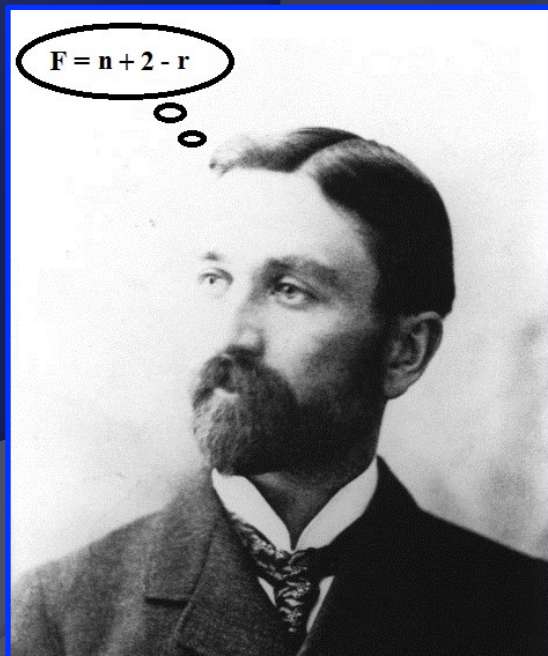
Sarah Lambart - 2016

LECTURE 5: GIBBS PHASE RULE

The most important lecture of the next two quarters!!!



Gibbs Rules

Rule #1: Never let suspects stay together.
Rule #1: Never screw over your partner.
Rule #2: Always wear gloves at a crime scene.
Rule #3: Don't believe what you're told - Double check.
Rule #3: Never be unreachable.
Rule #4: The best way to keep a secret? Keep it to yourself.
Second best? Tell one other person - if you must.
There is no third best.
Rule #6: Never apologize - It's a sign of weakness.
Rule #7: Always be specific when you lie.
Rule #8: Never take anything for granted.
Rule #9: Never go anywhere without a knife.

Rule #10: Never get personally involved on a case.
Rule #11: When the job is done, walk away.
Rule #12: Never date a coworker.
Rule #13: Never, ever involve lawyers.
Rule #15: Always work as a team.
Rule #18: It's better to seek forgiveness than ask permission.

Rule #22: Never, ever bother Gibbs in interrogation.
Rule #23: Never mess with a Marine's coffee if you want to live.
Rule #27: Two ways to follow: -First way they never notice you.
Rule #28: -Second way they only notice you.

Rule #38: Your case, your lead.
Rule #39: There is no such thing as coincidence.

Rule #40: If it seems someone is out to get you, they are.
Rule #42: To get the right answers - you have to ask the right questions.
Rule #44: First things first. Hide the women and children.
Rule #45: Left mess, clean it.

Rule #51: Sometimes you're wrong.

Unnumbered Don't work the system when you can work the people.
Unspoken You do what you have to do for family.

And remember...

"A slap to the face is an insult — to the back of the head is a wake-up call." – Leroy Jethro Gibbs

