- Assumptions (need confirmation)
- Raj bhaia imp notes
- Stuff I added (confirmed)

- (particles / molecules have mass but) negligible size / volume (compared to total volume of gas / container)
- no / negligible forces / interactions (between particles / molecules)
- collisions are elastic

State the Kinetic Particle Theory For Ideal Gases

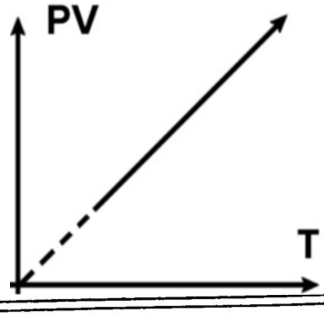
1) There are no intermolecular forces acting between the gaseous particles
2) The volume of the gas particle (size of the gas) is negligible compared to the volume occupied by the gas
3) The collision between the particles are perfectly elastic
↑ stated in order of priority when writing answers

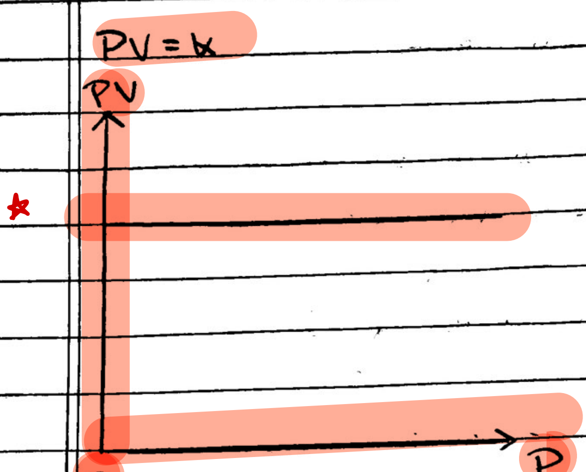
↳ Define Ideal gas

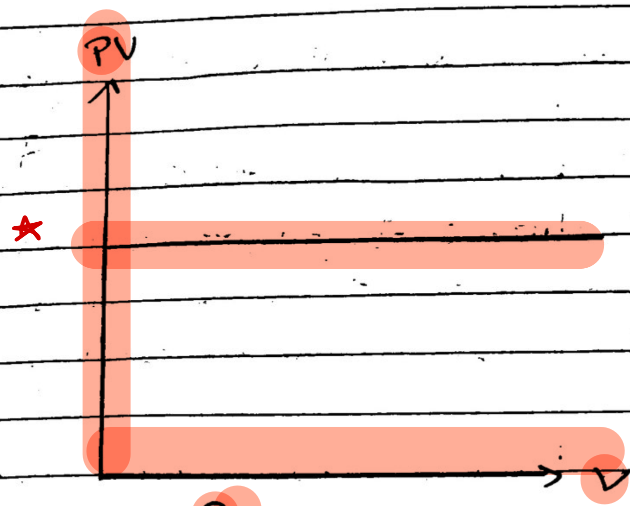
→ The gases that follow Kinetic Particle Theory are called ideal gases
There is no such ideal gases

