



Pakistan School
Kingdom of Bahrain

Grade :9th

Subject: Chemistry

**Welcome to
E-Learning**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



رَبِّ زِدْنِي عِلْمًا

Rabbi zidnī 'ilmā

O my Lord! Advance me in Knowledge

[Qur'an, 20:114]

CHEMISTRY

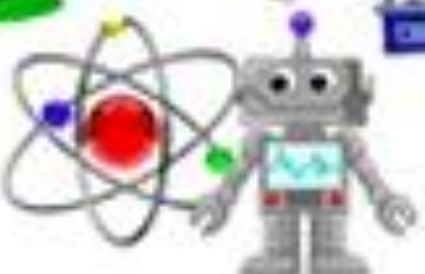
you



research



technology



science



industry



medicine



environment



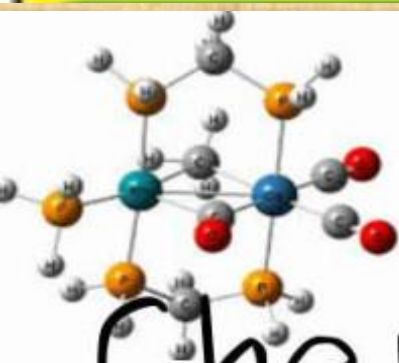
health



community



Welcome!



Chemistry



Periodic Table of the Elements

1																	18						
1 H 1.01																	2 He 4.00						
3 Li 6.94	2															5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18		
11 Na 22.99	12 Mg 24.30															13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95		
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80						
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (97.91)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29						
55 Cs 132.91	56 Ba 137.33	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (144.91)	62 Sm 150.36	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97							
87 Fr (223.02)	88 Ra (226.03)	89 Ac (227.03)	104 Rf (261.11)	105 Ha (262.11)	106 Sg (263.12)													81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209.98)	85 At (209.99)	86 Rn (222.02)

58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (144.91)	62 Sm 150.36	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237.05)	94 Pu (244.06)	95 Am (243.06)	96 Cm (247.07)	97 Bk (247.07)	98 Cf (251.08)	99 Es (252.08)	100 Fm (257.10)	101 Md (258.10)	102 No (259.10)	103 Lr (262.11)

Virtual Classroom Rules



Select a quiet place to study.



Be on time.



Come to class prepared in every way to learn and participate.

Virtual Classroom Rules



Be respectful.



Listen to & follow directions.



Turn off your video before joining the class.



I hope you will follow all the above mentioned rules to make your dear teacher happy.

- **ENGAGING STARTER**

- There are 5kg Apples in a bag so here in this sentence what does 5 kg represent here?
- Can we calculate the mass of an atom of any element? And how?



