

To Remember

- No. of mole atom / No.of GAM = <u>Mass in grams</u> GAM of the element
- No. of atoms = No. of mole atom / No.of GAM) x 6.022 x 10^{23}
- Mass in grams(In case of atoms) = No. of mole atom / No.of GAM x 1GAM
- The number 6.022 x 10^{23} is known as Avagadro number.

 $1 \text{ GAM} = 1 \text{ Mole atom} = 6.022 \text{ x } 10^{23} \text{ atoms}$

■ No.of GMM / No. of moles = <u>Mass in grams</u>

GMM

- No. of molecules = No. of GMM((No. of moles) $\times 6.022 \times 10^{23}$
- Mass in grams(In case of molecules) = No.of GMM(No. of moles) x 1GMM

1 GMM = 1 Mole molecules(Mole) = 6.022×10^{23} molecules

Each question from 1 to 9 carries 1 score.

[charles' law, Avogadro's law, Boyle's law, Le-chateller's Principle]

- Analyse the situations given below and write the one which is related to Charles' law.
 a) If an inflated balloon is kept in sunlight, it will burst after sometime.
 - b) As the balloon is being inflated, its volume increases.
 - c) The size of air bubbles rising from the bottom of a water body gradually increases

- Find the relation and fill in the blank
 16g Oxygen = 1 GAM
 16g Helium = GAM
 [Hint : Atomic mass O = 16 ,He = 4]
- 4. What is the mass of 1GMM CO₂? [Hint : molecular mass CO₂ = 44]
- 5. How many GAM is present in 56g nitrogen? [Hint : Atomic mass N = 14]
- 6. How many GMM are there in 48g CH₄?[Hint : Molecular mass CH₄ = 16]

Each question from 7 to 11 carries 2 scores.

7. Examine the data given in the table.(Temperature and number of molecules of the gas are kept constant)

| Pressure (P) | Volume (V) | |
|--------------|------------|--|
| 1 atm | 8 L | |
| 2 atm | 4 L | |
| 4 atm | 2 L | |

a) What will be the volume of this gas at 8 atm pressure?

b) Which is the gas law related to this ?

- 8. What happens to the size of a gas bubble rising from the bottom of a water body? why?
- 9. a) The volume of a fixed mass of gas at 300K is 10L.What will be the volume of the gas, if the temperature is doubled without changing the pressure.b) Which is the gas law related to this?
 - b) Which is the gas law related to this?
- 10. The molecular mass of CO_2 is 44.

a)Find the mass of 1GMM CO_2 .

b) How many moles of molecules are there in 220 g of CO₂?

- 11. Atomic mass of nitrogen is 14.
 - a) How many atoms are present in 1 GAM nitrogen.
 - b) Find the mass of $4 \times 6.022 \times 10^{23}$ nitrogen atoms.

Each question from 12 to 14 carries 3 scores.

12. The data of an experiment conducted on a fixed mass of gas at constant pressure are given.

| Volume(V) L | Temperature(T)K | |
|-------------|-----------------|--|
| 600 | 300 | |
| 800 | (X) | |
| (Y) | 450 | |

- a) Find the values of (X) and (Y)
- b) What is the relation between volume and temperature at constant pressure ?

13. Complete the table

| Element | Mass in grams | Number of GAM | Number of atoms |
|----------|---------------|---------------|----------------------------|
| Helium | 20g | (a) | (b) |
| Chlorine | (C) | 4 | 4 x 6.022x10 ²³ |

(Hint : Atomic mass He = 4, Cl = 35.5)

- 14. The molecular mass of CH₄ is16.
 - a) Find the number of molecules in 1GMM CH_{4} .
 - b) Find out the number of moles and molecules in 8g of CH₄.

Each question from 15 to 17 carries 4 scores.

15. Complete the table given.

| Compound | Mass in grams | Number of GMM | Number of molecules |
|-----------------|---------------|---------------|------------------------------|
| NH ₃ | 170g | (a) | (b) |
| SO ₂ | (c) | (d) | 5 x 6.022 x 10 ²³ |

(Hint :Molecular mass $NH_3 = 17$, $SO_2 = 64$)

- 16. a) The number 6.022 x 10^{23} is known as
 - b) Find out the number of mole molecules and molecules in $640g\ SO_2$.

[Hint : Molecular mass $SO_2 = 64$]

c) How many grams of CO₂ is to be taken to get as many molecules as are in 640g SO₂?

[Hint : Molecular mass $CO_2 = 44$]

- 17. Some samples of certain compounds are given.
 - P 85 g NH₃
 - Q 88g CO₂
 - R 20 g H₂
 - S 400g CaCO₃
 - a) Calculate the molecular mass of CaCO₃.

[Hint : Atomic mass Ca = 40 , C = 12, O = 16]

- b) How many GMMs are there in each sample ? (Hint : molecular mass NH₃ - 17, CO₂ - 44, H₂ - 2)
- c) Find out number of molecules in sample R.



Gas Laws and Mole Concept

| Qn. No | Answer Key / Value points | Score | Total Score |
|-----------|---|----------|----------------|
| 1. | Boyle's Law | 1 | 1 |
| 2. | a) If an inflated balloon is kept in sunlight, it will burst after sometime. | 1 | 1 |
| 3. | 4 GAM | 1 | 1 |
| 4. | 44g | 1 | 1 |
| 5. | 4 GAM | 1 | 1 |
| 6. | 3 GMM | 1 | 1 |
| 7. | a) 1L b) Boyle' Law | 1 1 | 2 |
| 8. | size increases , As the bubbles move from bottom to top in a water body, pressure decreases and correspondingly the volume increases. | 2 | 2 |
| 9. | a) 20 L b) Charles' Law | 1 1 | 2 |
| 10. | a) 44g b) 5 x 6.022x10 ²³ molecules | 1 1 | 2 |
| 11. | a) 6.022x10 ²³ atoms b) 56 g | 1 1 | 2 |
| 12. | a) X = 400 atm , Y = 900 L b) Directly propotional | 1+1 1 | 3 |

| 13. | a) 5 GAM | 1 | |
|-----|---|---------|---|
| | b) $5 \times 6.022 \times 10^{23}$ | 1 | 3 |
| | c) 142 g | 1 | |
| 14. | a) 6.022x10 ²³ molecules | 1 | |
| | b) Number of moles = 0.5 | 1 | 3 |
| | Number of molecules = $0.5 \times 6.022 \times 10^{23}$ | 1 | |
| 15. | a) 10 | 1 | |
| | b) $10 \ge 6.022 \ge 10^{23}$ | 1 | |
| | c) 320g | 1 | 4 |
| | d) 5 | 1 | |
| 16. | a) Avagadro number | 1 | |
| | b) Number of mole molecules = 10 | 1 | 4 |
| | Number of molecules = $10 \times 6.022 \times 10^{23}$ | 1 | |
| | c) 440g | 1 | |
| 17. | a) 100 | 1 | |
| | b) Number of GMM P =5 , Q = 2, R = 10, S = 4 | 1/2 x 4 | 4 |
| | c) $10 \ge 6.022 \ge 10^{23}$ | 1 | |