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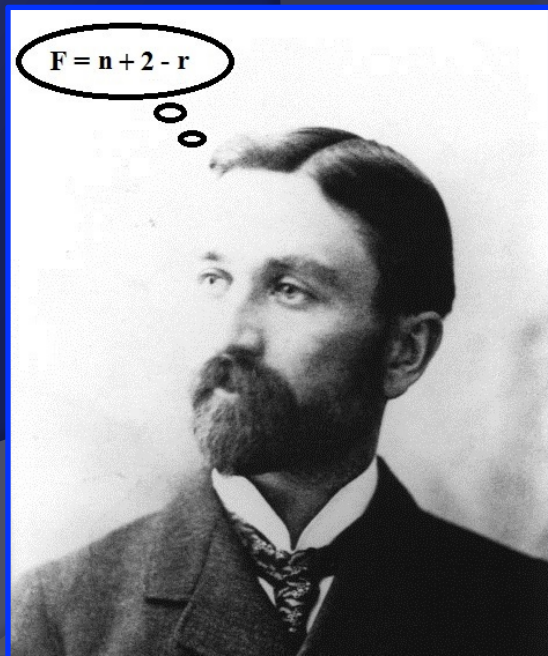
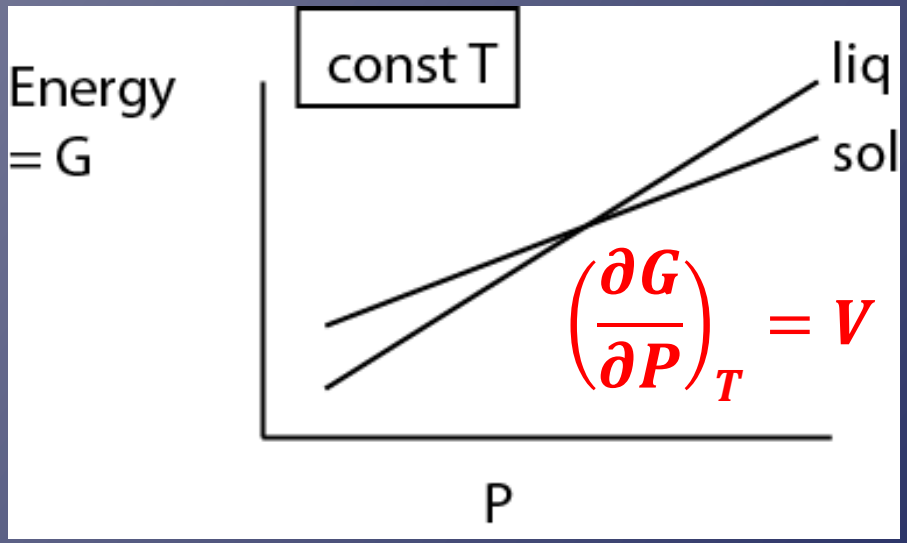
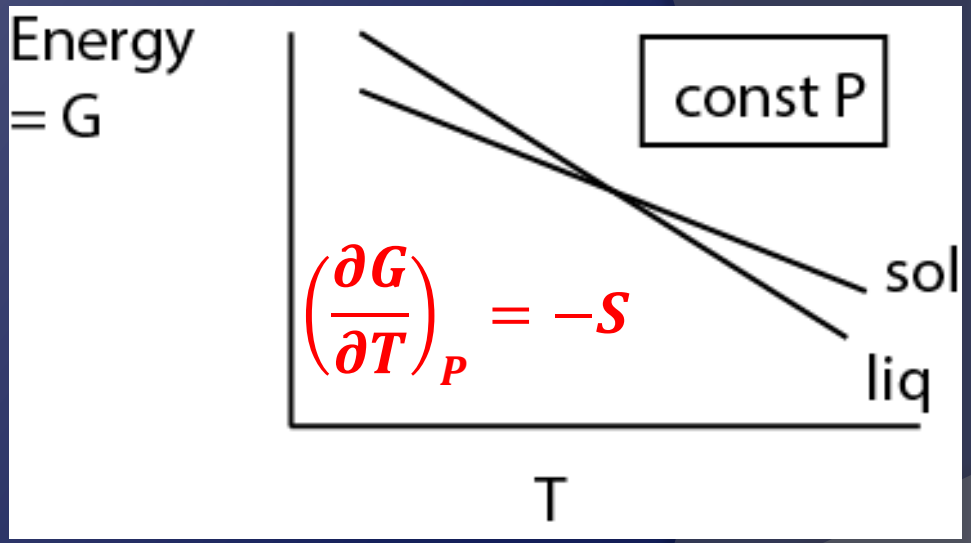


Recap Lecture 4

- Equilibrium: state of minimal energy (G)