CHEMICAL CALCULATIONS

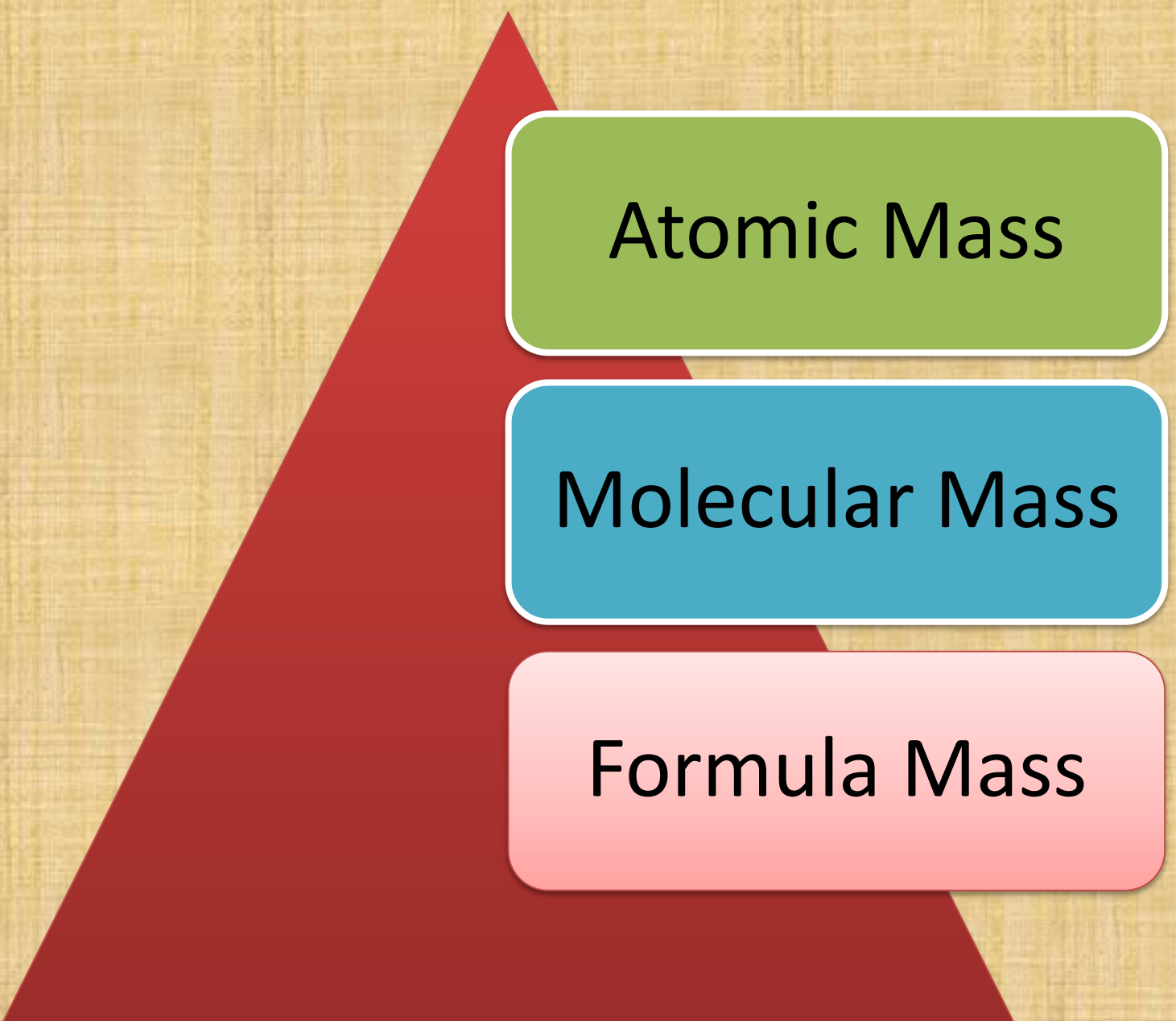
Lesson Objectives:

- By the end of this part of lesson, students will be able to:
 - Change atomic mass, molecular mass & formula mass into gram atomic mass, gram molecular mass & gram formula mass.
 - Solve problems involving mass in (gm), amount in mol,(Mole-Mass)

First Twenty Elements

1 H Hydrogen	2 He Helium	3 Li Lithium	4 Be Beryllium	5 B Boron
6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium	13 Al Aluminum	14 Si Silicon	15 P Phosphorus
16 S Sulfur	17 Cl Chlorine	18 Ar Argon	19 K Potassium	20 Ca Calcium

