What do you remember from last time?

You have two containers.
one has a total volume of 2 L and
one has a total volume of 1 L
Into each you place 500 mL of liquid ether

Which container has a higher pressure at equilibrium?

A. the 2 L container

B. the 1 L container

C. they are exactly the same ←

D. it depends on the temperature

What do you remember from last time?

You have two containers
one has a total volume of 2 L and
one has a total volume of 1 L
Into each you place 500 mL of liquid ether

Which container has a greater number of
ether molecules in the gas phase at equilibrium?

A. the 2 L container ←

B. the 1 L container

C. they are exactly the same

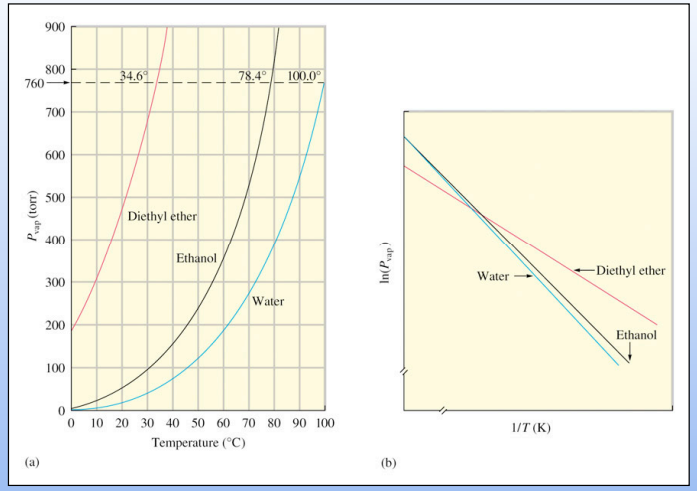
D. it depends on the temperature

Last time

Vapor Pressure is determined primarily from $\Delta_{vap}H$
$\Delta_{vap}H$ depends on the intermolecular forces

Vapor Pressure is independent of volume
Neither the volume or the gas or liquid matter

Vapor Pressure is a strong function of temperature



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How Does Vapor Pressure Change with T?

$$\ln\left(\frac{P_2}{P_1}\right) = -\frac{\Delta H_{vap}}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

The Claussius-Clapeyron Equation

Relates the vapor pressure P_1 at temperature T_1 to the vapor pressure P_2 at temperature T_2

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What is the normal boiling point of water?

Given the vapor pressure of water at 25°C is 24 Torr and the ΔH_{vap} = 40.8 kJ mol^{-1}

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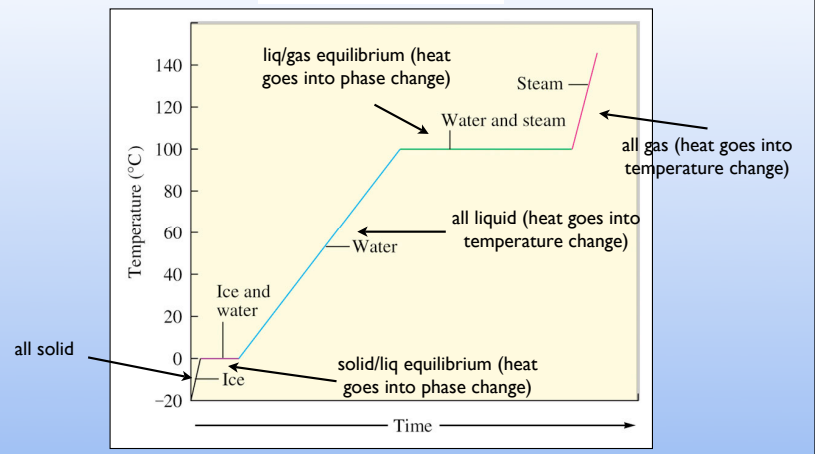
Phase Transitions



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Previous Thermo

Single Phase
energy into goes into temperature change
at constant P

$q = \Delta H = C_p \Delta T$
you need heat capacity of specific phase (sol,liq, gas)

Phase Change
energy into goes into phase change
(the two phases have the same free energy
but one is higher in enthalpy)