$Mg_2SiO_4(solid) \rightleftarrows Mg_2SiO_4(liquid)$

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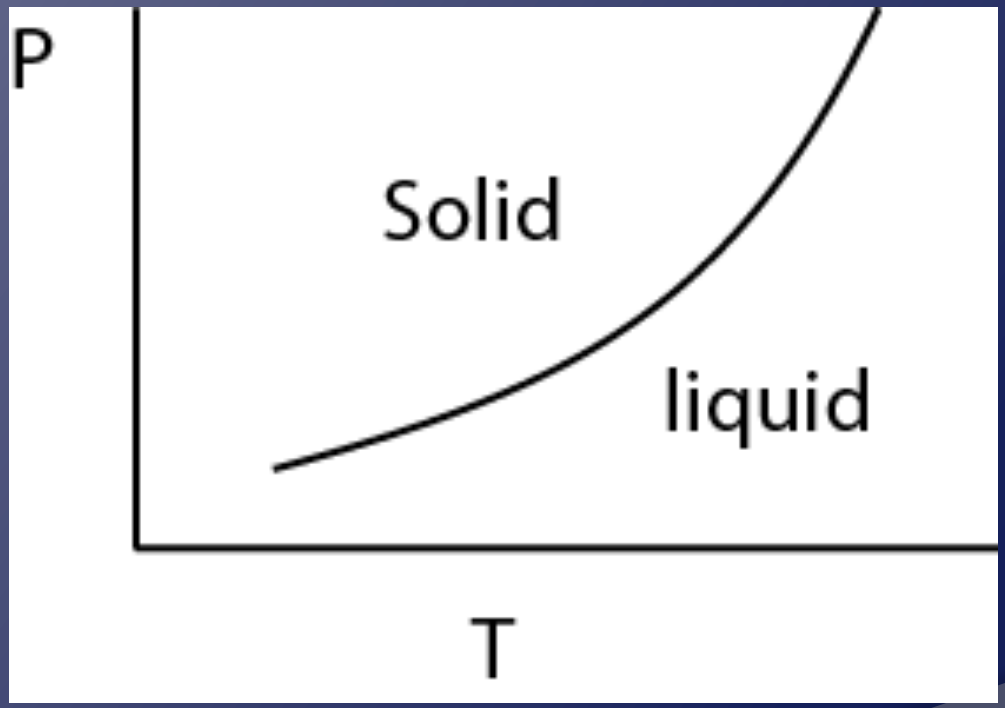
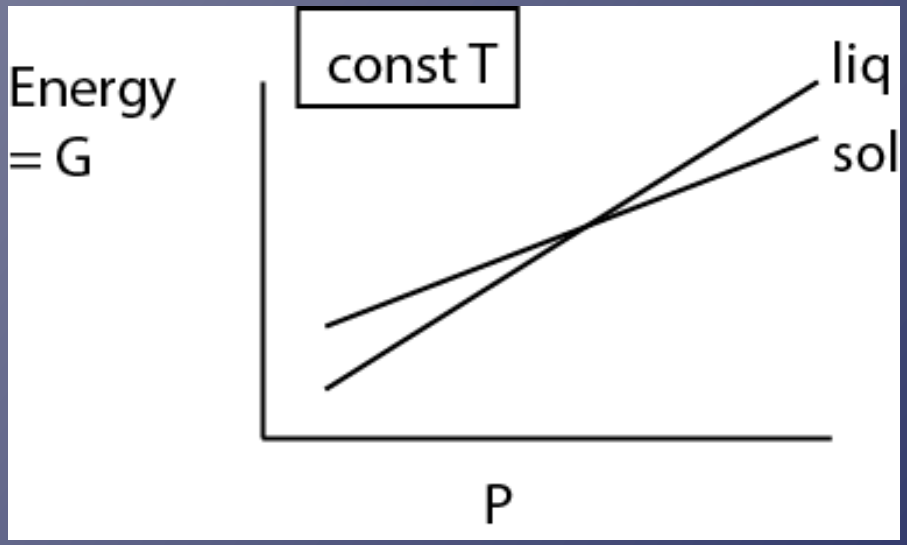
Recap Lecture 4