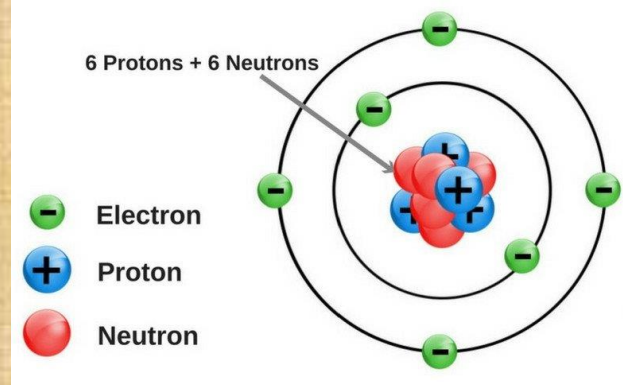
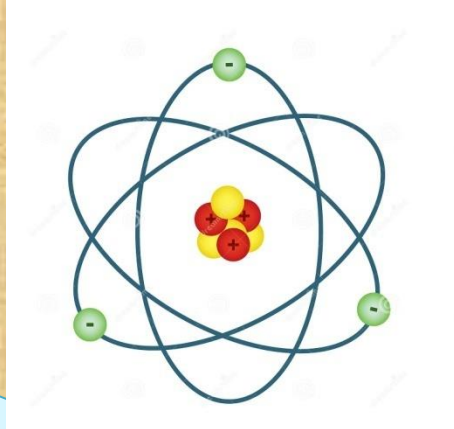
Element nameAtomic numberAtomic mass			Element nameAtomic numberAtomic mass		
Hydrogen	1	1	Sodium	11	23
Helium	2	4	Magnesium	12	24
Lithium	3	7	Aluminium	13	27
Beryllium	4	9	Silicon	14	28
Boron	5	11	Phosphorus	15	31
Carbon	6	12	Sulphur	16	32
Nitrogen	7	14	Chlorine	17	35.5
Oxygen	8	16	Argon	18	40
Fluorine	9	19	Potassium	19	39
Neon	10	20	Calcium	20	40



Atomic Mass

Molecular Mass

Formula Mass



Atomic Mass

- Atomic mass in an atom or group of an atom is the sum of the masses of protons, neutrons & electrons.
- Atomic mass of
 - Na = 23 amu
 - Ca = 20 amu
 - O = 16 amu

Molecular Mass

- It is the sum of atomic masses of all the atoms present in the molecule.
- Molecular mass of water (H_2O) =
 - = 2 (atomic mass of H) + atomic mass oxygen
 - = $2(1) + 16 = 18$ amu

Formula Mass

- The sum of the atomic masses of all the atoms in the formula unit of a substance is called formula mass.
- Formula mass of sodium chloride is 58.5 amu and that of CaCO_3 is 100 amu

Determining molecular Mass & Formula Mass

Molecular Mass

- Determine the molecular mass of glucose, $C_6H_{12}O_6$
- Determine the molecular mass of naphthalene $C_{10}H_8$

Solution:

$$\begin{aligned}\text{Molecular mass of } C_6H_{12}O_6 &= \\ &= 6(12) + 12(1) + 6(16) \\ &= 72 + 12 + 96 \\ &= \mathbf{180 \text{ amu}}\end{aligned}$$

$$\begin{aligned}\text{Molecular mass of } C_{10}H_8 &= \\ &= 10(12) + 8(1) \\ &= 120 + 8 = \mathbf{128 \text{ amu}}\end{aligned}$$

Formula Mass

- Determine formula mass of NaCl
- Determine its formula mass of $Mg(OH)_2$

Solution:

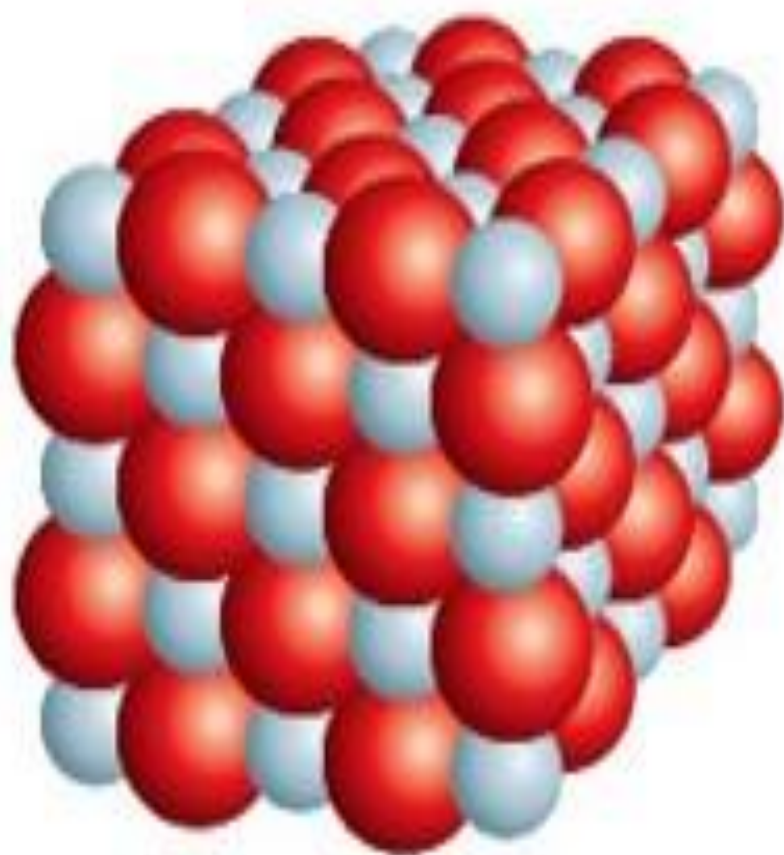
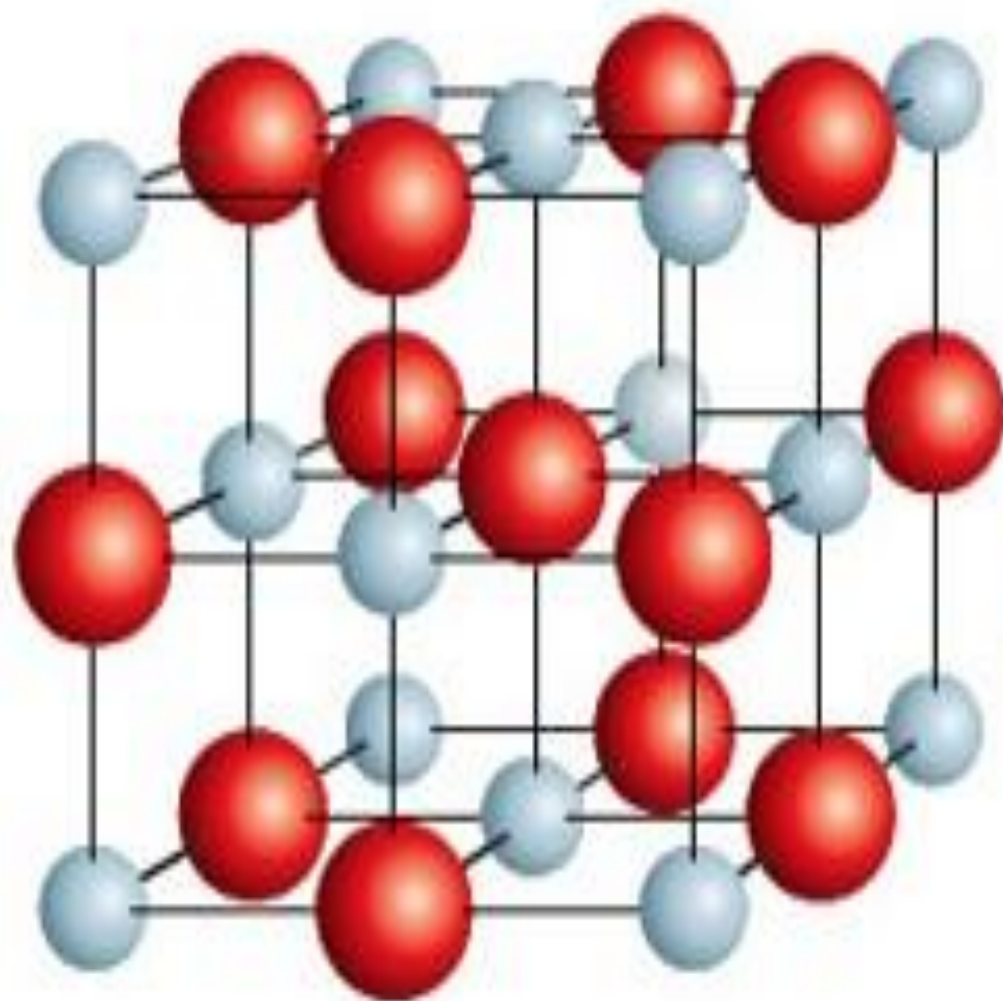
$$\begin{aligned}\text{Formula mass of NaCl} &= 1 \times \\ &\text{Atomic mass of Na} + 1 \times \text{Atomic} \\ &\text{mass of Cl} \\ &= 1 \times 23 + 1 \times 35.5 = \mathbf{58.5 \text{ amu}}\end{aligned}$$