$q = \Delta H_{transition}$ for example $q = \Delta H_{fus}$ for melting

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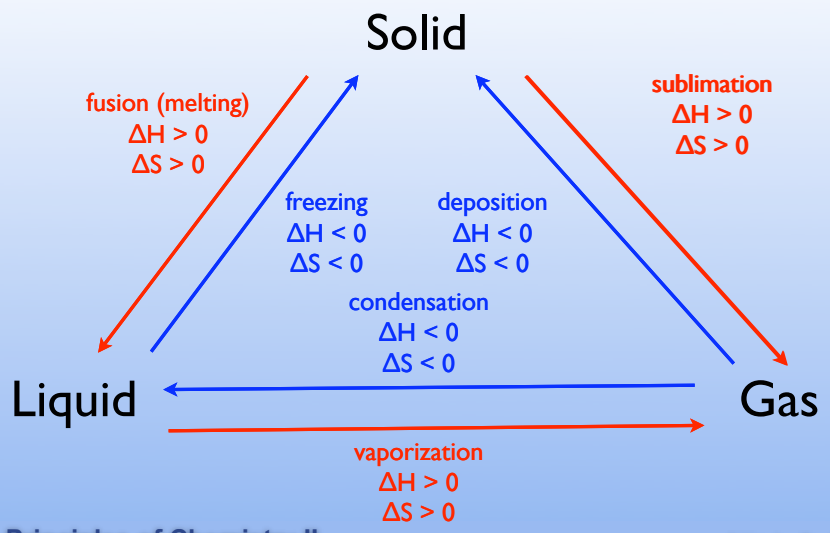
The different phase transitions



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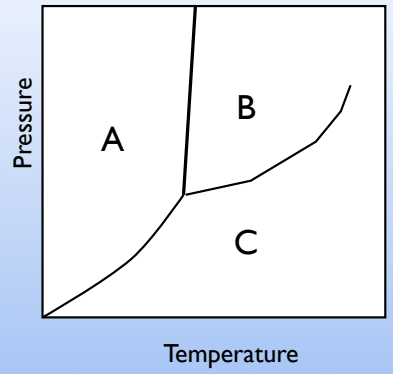
Phase Diagrams

The diagram on the right shows different phases for a compound as a function of temperature and pressure

What is the phase labeled "A"?

A. solid
B. liquid
C. gas
D. no way to know



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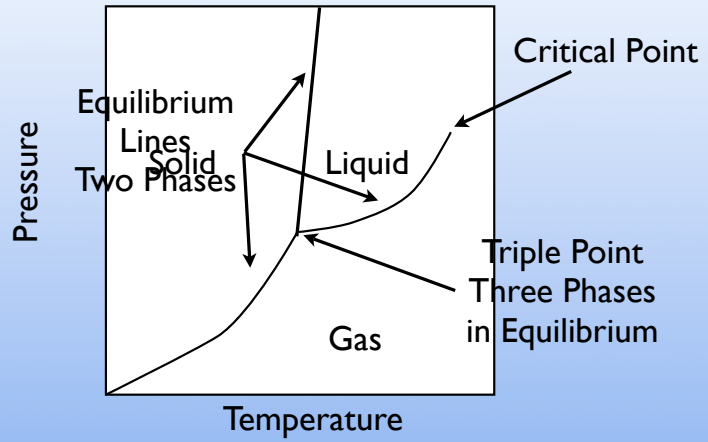
Important Points



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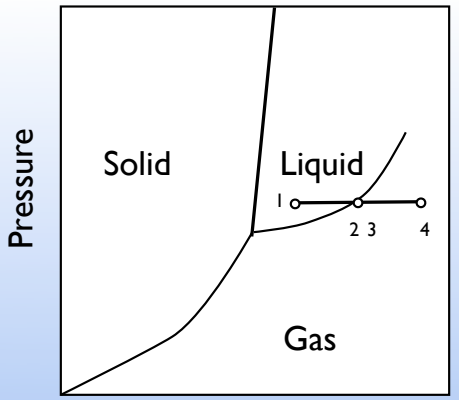