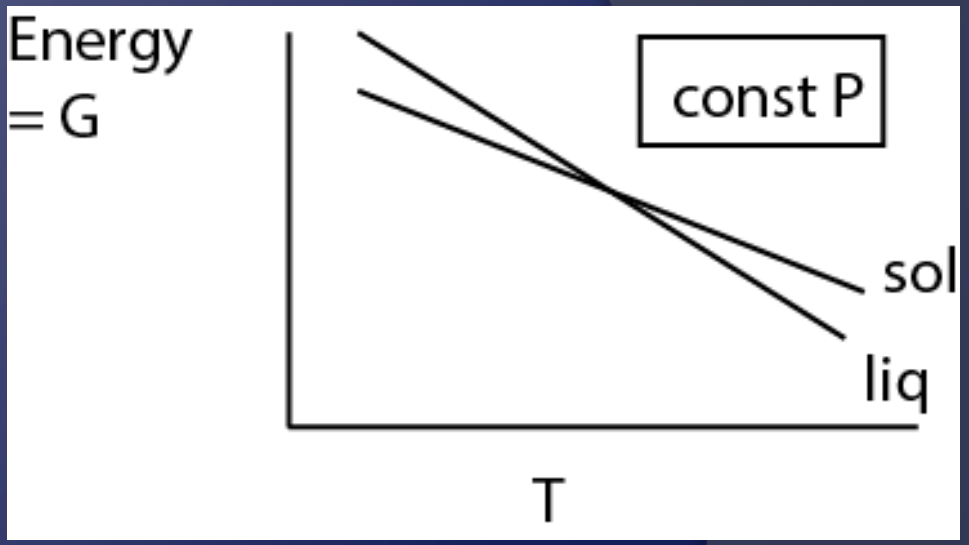
- Phase diagram = projection of the phase with the lowest G



Recap Lecture 4

- dG = -SdT + VdP: Gibbs-Duhem equation





- G or $\Delta G_F \neq \Delta G_R$

- $\Delta G_R = 0$: equilibrium
- $\Delta G_R < 0$: reaction proceeds to the right
- $\Delta G_R > 0$: reaction proceeds to the left

- $dP/dT = \Delta S_R/\Delta V_R$: Clapeyron equation
  - Positive if both ΔS and ΔV increase (or decrease)
  - Straight line: approximation

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PHASE RULE

- Phases stable for given P,T,X conditions.
- $\Phi_{max} = c + 2$
- $f = c + 2 - \Phi$

