## SOME IMPORTANT DEFINITIONS

Ex. Element x have three isotopes $x^{20}$, $x^{21}$ and $x^{22}$ if % abundancy of $x^{20}$ is 90% and avg atomic mass of element is 20.18 find abundany $x^{21}$.

Soln

| $x^{20}$ | $x^{21}$ | $x^{22}$ |
|---|---|---|
| 90 | x | (10−x) |

$$A_{avg} = \frac{20 \times 90 + 21 \cdot x + 22(10-x)}{100} = 20.18$$

$$1800 + 21x + 220 - 22x = 2018$$

$$2020 - x = 2018 \Rightarrow x = 2\%$$

## SOME IMPORTANT DEFINITIONS

Ex. If we double the mass of neutron and halved the mass of proton what will be % change in Atomic mass of $H_2O$.

$H_2O$ → $P = 2+8 = 10$, $n = 0+8 = 8$

mass of protons ≃ mass of neutron

$m_p \approx m_n = x$

$A = 10x + 8x$

$A = 18x$

$m_p = \frac{x}{2}$, $m_n = 2x$

$A = 10 \times \frac{x}{2} + 8 \times 2x$

$A = 21x$

$\Delta A = 3x$

$\% \frac{\Delta A}{A} = \frac{3x}{18x} \times 100$

# SOME IMPORTANT DEFINITIONS

Ex. If we double the mass of proton and Halved mass of neutron the what will % change in atomic mass of $C^{14}O_2$. [$_6C^{14}$, $_8O^{16}$]

$C^{14}O_2$

$P = 6 + 16 = 22$

$n = 8 + 16 = 24$

$M_p = M_n = x$

$A = 22x + 24x$

$A = 46x$

$M_p = 2x$, $M_N = x/2$

$A' = 2x(22) + \frac{x}{2} \times 24$

$A' = 56x$

$\Delta A = 10x$

$\% = \frac{10x}{46x} \times 100 =$

## SOME IMPORTANT DEFINITIONS

Ex. If an element has 20% more neutrons than it has protons. and mass number of Element is 44 find no of protons and neutrons.

Soln

$${}^{A}_{Z}X$$

$p = Z$

$n = \left[Z + \frac{Z \times 20}{100}\right] = 1.2Z$

$A = Z + n$

$44 = Z + 1.2Z$

$44 = 2.2Z$

$Z = 20$ , $n = 24$

# SOME IMPORTANT DEFINITIONS

## DALTON ATOMIC THEORY

Atom → A → not
Atom → tomeo → Divisible.

- Each substance is made up of very small indivisible particles know as atom. [ ]
- Atoms of an element are identical but different from atoms of other elements.
- Atom can neigther be created nor distroyed.
- Atom take parts in chemical reaction and form molecules.

# SOME IMPORTANT DEFINITIONS

## Molecule

"group of atoms chemically combined"

- **Homoatomic molecule :→**

  the molecules containing same type of atoms

  Ex $H_2$, $O_2$, $U_2$, $O_3$, $P_4$, $S_8$, $C_{60}$, etc.

  Atomicity = 2, 2, 2, 3, 4, 8, 60

- **Hetroatomic molecule :→**

  the containing different type of atom

  Ex. $H_2O$, $CH_4$, $C_6H_{12}O_6$, $H_2SO_4$ etc.

  Atomicity = 3, 5, 24, 7

# SOME IMPORTANT DEFINITIONS

## "ATOMIC MASS"

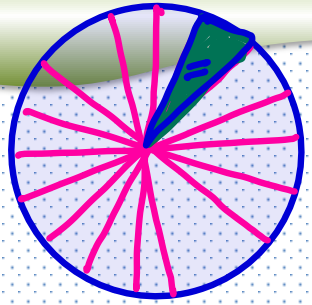
- Mass of an atom called atomic mass.
- Relative atomic mass = $\frac{\text{Mass of an atom of Element}}{(\text{mass of standard unit})}$

X 1) standard → Hydrogen ÷ (1.008)

Let Mass of 1 Hydrogen atom = 1.008 unit

1 unit = $\frac{1}{1.008}$ . mass of 1 atom of hydrogen

# SOME IMPORTANT DEFINITIONS



② Standard ÷ oxygen [16]

Let Mass of 1 atom of oxygen = 16 unit

1 unit = $\frac{1}{16}$ · mass of 1 atom of oxygen

**Atomic mass** ÷ The mass of an atom is how much times it is haver than $\frac{1}{16}^{th}$ part of 1 atom of oxygen.

# SOME IMPORTANT DEFINITIONS

③ Standard C-12 → abundancy high
Avg mass = 12.0001

Let Mass of 1 Carbon atom = 12 unit

1 unit = $\frac{1}{12}$ mass of C-12 atom


Atomic Mass unit (amu) = $\frac{1}{12}$ × mass of 1 atom C-12

" The mass of an atom of an element is how much times it is heavier than $\frac{1}{12}^{th}$ mass of 1 atom of C-12 "

## SOME IMPORTANT DEFINITIONS

- Mass spectrograph :- the mass of 1 atom of C-12 is found $1.992648 \times 10^{-23}$ gram.

$$1\ amu = \frac{1}{12} \times 1.992648 \times 10^{-23}\ g = 1.66 \times 10^{-24}\ g$$

Ex. Mass of oxygent atom in gram

$\Rightarrow$ 16 amu

$= 16 \times 1.66 \times 10^{-24}\ g$ / atom

# SOME IMPORTANT DEFINITIONS

## ATOMIC MASS

- **Relative atomic mass** → mass of an atom Relative to C-12.

O = 16 amu

- **Actual Atomic mass** ÷ **mass of an atom**

**1 gram**

$6.02 \times 10^{23}$

O = $16 \times 1.66 \times 10^{-24}$ g/atom

- **Molar Mass / Gram atomic mass** = mass of 1 mole ($6.022 \times 10^{23}$ oxygen atom)

$O = 16 \times 1.66 \times 10^{-24} \times 6.022 \times 10^{23} = 16$ g/mol.

(amu, $N_A$)

# SOME IMPORTANT DEFINITIONS

$$1\,amu = \frac{1}{N_A}$$