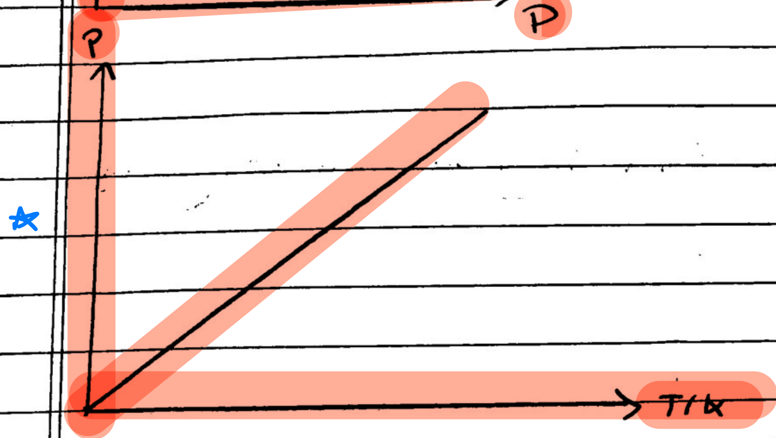
→ Define Real Gas

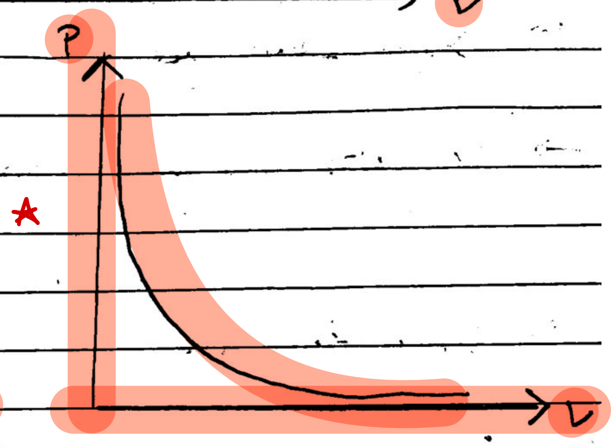
↳ The gases that deviate from ideal gas characteristics are called real gases.





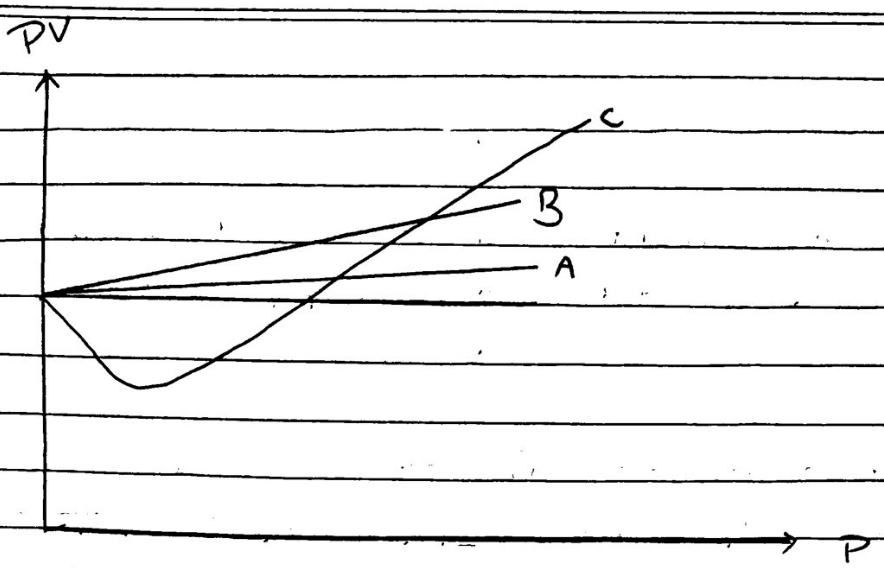






* - At constant temperature

* - At constant volume



N_2 - B
NH_3 - C strongest imf
H_2 - A weakest imf

Weaker imf means more ideal

↳ Weaker imf also means particles are further apart from each other hence the volume of the gas particle compared to the volume occupied by the gas is less significant, hence more ~~ideal~~

↳ Graph ~~a~~ A represents H_2 as it deviates the least from the ideal gas graph. This is because it has the weakest imf.

↳ Graph C represent NH_3 as it deviates the most from the ideal gas graph. This is because it has the strongest imf, hydrogen bonds

How to convert Real Gases into Ideal Gases

↳ By increasing the temperature and decreasing the pressure, a real gas can be converted to an ideal gas to a certain extent.

↗ Thus gas particles can move further apart from each other

↳ This will weaken the imf. In addition it will also increase the volume occupied by the gas. Thus the volume of gas ~~gases~~ ~~gaseous~~ particles will become less significant compared to the volume occupied by the gas.

Increasing the temperature provides the gas particles with energy to overcome the imf to a certain extent

Decreasing the pressure means less work has to be done against the atmosphere to expand, thus making it easier for the gas to expand and occupy more volume

When pressure increases, particles come closer to each other, as distance between particles decreases, strength of imf increases. Newton's square law. $F \propto (\frac{1}{d})^2$

Effect of increase in pressure// Explain why a gas does not behave ideally at high pressures.
M1 IMF become larger / more significant
M2 volume of molecules / particles becomes significant / no longer negligible

Ideal Gas Equation

$pv = nRT$

p = Pressure / Pa
v = volume / m^3
n = no. of mols of gas
R = molar gas constant (8.31)
T = temperature / K # $x\,°C = 273 + x$ K

$1\,cm^3 = 10^{-6}\,m^3$
$1\,dm^3 = 10^{-3}\,m^3$

at room temperature (25°C // 298K) and pressure (1atm // to 1.01×10^5 Pa) what is the volume of 1 mol of gas

$Pv = nRT$, $1.01 \times 10^5\,v = 1 \times 8.31 \times 298$
$\therefore v = 0.245\,m^3 =$ ~~25~~ $24.5\,dm^3$

When doing MCQs, form equations where the subject of the equation is a varible that remains constant for all the options in the MCQ.

