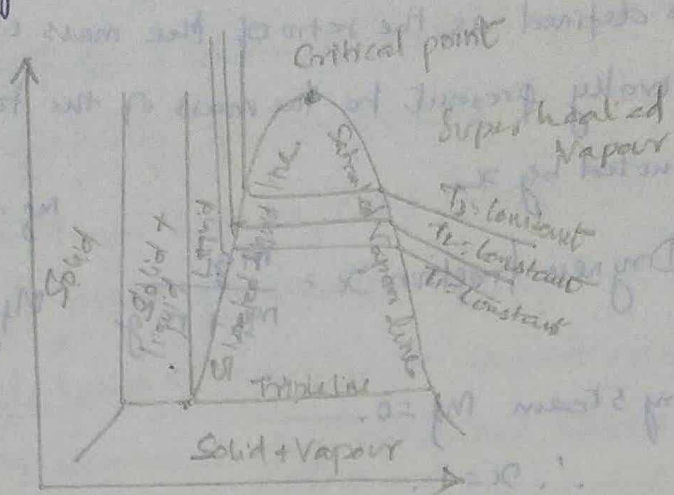


P-V Diagram.



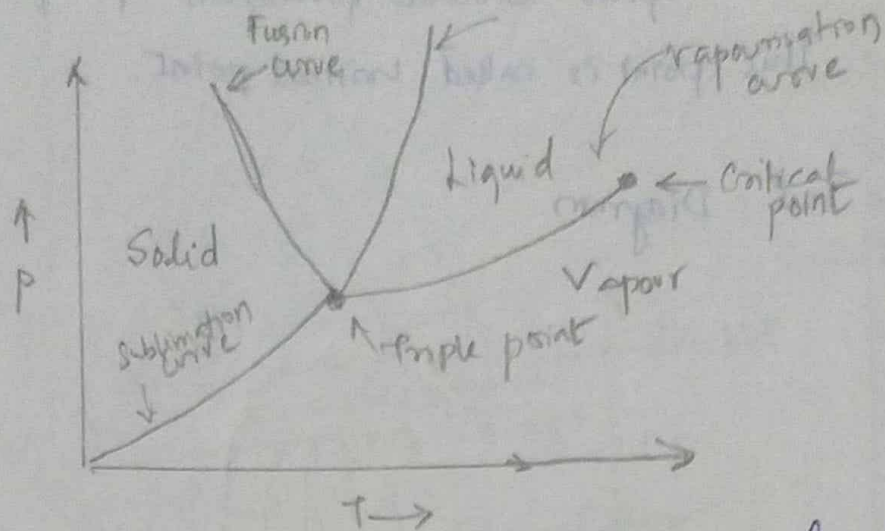
- > Specific volume is on x-axis and Pressure on y-axis.
- > The state of change of pure substance at different constant pressure are shown.

> On P-V Diagram, the triple states form a line called the triple line, where three phases solid, liquid and gas exist in equilibrium. It is called as Triple point
 273.16 K and 0.6113 kPa [For water]

> The saturated liquid line and saturated vapour line converge with increase in pressure, at a particular point liquid is directly converted into vapour without formation of liquid-vapour mixture. This point is called Triple point

The critical pressure, temperature and volume of water are 221.2 bar, 374.15°C and 0.00317 m³/kg

P-T Diagram

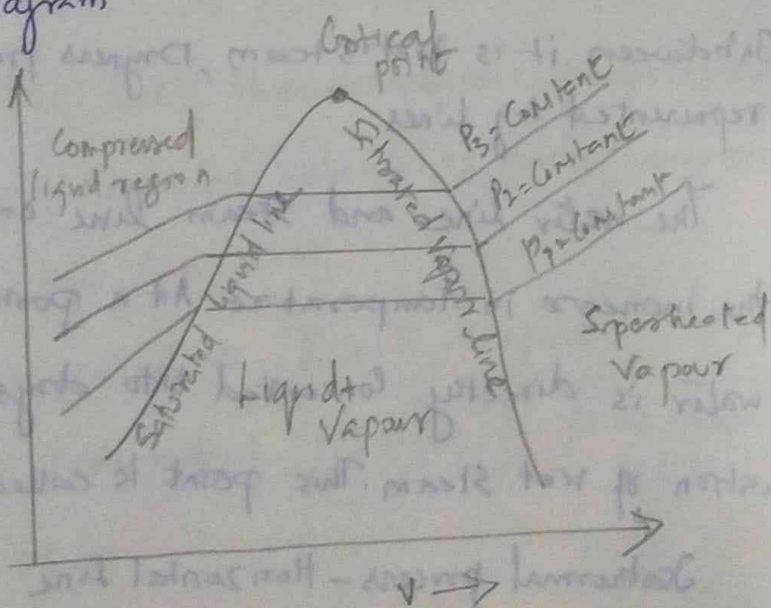


> The state changes of a pure substance when heated slowly at different constant pressure are plotted

> The diagram is called as phase diagram since all three phases are separated from each other from by lines.