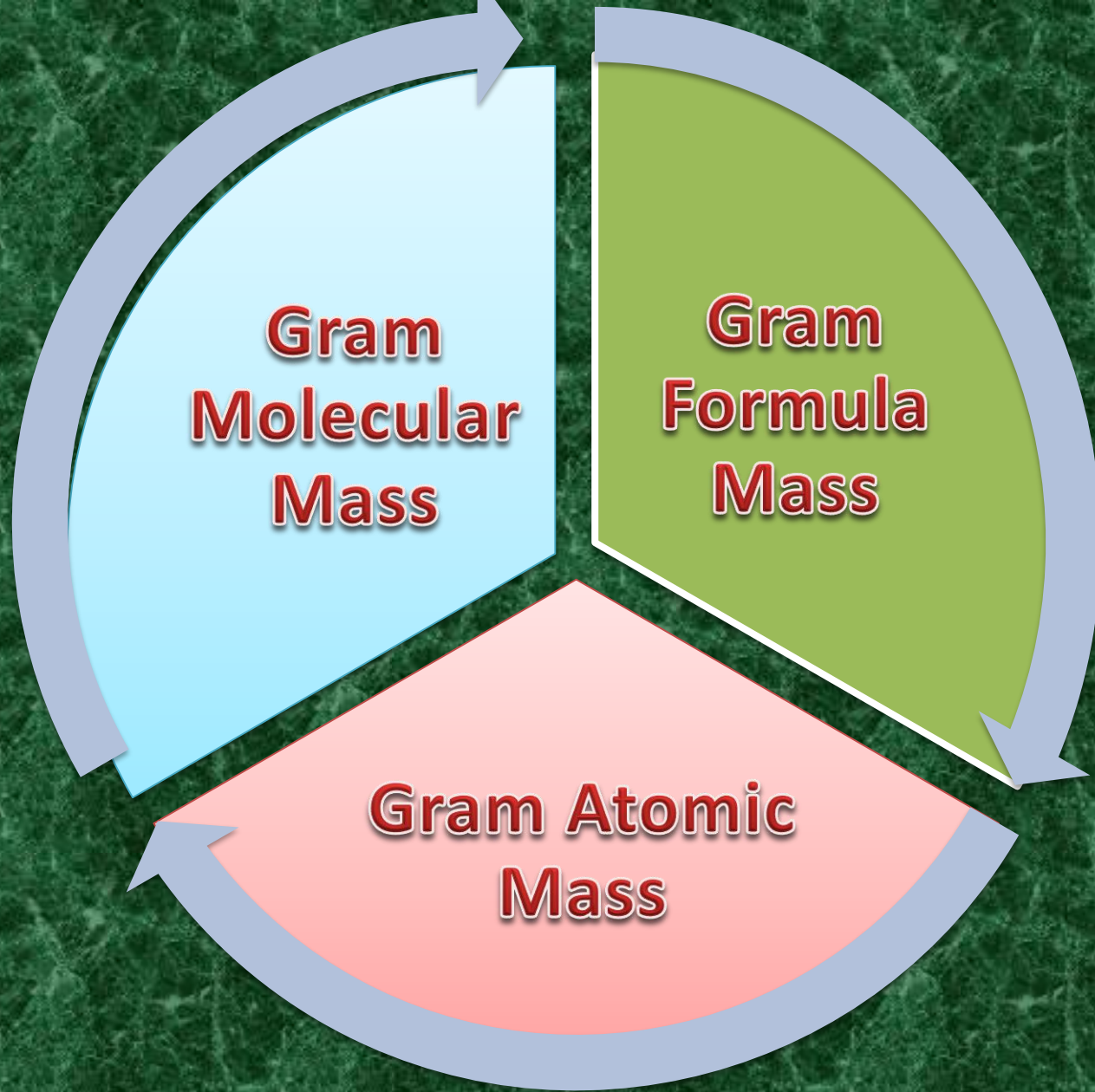
$$\begin{aligned}\text{Formula mass of } Mg(OH)_2 &= \\ &= 24 + 2(16) + 2(1) \\ &= 24 + 32 + 2 = \mathbf{58 \text{ amu}}\end{aligned}$$