The constants in the body of the equations will cancel out

$P = \frac{nRT}{V}$ → body
↳ subject

- A flask of volume $2 dm^3$, was found to contain 5.28g of a gas. The pressure in the ~~gas~~ flask was 200kPa and temperature was 20°C.

$200,000 \times 0.002 = \frac{5.28}{M_r} \times 8.31 \times 293$

$M_r = 32.1g$

- ~~200,00~~

$101000 \times v = \cancel{\frac{1}{18}} \quad \cancel{\frac{1}{20}} \quad \frac{1}{18} \times 8.31 \times 596$

$= 2.72 dm^3$ ∴ ~~267~~ C (2.67)

- $pv = n\cancel{R}\ RT \qquad \frac{x}{2}$

$\cancel{p = \frac{RT}{V}} \qquad \cancel{\text{n}} \quad 2 = \frac{2p}{RT}$

$p = n\cancel{RZ} \qquad \frac{x}{4} RT$

$4 \times \frac{P}{RT} = x$

$x = 4g$

c.)

Define Vapour Pressure

→ The pressure exhibited by vapours present above a liquid surface

→ For any liquid, with increase in temperature, ~~vo~~ its vapour pressure increases

Define Boiling Point

→ The temperature at which the vapour pressure of a liquid will equalize atmospheric pressure, that temperature is the boiling point of the liquid.

\# Volatile liquids have more vapour pressure than less-volatile at a given temperature.

An application of Bucky Balls can be the delivery of medicine

Buckmingter Fullerene (Bucky Ball)

1 → It is an allotrope of Carbon.

2 ↳ Unlike diamond and graphite, it has simple molecular structure

3 ↳ Its molecular formula is C_{60} # C_{60n} where n is an Integer

4 ↳ Just like graphite, each carbon atom is covalently bonded to 3 other carbon atoms.

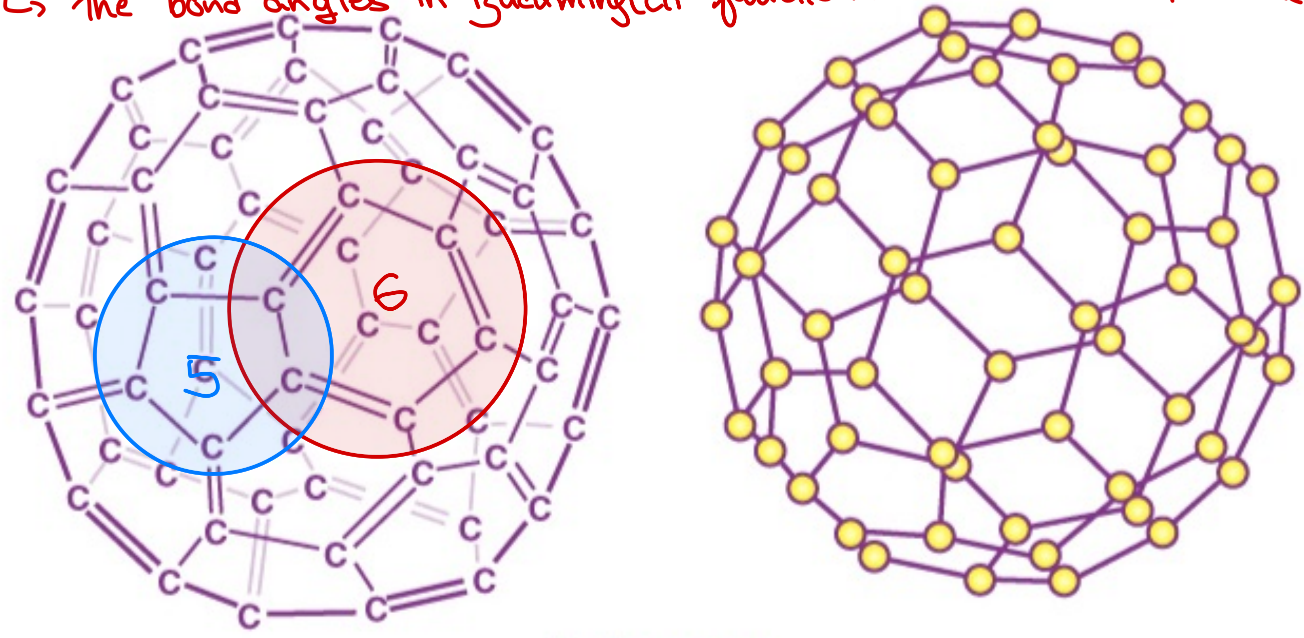
5 ↳ Despite ~~having free e^- in~~ every C atom, the e^- in the structure having a free e^- are not ~~able to move freely~~ fully delocalised. Hence it is not a good conductor of electricity