f: variance or degree of freedom

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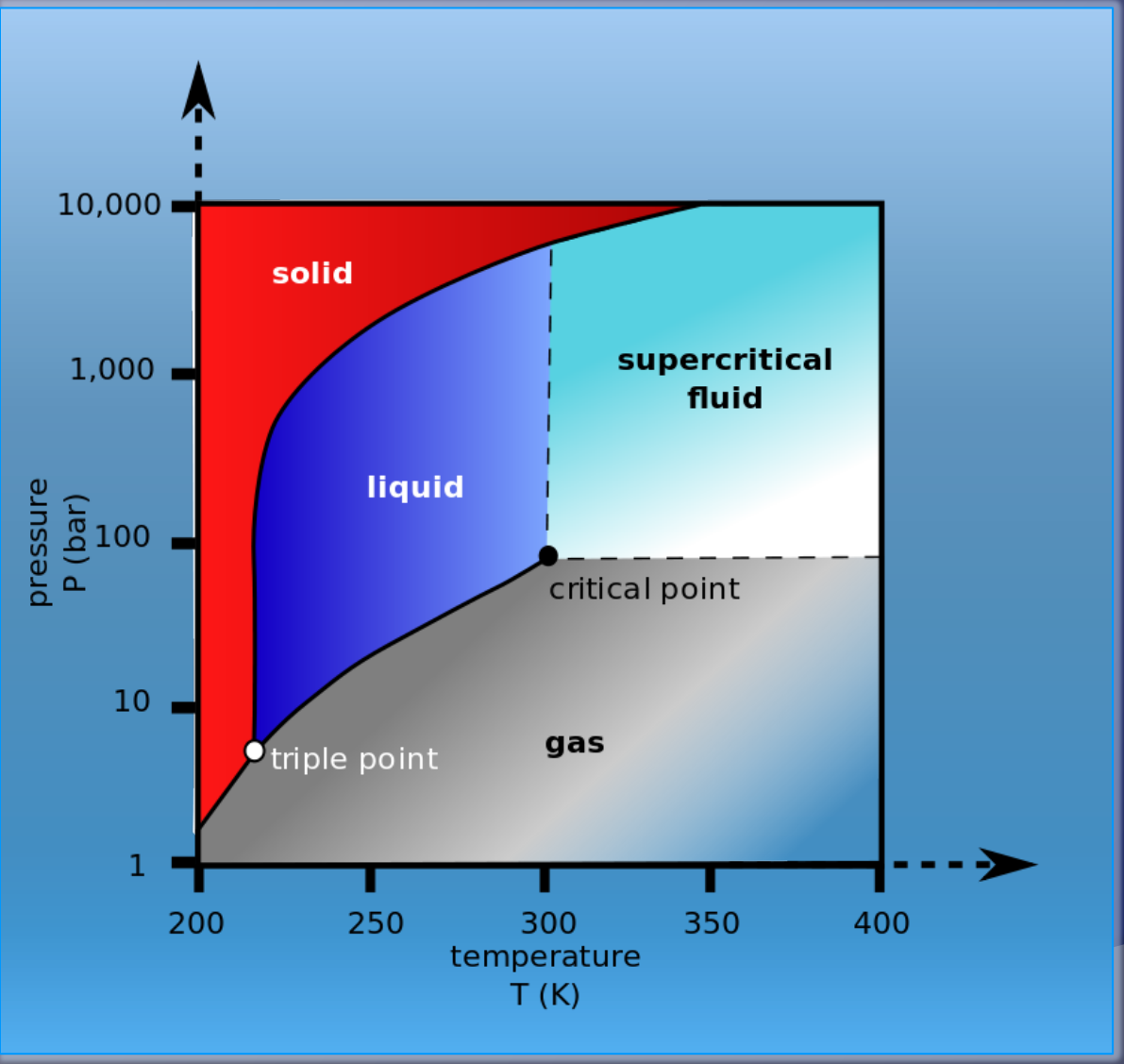
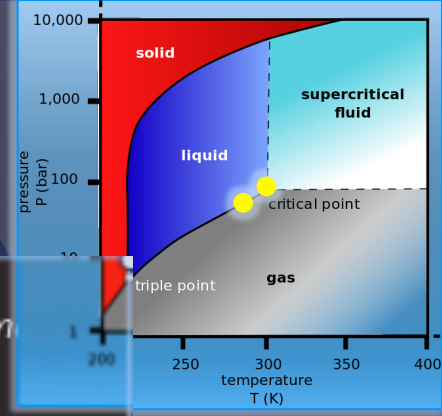
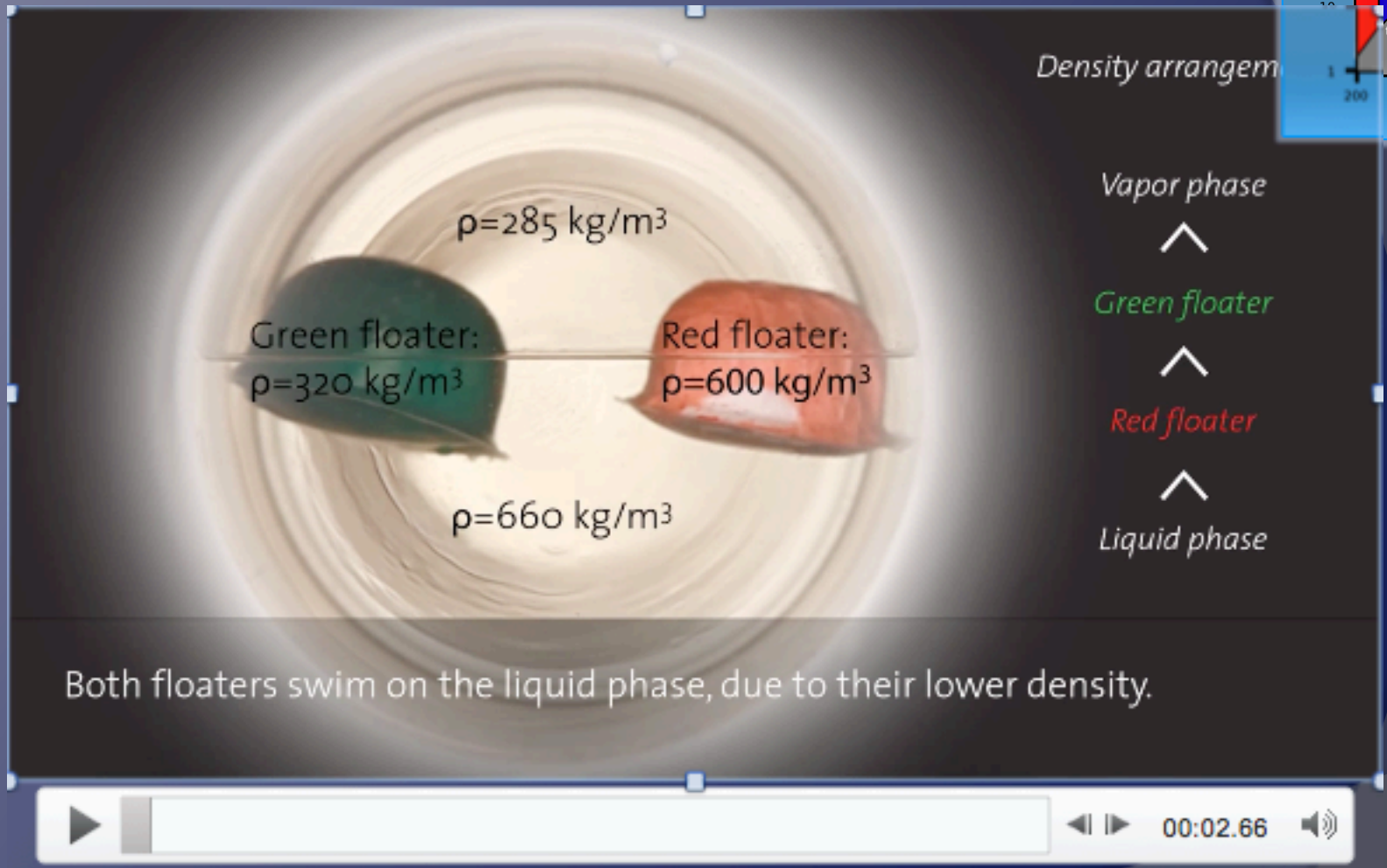
One component systems