- > Solid and Vapour - Sublimation Curve
- > Liquid and Vapour - Vapourisation Curve
- > Solid and liquid - Fusion or melting Curves.

T-V Diagram

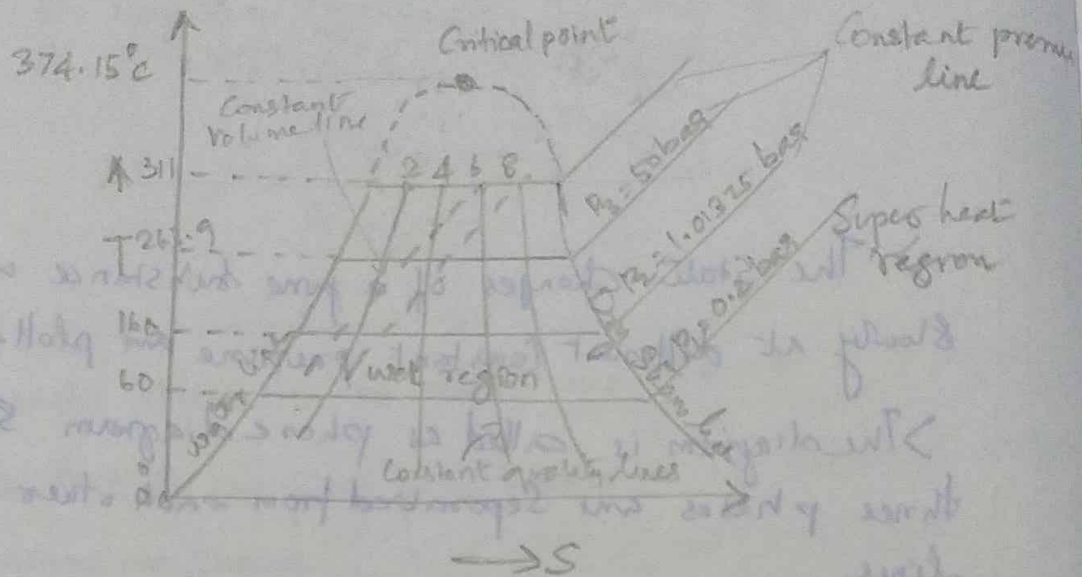


> The Saturated liquid line and Saturated Vapour line are converging with the Increase in pressure.

> At a particular point the liquid is directly converted

into vapour without formation of liquid vapour mixture.
This point is called critical point.

T-s Diagram



> It is the plot between temperature of water and steam to various pressures against the entropies.

> Left of water line it exists as water, Right side of the dry steam line, water exists as superheated steam.

