INTRODUCTION:

1. Anything which has mass and occupies some space is called matter.
2. Matter exists in three different physical states known as solids, liquids and gases.
3. Depending on the temperature and pressure a substance can exist in either of the 3 states and these 3 states are inter convertible by changing P and T.
4. Both liquids and gases are termed as fluids as they have flowing ability.
5. Of these three states, gaseous state is the simplest because of uniformity in behavior.

Comparison of these 3 states:

Property	Gases	Liquids	Solids
1. Shape	No definite shape	No definite shape	Have definite shape
2. Volume	No definite volume	Have definite volume	Have definite volume
3.Randomness	Complete molecular randomness	In between that of gases and solids	Orderly arrangement of molecules
4. Density	Very low	Inter mediate	Very high
5. Compressibility	Highly compressible	Slightly compressible	Incompressible
6. Diffusion	Diffuse rapidly	May diffuse slowly	Will not diffuse
7.Inter molecular forces	Very weak	Intermediate	Strong
8. Inter molecular distances	Very large	Intermediate	Very small

6. The standard conditions for a gas are also known as S.T.P conditions or N.T.P conditions
7. S.T.P conditions

Temperature	Pressure
$t = 0^0C$	P = 1 atm
T = 273 K	P = 76 cm of Hg
	P = 760 mm of Hg

8. The weight of one litre of a gas is known as its density. The density of a gas depends on its temperature and pressure.
9. The units for the density of a gas are gm/lit.

10. Mass, Volume, Pressure and temperature are the measurable properties of a gas.

11. Mass (m):

1. The mass of a gas is expressed in gms (or) kilograms.
2. The mass of 6.023×10^{23} molecules of a gas is known as gram molar mass.
3. For any gas, n = $\frac{m}{M}$
   n = number of gram moles of the gas
   m = mass of the gas in grams
   M = gram molar mass of the gas
4. The amount of the gas is generally expressed in gram moles.
5. One gram mole of a gas contains Avogadro number of molecules.

12. VOLUME (V):

1. The space occupied by the gas is known as its volume
2. The volume of a gas is expressed in litres
   1 litre = 1000 ml, 1 litre = 1 dm^3 = 10^3 cm^3
   1 litre = 1000cm^3 1 ml = 1.000028 c.c.
   1m^3 = 10^3 dm^3 = 10^6 cm^3 = 10^6 ml = 10^3L
3. The volume of a gas is measured with gas burette.
4. The volume occupied by one gram mole of gas under S.T.P conditions is known as gram molar volume of a gas.
5. The density of a gas at STP = $\frac{Grammolarmass}{22.4}$
6. The number of molecules in 22.4 lit of a gas measured under S.T.P conditions is equal to Avogadro number.
7. The number of molecules in 1 ml of a gas measured under S.T.P. conditions is known as Loschmidt number.
8. Loschmidt number = 2.688×10^{19}

13. PRESSURE (P):

1. The pressure of a gas is defined as the force per unit area P = $\frac{F}{A}$
2. The pressure of a gas is measured with manometer.
3. The atmospheric pressure is measured with Barometer.
4. The practical unit of pressure is atmosphere.
   1atm = 760mm of Hg=760torr = 76cm of Hg.
5. The absolute unit of pressure is
   i) dynes/cm^2 (C.G.S.system)
   ii) Newtons/m^2 (S.I.system)
6. The unit of high pressure is Bar.
   1 Bar = 10^6 dynes/cm^2
7. The unit of low pressure is Torr
   1 Torr = 1 mm of Hg
8. The S.I. unit of pressure is Pascal (Pa). Pascal is defined as the pressure exerted when a force of 1 Newton acts on 1square metre.
   1 P = 1 N / m^2
9. Units:
   1atm = 1.01325×10^6dynes/cm^2=1.01325 Bar

1atm= 1.01325 $\times$ 10^5N/m^2 = 1.01325$\times 10^5$ Pa

= 101.325 K.Pa

14. Temperature:

1. The temperature of a gas is expressed in absolute scale (or) Kelvin scale. It avoids negative values.
2. The absolute zero is at - 273.15^{0}C
3. The temperature of a gas in absolute scale (or) Kelvin scale is given by

   1) $\overset{o}{A} = \overset{o}{C} + 273$ 2) $K = \overset{o}{C} + 273$

   T = t + 273
4. At absolute zero,
   1. Molecular motion in the gas ceases.
   2. Pressure of the gas becomes zero.
   3. Volume of the gas becomes zero.
   4. Kinetic energy of the gas becomes zero.