CO_2

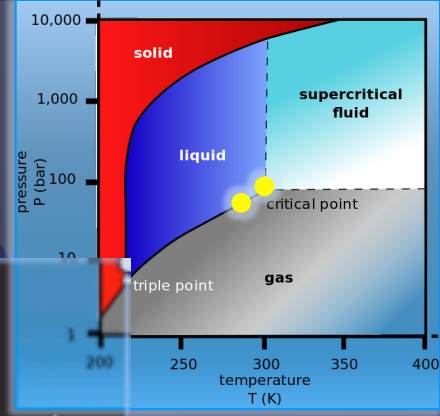
One component systems

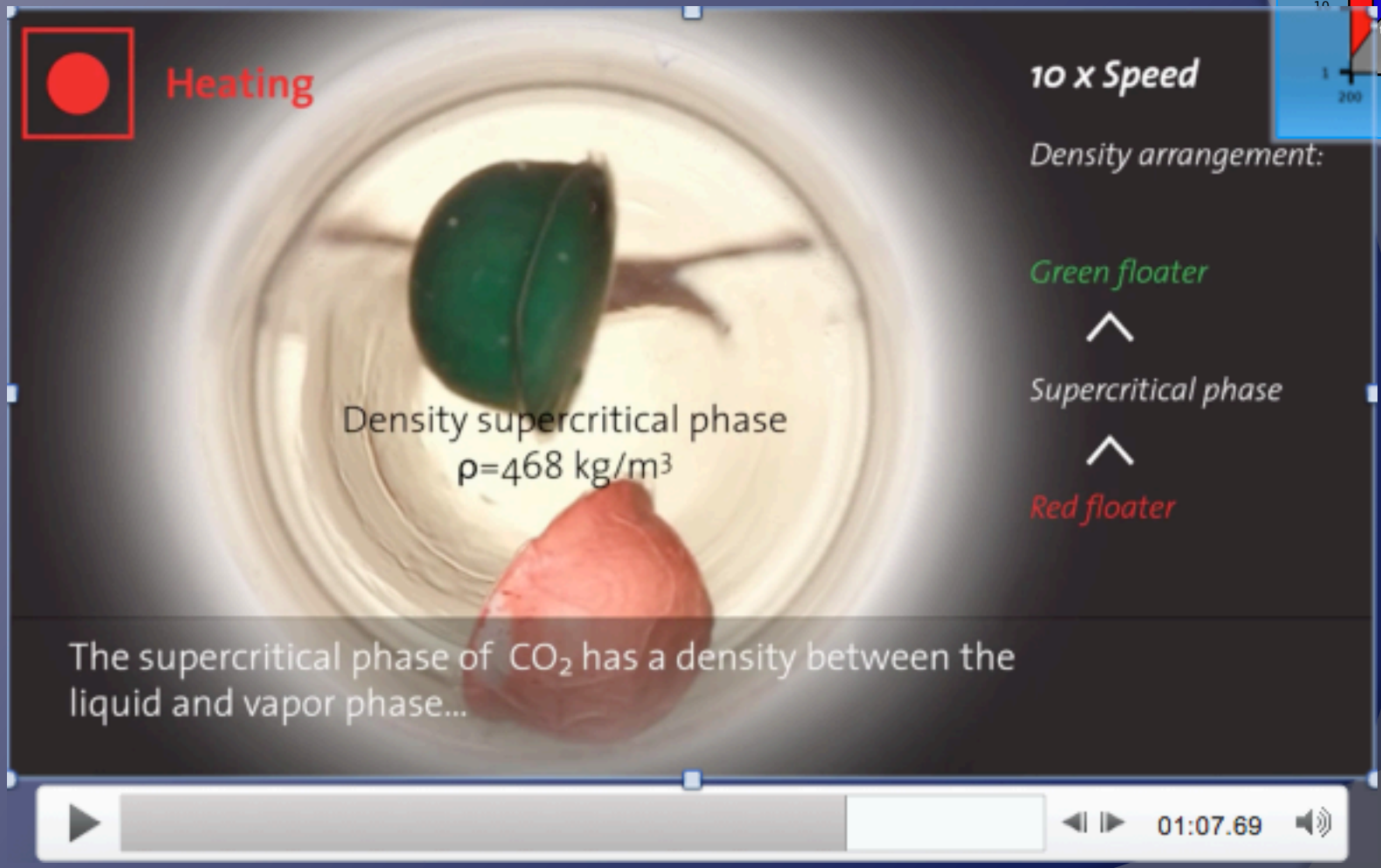




Source: Part of the exibition about CSS at ETH Zurich: https://www.youtube.com/watch?v=P9EftqFYaHg