↳ extent of delocalization of the free e^- is less than that in graphite

6 ↳ It has low m.p. and b.p ~~and~~ compared to diamond and graphite

7 ↳ It is soft

8 ↳ The bond angles in Buckmingten fullerene are between 109° and 120°.



Fullerene

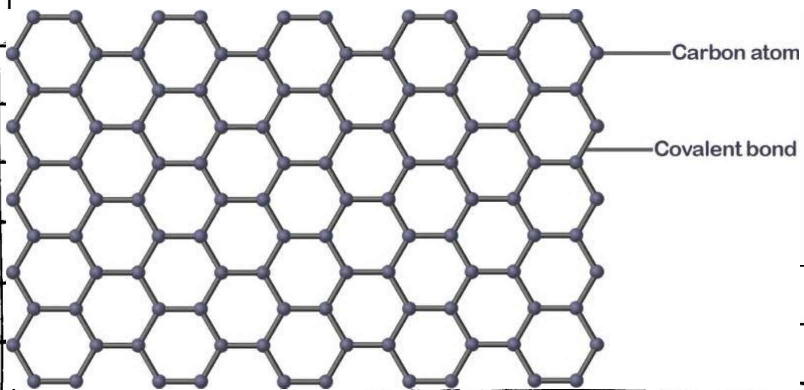
The carbon rings in Bucky Balls have 5 or 6 carbons (C)

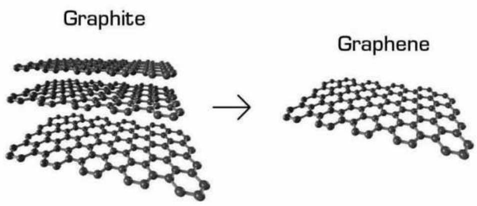
Graphene

Graphene is a single isolated layer of graphite (Figure 5.20). The hexagonally arranged sheet of carbon atoms is not completely rigid and it can be distorted.

Graphene has some of the properties of graphite, but they are more exaggerated. For example:

- Graphene is the most chemically reactive form of carbon.
- Single sheets of graphene burn at very low temperatures and are much more reactive than graphite.
- Graphene is extremely strong for its mass.
- For a given amount of material, graphene conducts electricity and heat much better than graphite.





Misc Notes

\# Why do gases act less ideally at:

↳ low temperatures: IMFs become significant / non-negligible / collisions are not elastic

↳ high pressures: size / volume of molecule / particle becomes significant / non-negligible OR IMFs become " / "

(separate ms) : particles are (so) close [1]* (that) particle size becomes significant [1] (OR // AND) repulsive forces between particles become significant -ms

\# Assumptions about the properties of Ideal gases:

↳ particles have negligible volume (compared to volume of gas container //)
↳ no forces between particles
↳ collisions between particles are elastic
* ↳ gas obeys (all) basic gas laws
* ↳ gas particles behave as rigid spheres

\# Room temperature is 298K

\# Mr of Air is 28.96g

State and explain the conditions at which a gas behaves most like an ideal gas.

M1 low pressure AND high temperature M2: Either of:

• volume of particles is negligible (compared to volume of container)

• VdW forces are insignificant (owing to high kinetic energy of particles