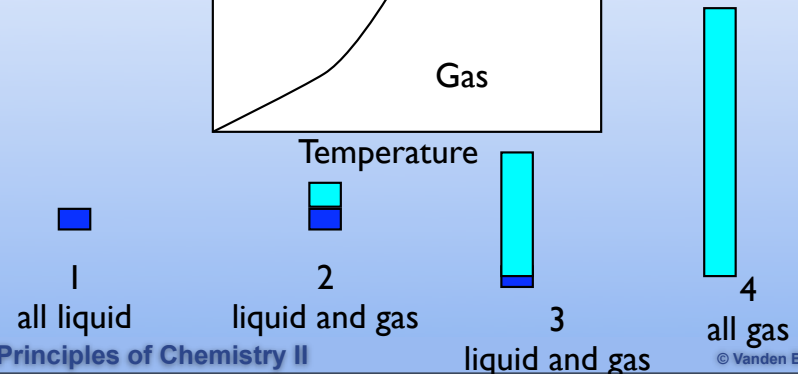

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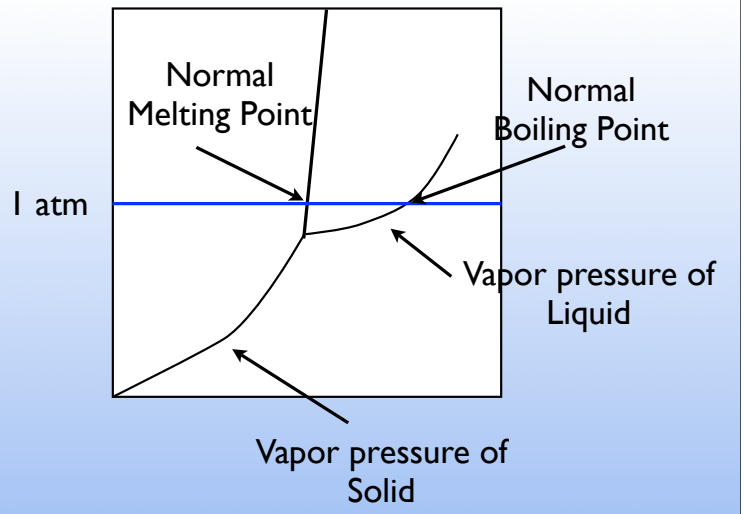
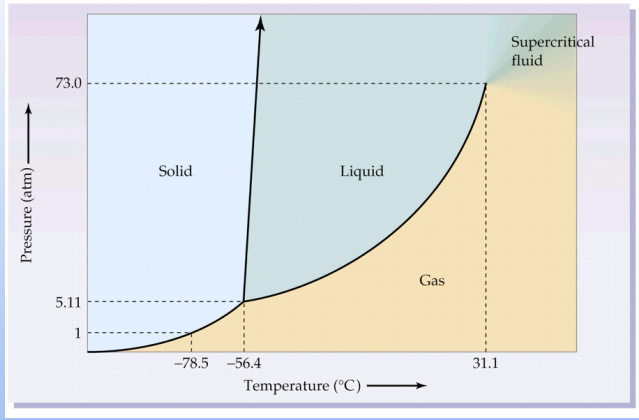


Phase Diagram of CO_2



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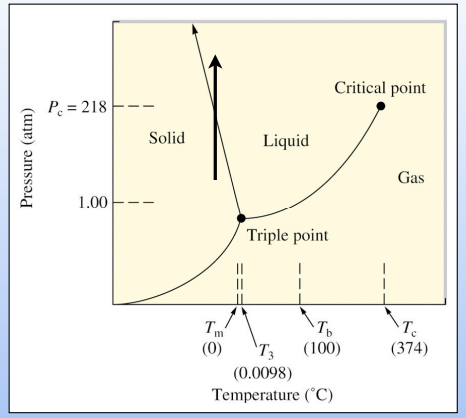
Phase Diagram of Water



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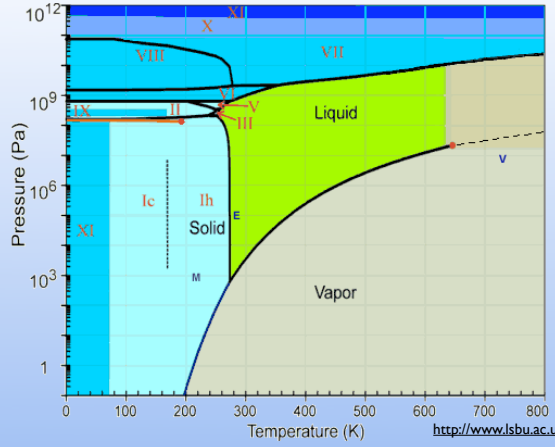
At a constant temperature, increasing the pressure will cause ice to melt (it moves to the higher density phase which for water is a liquid)

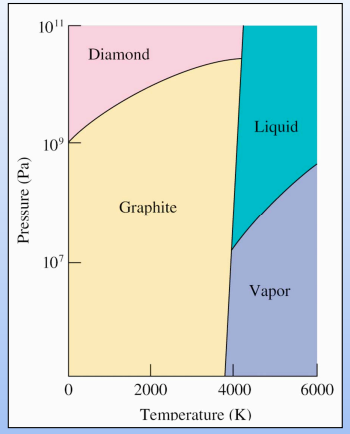
Phase Diagram of Water



http://www.lsbu.ac.uk/water/images/phase.gif

Many different solid phases. At very high pressure the liquid will solidify

Other Substances



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