One component systems





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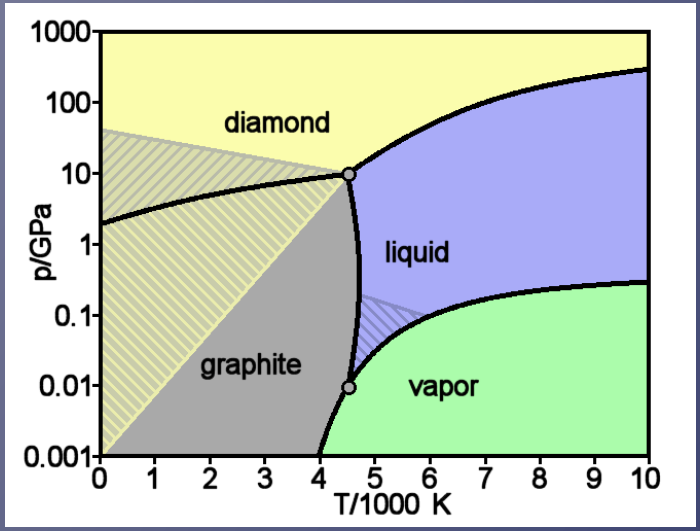
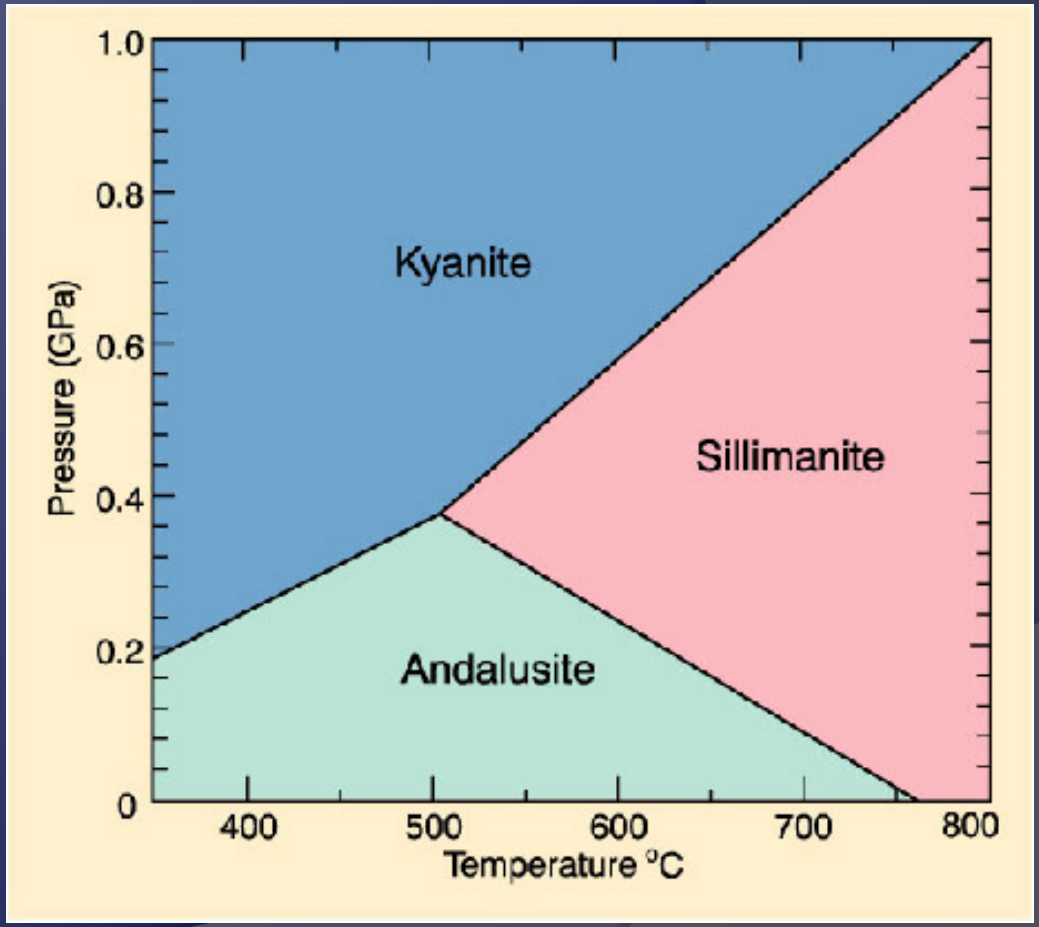
One component systems

