of

   a. Lithium, Sodium and Potassium.

   b. Beryllium, Magnesium and Calcium

   Answer : a. Lithium, Sodium and Potassium are metals. These metals have only one electron in the outermost shell.

   b. Beryllium, Magnesium and Calcium are metals. These metals have two electrons in the outermost shell.

6) What is combination reaction ?

   Answer : A reaction where two or more substances combine to form a single substance.

7) Name the other particles present in the Nucleus of an atom.

   Answer : Mesons, neutrino, antineutrino, positrons are present in the nucleus of an atom.

8) An atom is electrically neutral. Why?

   Answer : An atom is electrically neutral because the number of protons is equal to the number of electrons.

9) How is J.J. Thomson atomic model look like?

Answer : It is look like that plum pudding.

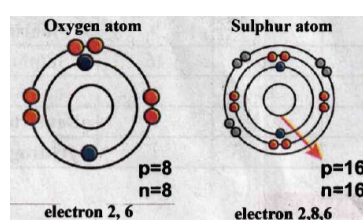10) How many electrons present their valence shells of non - metals?

Answer : These elements have 4 to 7 electrons in their valence shells.

3 Marks   10 x 3 = 30

11) Draw the structure of oxygen and sulphur atoms.

Answer :

12) Calculate the number of neutrons, protons and electrons (i) atomic number 3 and mass number 7 (ii) atomic number 92 and mass number 238.

Answer :

| S.No	Element	Atomic number	Mass number	No. of protons	No. of electrons	No. of neutrons
1.	Lithium	3	7	3	3	4
2.	Uranium	92	238	92	92	146

13) How was it shown that atom has empty space?

Answer : Lord Rutherford a scientist from Newzealand performed his famous experiment of bombarding a thin gold foil with very small positively charged particles called alpha (α) particles. Most of the alpha particles passed straight through the foil. So he noticed that atom has empty space.

14) Why do $_{17}^{35}\text{Cl}$ and $_{17}^{37}\text{Cl}$ have the same chemical properties? In what respect do these atoms differ?

Answer : $_{17}^{35}\text{Cl}$ and $_{17}^{37}\text{Cl}$ are the isotopes of chlorine. These isotopes have same atomic number. So they have same chemical properties.

15) What are nucleons? How many nucleons are present in Phosphorous? Draw its structure.

Answer : The protons and neutrons found in the nucleus of an atom is collectively called as nucleons. Phosphorus have 15 protons and 16 neutrons, so 31 nucleons are found in the Phosphorus atom.
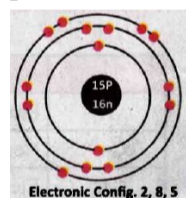
16) List the uses of isotopes?

Answer : Uses of Radioactive isotopes:

1. Uranium 235 is used as fuel in nuclear reactor.

2. Cobalt 60 is used in the treatement of cancer.

3. Iodine 131 is used in the treatment of goitre.

4. C-14 is used in carbon dating.

17) What is isotone? Give an example.

Answer : Atoms of different elements with different atomic numbers and different mass numbers, but with the same number of neutrons are called isotones.

Example: Boron and Carbon have same number of neutrons.

18) State the law of multiple proportions. Who stated this?

Answer : When two elements A and B combine together to form more than one compound, then masses of A which separately combines with a fixed mass of B are in simple ratio.
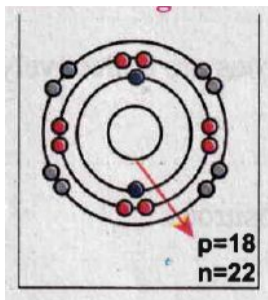
This law was stated by John Dalton

19) Assign the valency of magnesium and sulphur

Answer : Electronic configuration of Magnesium is 2, 8, 2. So the valency is 2.

Electronic configuration of Sulphur is 2, 8, 6. So the valency is 2(8 - 6).

20) Draw the atomic structure of electronic configuration 2,8,8 and identify the element: Argon.

Answer :

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5 Marks   5 x 5 = 25
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21) What conclusions were made from the observations of Gold foil experiment?

Answer : (i) Atom has a very small nucleus at the centre.

(ii) There is large empty space around the nucleus.

(iii) Entire mass of an atom is concentrated in a very small positively charged region which is called the nucleus.

(iv) Electrons are distributed in the vacant space around the nucleus.

(v) The electrons move in circular paths around the nucleus.

22) Explain the postulates of Bohr's atomic model.

Answer : (i) In atoms, electrons revolve around the nucleus in certain special or permissible orbits known as discrete orbits or shells or energy levels.

(ii) While revolving in these discrete orbits the electrons do not radiate energy.

(iii) The circular orbits are numbered as 1, 2, 3, 4, ... or designated as K, L, M, N, shells. These numbers are referred to as principal quantum numbers (n)

(iv) K shell (n = 1) is closest to the nucleus and is associated with lowest energy. L, M, N, ... etc are the next higher energy levels. As the distance from the nucleus increases the energy of the shells also increases.

(v) The energy of each orbit or shell is a fixed quantity and the energy is quantized.

(vi) As the distance from the nucleus increases, the size of the orbits also increases.

(vii) Maximum number of electrons that can be accommodated in an energy level is given by $2n^2$ where n is the principal quantum number of the orbit.

(viii) When an electron absorbs energy, it jumps from lower energy level to higher energy level.

(ix) When an electron returns from higher energy level to lower energy level, it gives off energy.

**23)** State the Gay Lussac's law of combining volumes, explain with an illustration.

Answer : Gay Lussac's law of combining volumes.

Gay Lussac's law:

Whenever gases react together, the volumes of the reacting gases as well as the products if they are gases bear a simple whole number ratio provided all the volumes are measured-under similar conditions of temperature and pressure.
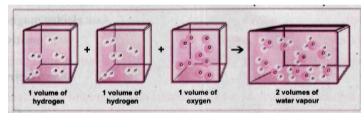
Hydrogen combines with oxygen to form water.

$2H_2 + 2O_2 \longrightarrow 2H_2O$

(1 volume) + (2 volumes) $\longrightarrow$ (2 volumes)

(1:2:2)
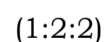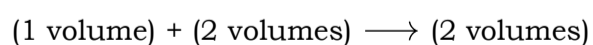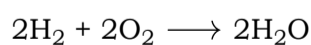
One volume of hydrogen react with two volumes of oxygen to form two volumes of water vapour.

The ratio by volume which gases, bears is 1.2:2 which is a simple number ratio.

24) Explain Rutherford's α-ray scattering experiment

Answer : Gold metal can be made into a very thin layer. A natural radioactive source that emitted highly energetic alpha particles was chosen. The source was kept inside lead box with a small hole in it. Alpha particles came out of the source in all directions.

A thin gold foil, about 400 atoms thick was kept on the path of the alpha particle and a circular screen coated with zinc sulphide surrounding the foil. Alpha particles produce fluorescence glow in the screen.

1. Most of the fast moving α-particles passed straight through the gold foil. This should imply that most part of the atom is empty.

2. Some α-particles were deflected by small angles and few by large angle. This shows the electron orbit the nucleus at the distance.

3. Very few α-particles completely rebounded shows that the positive charge be concentrated at the centre of the atom

25) Draw the model of the following pairs of isotones

Answer :