Why the term molecular mass is used for Molecular compounds. Whereas, the term formula mass is used for ionic compound?

The term molecular mass is used for Molecular compounds. ionic compounds consist of arrays of oppositely charged ions rather than separate molecules. so we represent an ionic compound by its formula unit.

- A formula unit indicates the simplest ratio between cations and anions in an ionic compound.**





Gram Atomic Mass

- Atomic mass of an element expressed in grams is called gram atomic mass. It is also called a mole or a gram atom.
- 1 g-atom of hydrogen = 1.00 g = 1 mol of hydrogen.
- 1 g-atom of carbon = 12g = 1 mol of carbon.
- It shows that 1-gram atom of different elements has different masses

Gram Molecular Mass

- Molecular mass of an element or a compound expressed in grams is called gram molecular mass. It is also called a mole or a gram molecule.
- 1 g-molecule of H_2 = 2g = 1 mol of hydrogen
- 1 g-molecule of H_2O = 18 g = 1 mol of water.
- 1 g -molecule of $C_6H_{12}O_6$ = 180 g = 1 mol of glucose.

Gram Formula Mass

.Formula mass of an ionic compound expressed in grams is called gram formula mass or gram. It is also called a mole.

1 g –formula mass NaCl = 58.5 g = 1 mol of NaCl.

1 g- formula mass of KCl = 74.5g = 1 mol of KCl

MOLAR MASS

Gram Atomic Mass

- Gram atomic mass represent one mole of atoms of an element.
- Gram atomic mass contains 6.022×10^{23} atoms

Gram Molecular Mass

- Gram molecular mass represent one mole of molecules of a compound or an element that exists in molecular state.
- Gram molecular mass contains 6.022×10^{23} molecules.

Gram Formula Mass

- Gram formula mass represent one mole of atoms of ionic formula units of a compound.
- Gram atomic mass contains 6.022×10^{23} formula units.

Molar Mass

Mass of one mole of a substance expressed in gram is called molar Mass

“Therefore , mole can be defined as atomic mass, molecular mass or formula mass expressed in gram”

CHEMICAL CALCULATION

Mole-Mass Calculation:

Calculate the molar masses of :

(a) Na (b) Nitrogen (c) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

If an element is a metal then its molar mass is its atomic mass expressed in grams (gram atomic mass). If an element exists as molecule, its molar mass is its molecular mass expressed in grams (gram molecular mass).

Hydrogen H_2

Fluorine F_2

Oxygen O_2

Chlorine Cl_2

Nitrogen N_2

Bromine Br_2

Iodine I_2

i) Na

1 mol of Na = 23g

ii) N₂

Nitrogen occurs as diatomic molecules.

Molecular mass of N₂ = 14X2
= 28 amu

Therefore, mass of 1 mole of N₂ = 28g

iii) Molecular mass of C₁₂H₂₂O₁₁

= 12(12) + 22(1) + 11(16)
= 144 + 22 + 176

Therefore, mass of 1 mol of sucrose = 342g

Activity

- **Calculate the mass of one mole of:**
 - **i) Oxygen**
 - **ii) Copper**

**Q: Oxygen is converted to ozone (O_3) during thunder storms.
Calculate the mass of ozone if 9.05 moles of ozone is formed in
a storm?**

DATA

➤ Given:

Moles of ozone (O_3) = 9.05 moles

➤ Required:

Mass of ozone (O_3) = ?