C

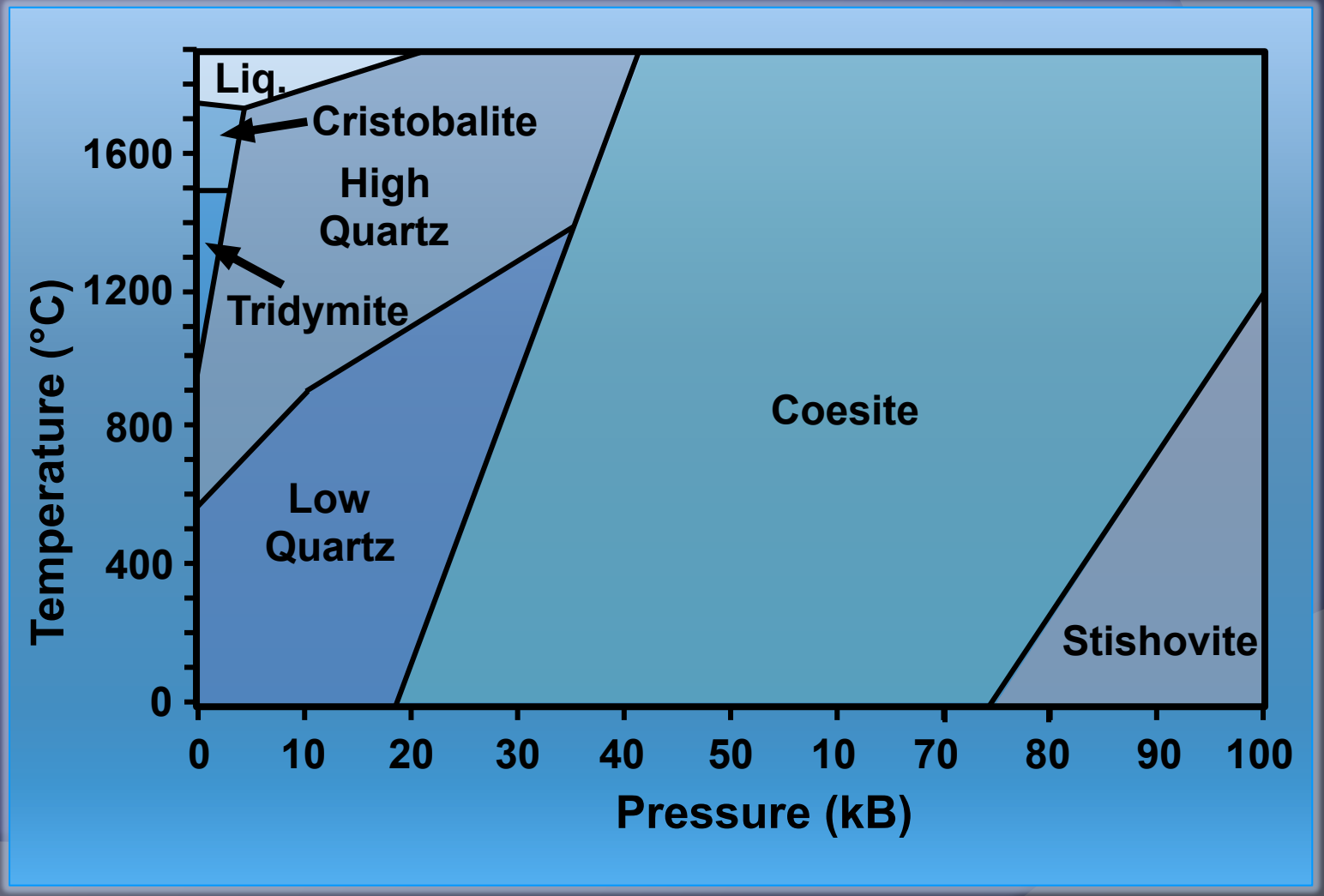


Al_2SiO_5

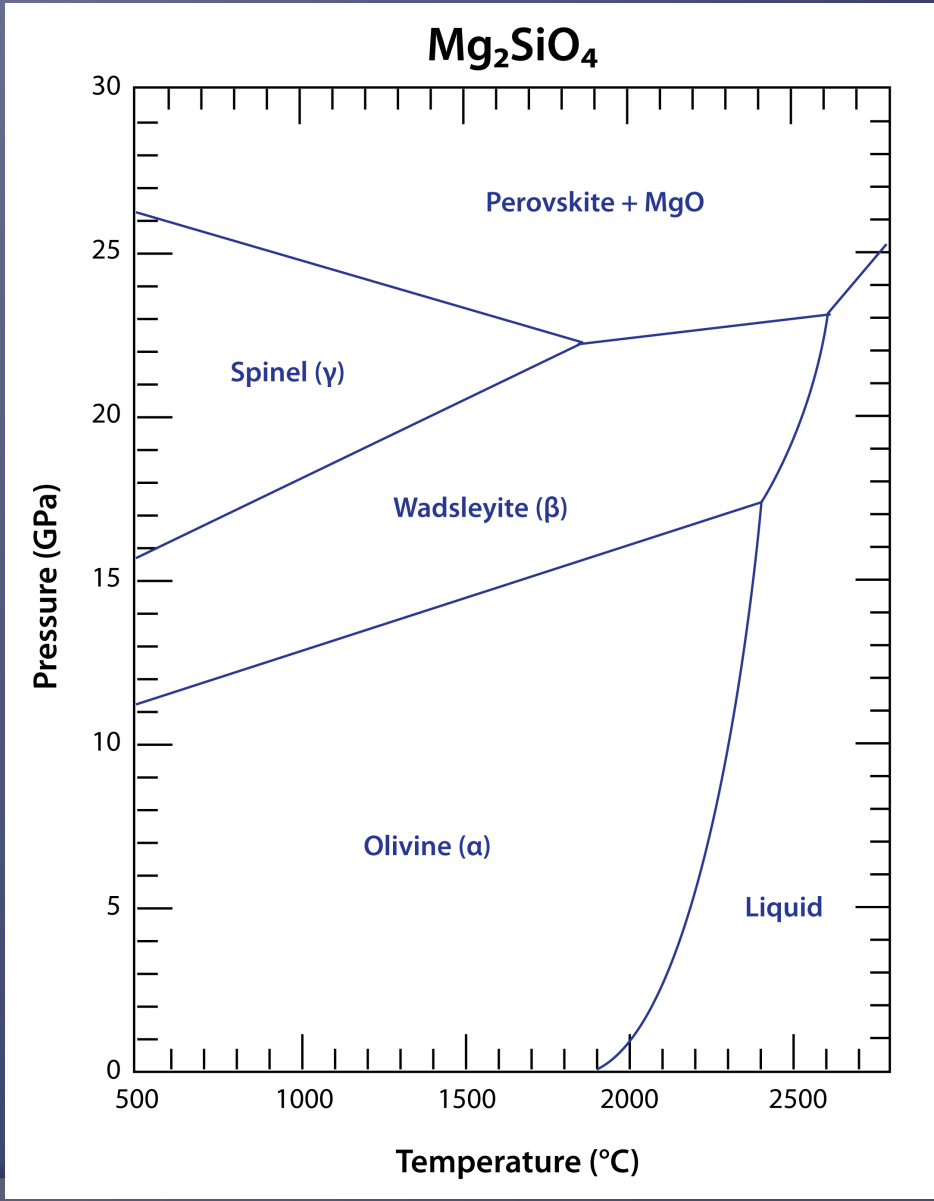


One component systems

SiO_2



One component systems



Forsterite

NEXT TIME

Two component diagrams

TO READ:

Chapters 2 Ehlers (smartsite)

FIGURE PRESENTATION