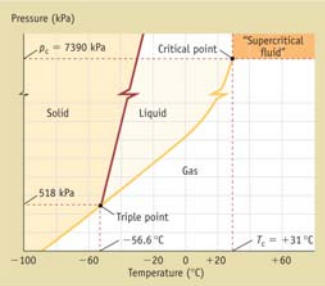
[TP] CO_2 gas at 1 atm, 0 °C
is heated to 1 atm, 60 °C;
then compressed to 75 atm, 60 °C;
then cooled to 75 atm, 0 °C;
then expanded to 70 atm, 0 °C.
At this point, the CO_2 will be a ...

25% 1. gas
25% 2. supercritical fluid
25% 3. liquid
25% 4. solid



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Lecture 10 CH102 A1 (MWF 9:05 am)

Friday, February 10, 2017

- Complete: Phase diagrams

Begin ch12: Solutions and their behavior

- Enthalpy change of solution: Ionic Solutes

Next: Continue ch12: $\Delta_{latt}H$, $\Delta_{aq}H$ and $\Delta_{soln}H$. Predicting relative values of $\Delta_{latt}H$ and $\Delta_{aq}H$

Triple point YouTube video: http://goo.gl/4K1SR
Critical point YouTube video: http://goo.gl/xo2jU

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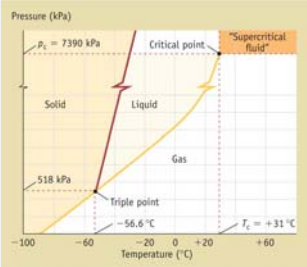
Supercritical fluid

Supercritical transition of liquid Cl_2 ... http://goo.gl/xo2jU



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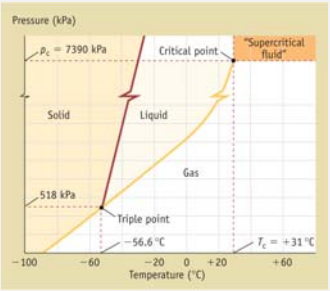
Changes of phase

CO_2 gas at 1 atm, 0 °C
is heated to 1 atm, 60 °C;
then compressed to 75 atm, 60 °C;
then cooled to 75 atm, 0 °C;
then expanded to 70 atm, 0 °C.
At this point, the CO_2 will be a ...



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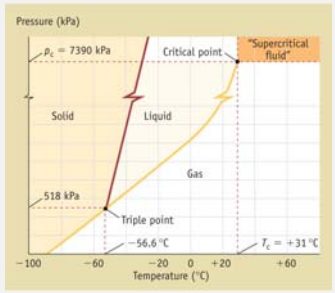
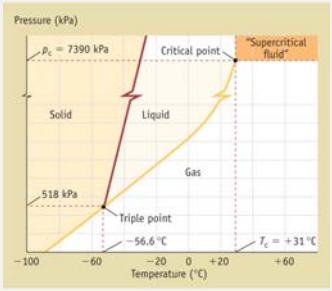
[TP] CO_2 gas at 1 atm, 0 °C
is heated to 1 atm, 60 °C;
then compressed to 75 atm, 60 °C;
then cooled to 75 atm, 0 °C;
then expanded to 70 atm, 0 °C.
At this point, the CO_2 will be a …

25% 1. gas
25% 2. supercritical fluid
25% 3. liquid
25% 4. solid



[Group quiz] CO_2 at 1 atm, 0 °C
is heated to 1 atm, 60 °C;
then compressed to 75 atm, 60 °C;
then cooled to 75 atm, 0 °C;
then expanded to 70 atm, 0 °C.
At this point, the CO_2 will undergone a phase transition …

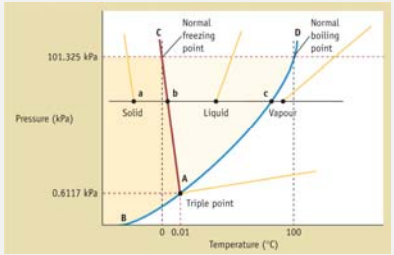
25% 1. once
25% 2. twice
25% 3. three times
25% 4. none of the above



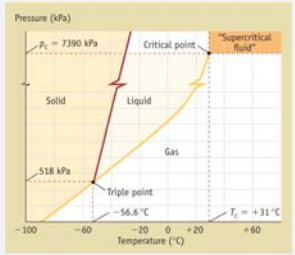
Response Counter 10

Phase diagrams are specific to each substance

Water



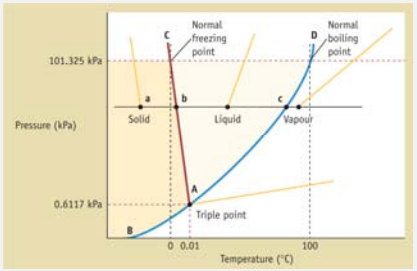
CO_2



H_2O phase diagram

Is density of liquid H_2O greater than that of solid H_2O?

How can we tell?



Continue ch 12

Solutions and Their Behavior

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How ionic substances dissolve

$NaCl(s) \longrightarrow Na^+(aq) + Cl^-(aq)$

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Recall from CH101: About "NaCl(*aq*)", etc.

Ionic solids dissolve by their ions being surrounded by water.

For example, $NaCl(s) \rightarrow Na^+(aq) + Cl^-(aq)$

The collection of hydrated ions is sometimes represented as "salt(*aq*)".

For example, $Na^+(aq) + Cl^-(aq)$ is abbreviated as $NaCl(aq)$

However, chemically, salt(*aq*) does not exist.

It is only an abbreviation for the hydrated ions, e.g., $Na^+(aq) + Cl^-(aq)$

Since salt(aq) does not exist, in this course please do not use it!

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[TP] Do we get the same amount of energy back from making bonds between an ion and water molecules, as it took to break the ionic bonds holding an ion in the solid?

25% 1. The energy is the same
25% 2. More energy to break ion bonds in solid
25% 3. More energy from making ion-water bonds
25% 4. We don't know

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Enthalpy change of solution

When an ionic solid dissolves in water, depending on the ionic solid …

the solution gets warm or …

the solution gets cold.

Let's develop a framework with which to analyze such results.

[TP] Lattice enthalpy, $\Delta_{latt}H$, is the enthalpy change required to separate a mole of ionic solid into its individual ions in the gas phase, so that they are so far apart they no longer interact with one another electrically. Lattice enthalpy …

33% 1. is always positive
33% 2. is always negative
33% 3. can be positive or negative, depending on the ionic solid

Response Counter

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Lattice enthalpy, $\Delta_{latt}H$

Write the chemical equation whose enthalpy change is the lattice enthalpy of KCl, $\Delta_{latt}H$. Be sure to include the states of all.