CHEMISTRY REVISION WORKSHEET- 2019-2020 Std.IX

Ch.4- STRUCTURE OF ATOM

1. An element X is available in the form of two isotopes $^{18}_{8}X$ and $^{16}_{8}X$ .Calculate the average atomic mass of element X, if they are available as 76% and 24% respectively.
2. Calculate the no. of protons, electrons and neutrons in $^{40}_{20}Ar$, $^{35}_{17}Cl$, $^{12}_{6}C$, $^{27}_{13}Al$
3. Write the electronic configuration , valency and valence electrons in K(19) P(15) Ne(10) Si (14)
4. Write the electronic configuration and valence electrons of $^{16}_{8}O$, $^{24}_{12}Mg$, $^{14}_{7}N$, $^{40}_{20}Ca$
5. A) Write differences between isotopes and isobars giving an example of each.
   B) Name the three isotopes of hydrogen.
6. Isotopes of an element have the same chemical properties. Explain. Mention the applications of isotopes.
7. Mention the observation and conclusion of Rutherford's model of an atom. Write any one drawback.
8. Define mass number of an element.

Chapter - 4 (Structure of Atom)

i) Average atomic mass of element X

$= 76\%$ of $18 + 24\%$ of 16

$= \frac{76}{100} \times 18 + \frac{24}{100} \times 16$

$= 0.76 \times 18 + 0.24 \times 16$

$= 13.68 + 3.84$

$= 17.52$ amu

(2) (i) The number of protons in the nucleus of the atom is equal to the atomic number (z)

(ii) The number of electrons in a neutral atom is equal to the number of protons

(iii) The number of neutrons is equal to the difference between mass number (m) and atomic number (z)

∴ $^{40}_{20}Ar$

No. of protons = 20
No. of electrons = 20
No. of neutrons = 40 − 20
= 20

$^{35}_{17}Cl$

No. of protons = 17
No. of electrons = 17
No. of neutrons = 35 − 17
= 18

$^{12}_{6}C$

No. of protons = 6
No. of neutrons = 6
No. of electrons = 6

$^{27}_{13}Al$

No. of protons = 13
No. of electrons = 13
No of neutrons = 27 − 13
= 14.

(3) K(19) Electronic configuration : 2, 8, 8, 1
Valency : 1
Valence electron : 1

P(15) Electronic configuration : 2, 8, 5
Valency : 8 − 5
= 3
Valence electron = 5

Ne(10) Electronic configuration : 2, 8
Valency : Zero (0)
Valence electron : 0

Si(14) Electronic configuration : 2, 8, 4
Valency : 4
Valence electron : 4

(4) $^{16}_{8}O$ Electronic configuration : 2, 6
Valence electron : 6
Valency : 8 − 6 = 2

$^{24}_{12}Mg$ Electronic configuration : 2, 8, 2
Valence electron : 2
Valency : 2

$^{14}_{7}N$ electronic configuration : 2, 5
Valence electron : 5
Valency = 8 − 5
= 3

$^{40}_{20}Ca$ electronic configuration : 2, 8, 8, 2
Valence electron : 2
Valency : 2

(5) A)

Isotopes	Isobars
(i) They have same atomic number but a different mass number	(i) They have same mass number but a different atomic number
(ii) They have same number of protons and electrons, but neutron number is different so they have similar chemical properties.	(ii) They have different chemical properties as they have different protons and electron number.
(iii) Example : Isotopes of Hydrogen (a) $_1H^1$, $_1H^2$, $_1H^2$ (b) Isotopes of Carbon : $_6C^{12}$, $_6C^{13}$, $_6C^{14}$	(iii) Examples : Isobars (a) $_{10}Ar^{40}$, $_{20}Ca^{40}$, $_{19}K^{40}$ (b) $_{11}Na^{24}$, $_{12}Mg^{24}$

(B) Three Isotopes of Hydrogen :
protium ($A=1$), deuterium ($A=2$), and tritium ($A=3$)

(6) Isotopes of an element have same chemical properties because they have same number of electrons.

Application of Isotopes :

(i) An isotope of uranium is used as a fuel in nuclear reactor.

(ii) An isotope of cobalt is used in the treatment of cancer.

(iii) An isotope of iodine is used in the treatment of goitre.

(7) Rutherford's model of an atom

Observations :- In Rutherford experiment, fast moving alpha (α) particle were made to fall on a thin gold foil.
(i) Most of the alpha particle passed straight through the gold foil. (ii) very few particles were deflected.

Conclusions :-

(i) Most of the space inside the atom is empty because most of the α-particle passed through.

(ii) Positive charge of the atom occupies very little space, since very few particles were deflected.

(iii) All the positive charge and mass of the gold atom were concentrated in a very small volume within the atom.

Drawback

(i) According to Rutherford model electron revolving around nucleus will not be stable because during revolution it will experience acceleration and it will loss energy in form of radiation and fall into nucleus. In such case, the atom would collapse. But we know that atoms are quite stable.

(8) Mass Number :

Mass number of an element is the sum of the number of proton and neutron present in atom of that element. for example, the atom of boron has 5 proton and 6 neutron. So, the mass number of boron is 5+6 = 11.