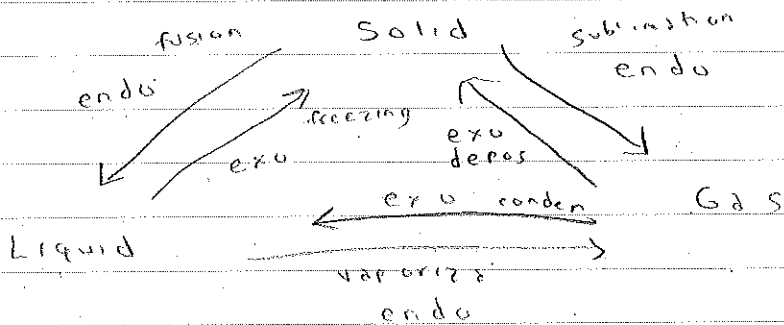


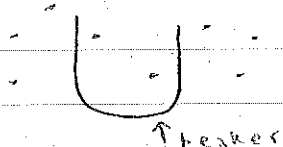
c) ✓ The sign for ΔH_{vap} is - always positive



Know all vocab and signs of thermo functions

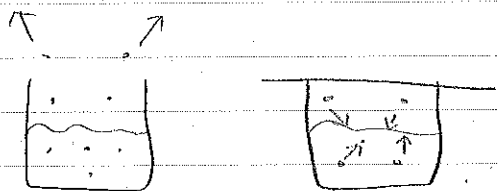
- what if there were no IMF?

- there would be no energy difference
- entropy would dominate
- IMF hold them back from wandering off



But there are IMFs!

But... what about evaporation?

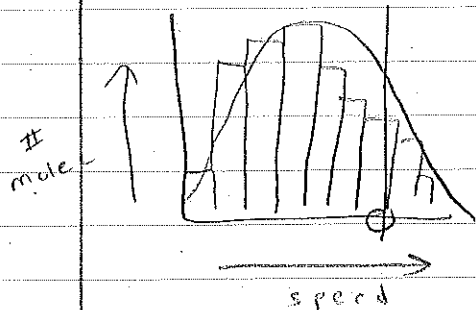


EMPTY

STILL FULL

with lid ... evap & cond are same
w/o lid ... evap > cond

- Boltzmann dist explains evap!

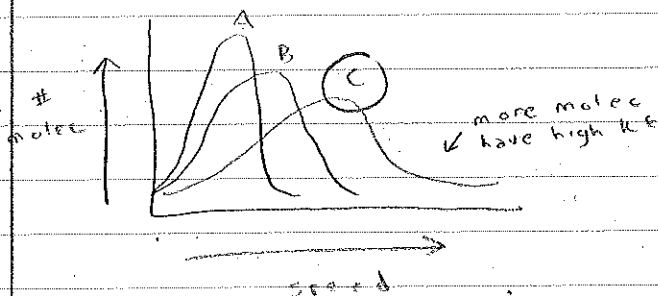


How much KE do you
need to overcome
the IMF?

↑ surface area, ↑ speed

C2) +10 points (poll)

which dist is a dist at higher T?



- high speed, high energy, high T

Vapor Pressure

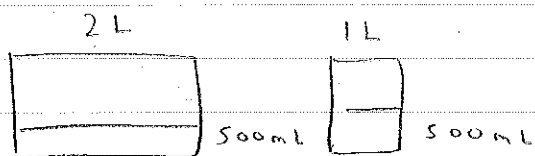
with lid: $evap = cond$ (constant press / equilibrium)

- no net change

- establishes VP

VP = partial pressure of gas above its liquid

c3) +10 points (poll)



one container has a volume of 2L and one has volume of 1L. Each has 500 ml of liquid.

They have same temp. which container has a higher pressure at equilibrium?

- they are exactly the same

VP is the pressure when "in" and "out" are the same. VP is like a concentration. SIZE of container doesn't matter.

c4) +10 points (poll)

which container has a greater number of molecules of the ether in the gas phase? - 2L container

Larger container \rightarrow more molecules to get same pressure

- what is the relationship between VP and ΔH_{vap} ?
- smaller ΔH_{vap} , larger VP (NOT LINEAR)

VP (torr)

ΔH_{vap} (kJ mol⁻¹)

760 torr = 1 atm

volatile liquid

gas \rightarrow

water

24

40.65

diethyl ether

545

27.4

propane

7500

18.8

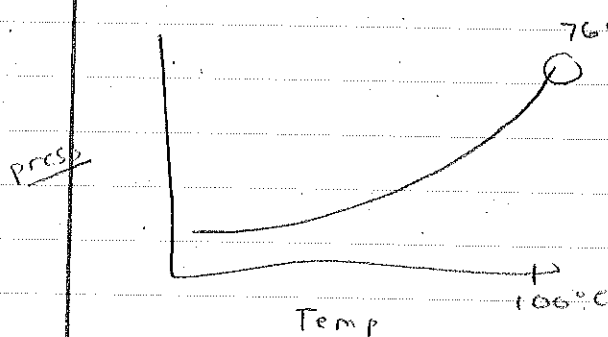
↑ IMF, ↓ VP

(5) +10 points (poll)

Why does octane (C_8H_{18}) have lower VP than hexane (C_6H_{14}) at $25^\circ C$?

- octane has stronger IMF

How does VP change w/ T?



- VP inc w/ T

- exponential relationship

- at $100^\circ C$, VP = 760 torr = 1 atm

which is same as external pressure in the room

- boiling = VP = ext press

(6) Is the normal BP same for all liquids? NO
+10 points (poll)

normal BP means at 1 atm pressure

↑ VP, the faster something will evaporate

- VP of a liquid inc w/ inc T

Clausius - Clapeyron equation

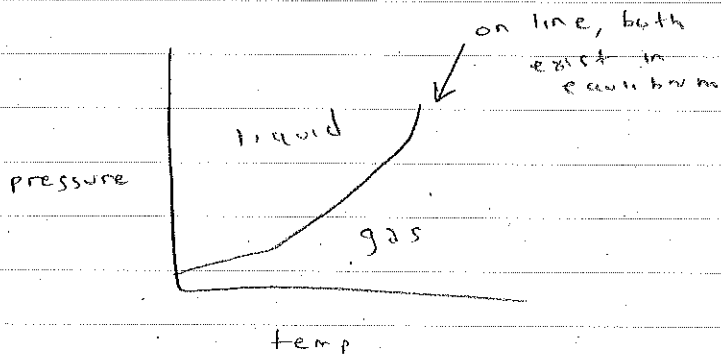
$$\ln \left(\frac{P_2}{P_1} \right) = \Delta H^\circ_{vap} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

BE ABLE TO MANIPULATE EQUATION

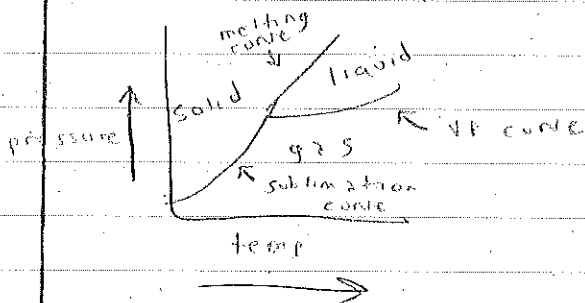
P is VP

Summary

- VP is related to energy of a substance
- VP is dependent on T



Phase diagram



Important points

