

Introduction to Phase Diagram

MSE-S203

(Phase Equilibria in Materials)

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Basics of Phase Diagram

➤ *Phase Diagram*

- Phase Diagram is a kind of chart which is used to explain conditions at which thermodynamic distinct phases can occur and coexist at equilibrium.
- Phase Diagram is a graphical illustration of the physical states of a substance under different conditions of temperature and pressure.

Basics of Phase Diagram

➤ *Phase Diagram*

- In other words, phase diagram is a graphical illustration of different phases of a substance(s) that coexist in a thermodynamic equilibrium and undergo phase changes at different operating conditions like temperature, pressure, composition, volume etc.
- The simplest phase diagrams are Pressure–Temperature Diagram of a single substance, such as pure water.

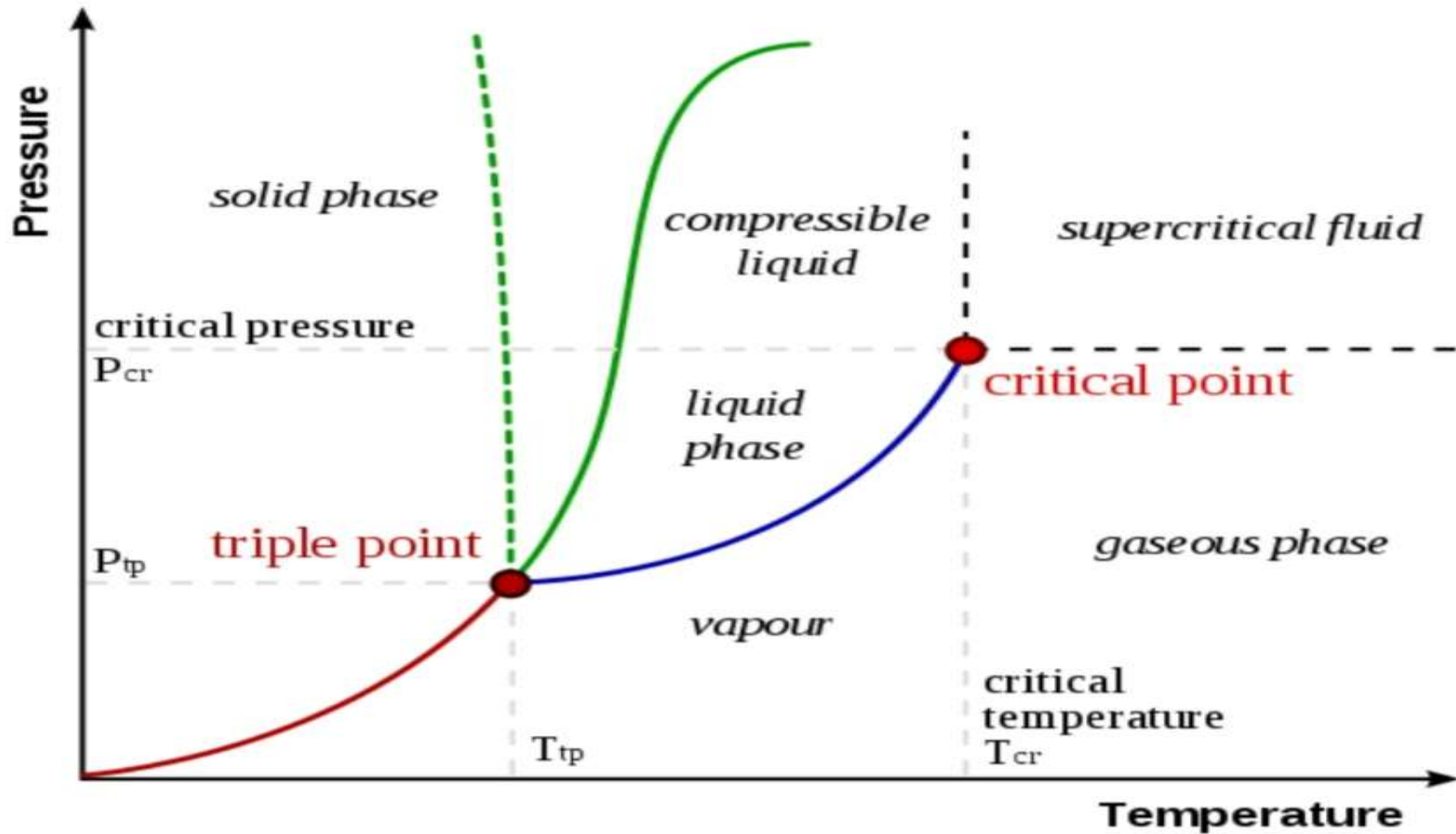
Basics of Phase Diagram

➤ *Phase Diagram*

- Generally, in unary phase diagram, the axes correspond to the pressure and temperature.
- Generally, in unary phase diagram, pressure on the y-axis and temperature on the x-axis.

Basics of Phase Diagram

➤ *P-T Phase Diagram*



Basics of Phase Diagram

➤ *Phase Diagram*

- In addition to temperature and pressure, other thermodynamic properties also may be graphed in phase diagrams.
- Examples of such thermodynamic properties include specific volume, specific enthalpy, specific entropy, etc.
- ***Example:*** Unary phase diagram for water/steam (Single-component graphs of Temperature vs. specific entropy).