➤ Solution:

1 mole of O_3 = $16 \times 3 = 48$ g

1 mole of O_3 = 48 g

So, 9.05 moles of O_3 = $48 \text{ g} \times 9.05 =$

434.4g of O_3

➤ Result:

Mass of ozone (O_3) = 43.4g

DATA

➤ Given:

Moles of ozone (O_3) = 9.05 moles

➤ Required:

Mass of ozone (O_3) = ?

➤ Solution:

Formula:

Moles = $\frac{\text{mass in gram}}{\text{Molar mass}}$

$9.05 = \frac{\text{mass in gram}}{48}$

Mass = $9.05 \times 48 = 432.4\text{g}$

**Molar mass
of (O_3):**
= $3(16)$
= 48g/mol

➤ Result:

Mass of ozone (O_3) = 43.4g

Q: How many moles of each of the following substance are present?

(a) A balloon filled with 5g of hydrogen.

DATA

(a)

➤ Given:

Mass of hydrogen (H_2) = 5g

➤ Required:

Number of moles = ?

➤ Solution:

1 mole of H_2 = $2 \times 1 = 2$ g

1 mole of H_2 = 2 g

2g of H_2 = 1mole of H_2

1g of H_2 = $1/2$ moles of H_2

5g of H_2 = $1/2 \times 5$ moles of H_2
= 2.48 moles of H_2

So, moles of H_2 = 2.48 moles

➤ Result:

➤ Moles of H_2 = 2.48 moles

DATA

(a)

➤ Given:

Mass of hydrogen (H_2) = 5g

➤ Required:

Number of moles = ?

Solution:

Formula:

Moles = $\frac{\text{mass in gram}}{\text{Molar mass}}$

Moles = $\frac{5}{2}$

Moles = 2.48 moles

➤ Result:

➤ Moles of H_2 = 2.48 moles

Molar mass
of H_2 :
= $2(1)$
= 2g/mol

(b) A block of ice that weights 100g.

DATA

➤ Given:

Weight of ice block (H_2O) = 100g

➤ Required:

Number of moles = ?

➤ Solution:

1 mole of H_2O = $2(1) + 16 = 18 \text{ g}$

1 mole of H_2O = 18 g

So,

18g of H_2O = 1mole of H_2O

1g of H_2O = $1/18$ moles

100g of H_2O = $1/18 \times 100$ moles
= 5.55 moles of H_2O

So, moles of H_2O = 5.55 moles

➤ Result:

moles of H_2O = 5.55 moles

DATA

➤ Given:

Weight of ice block (H_2O) = 100g

➤ Required:

Number of moles = ?

Solution:

Formula:

Moles = $\frac{\text{mass in gram}}{\text{Molar mass}}$

Moles = $\frac{100}{18}$

Moles = 5.55 moles

➤ Result:

moles of H_2O = 5.55 moles

Molar mass

of (H_2O) :

= $2(1) + 16$

= 18g/mol

Plenary

(i)-What is the mass of 4 moles of hydrogen gas?

A- 8.064g

B- 4.032g

C- 1g

D- 1.008g

(ii) What is the mass of Carbon present in 44g of Carbon dioxide?

(iii)What is the difference between molecular mass and formula mass?

Home Work

- Solve :
- Self-Assessment Exercise 1.4,(pg no.15)
- Self-Assessment Exercise 1.8(pg no.22)
- Self-Assessment Exercise 1.9(pg no.23)
- Review Questions: 6,7,12

Let's Stop COVID-19

Stay
Home
Stay Safe



**WORK
FROM HOME**

A large yellow flower with a dark center is positioned in the top right corner of the image.

.Allah Hafiz.

خدا حافظ

A background image of pink roses with green leaves, slightly out of focus.

في أمان الله

May Allah protect you

[ARABIC PHRASE USED BY
WAY OF SAYING GOODBYE]

@TRUSTING TRUTHS