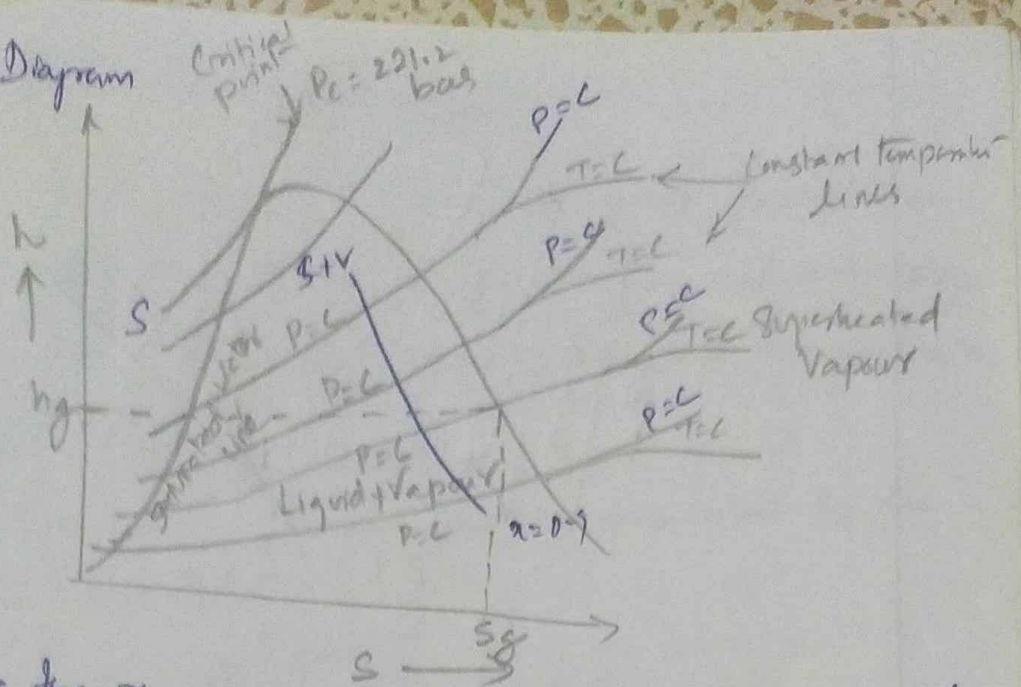
> In between it is wet steam, Dryness fraction lines are represented by lines.

The water line and steam line are converging with the increase in temperature. At a particular point the water is directly converted into dry steam without formation of wet steam. This point is called critical point.

Isothermal process - Horizontal line

constant volume lines in wet region and constant pressure lines in superheated region.

h-s Diagram



In this the x axis represents entropy and y axis enthalpy.

> The Region which is below the dry steam line is the wet condition of steam. parallel lines to the dry steam line are Dryness fraction lines.

> The region above the dry steam line represents the superheated condition of steam.

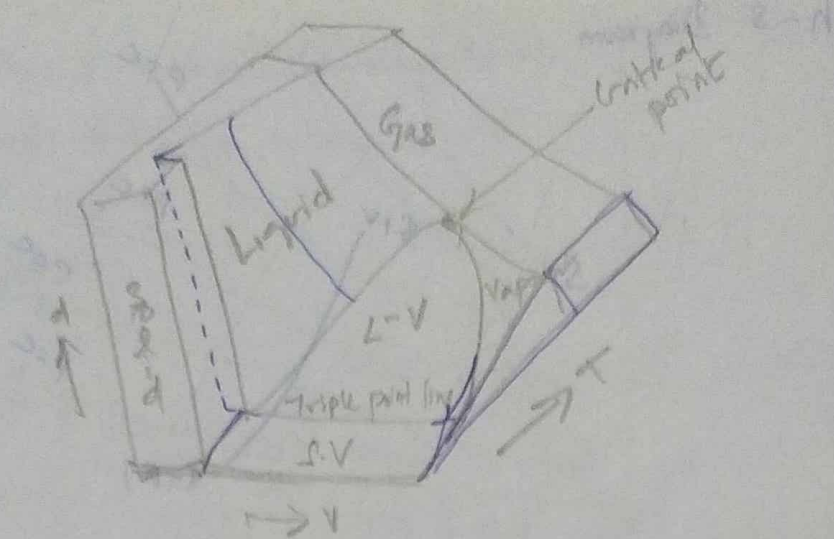
P-v-T Surface

The three thermodynamic properties such as pressure (p), specific volume (v) and temperature T are plotted in three dimensions.

This is called as P-v-T surface.

$T-v$ are independent variables. P as dependent variable. (PVS)

Variable. (CVS)



the region above the triple point line is the region where the liquid and gas phases are indistinguishable. The region below the triple point line is the region where the solid and liquid phases are indistinguishable. The region to the left of the triple point line is the region where the solid and gas phases are indistinguishable.

P-V diagram is a projection of the P-V-T surface on the P-V plane. P-V-T gives more information at once. It is more convenient to work with two dimensional diagrams such as P-V, P-T and T-V diagrams.

- (Specific heat of ice = 20.9 kJ/kg ($-10^\circ \text{ to } 0^\circ \text{C}$))
- (One Hour) Fusion = 335 kJ/kg
- $0^\circ \text{ to } 100^\circ \text{C} = 418.6 \text{ kJ/kg}$
- $100^\circ \text{C} - \text{Vaporization} = 2256.9 \text{ kJ/kg}$
- to $250^\circ \text{C} = 315 \text{ kJ/kg}$