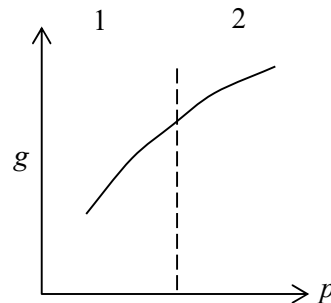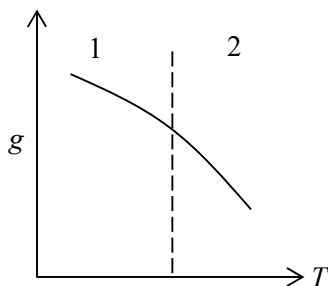# Chapter 11
Phase Transition and Low Temperature Physics

## 3. Second Order Phase Transition

In some cases the state of matter does not change but the arrangement of its constituent particle changes. This kind of phase transition is known as second order phase transition.

In the case of second order phase transition, no heat is evolved or absorbed. In second order phase transition

1. Gibbs free energy is continuous

H.N. 28 A/1, Jia Sarai, Near IIT-Delhi, Hauz Khas, New Delhi-110016
#: +91-89207-59559
Website: www.pravegaa.com | Email: pravegaaeducation@gmail.com

1

2. First order differential of Gibbs energy with respect to temperature i.e. entropy are changes smoothly
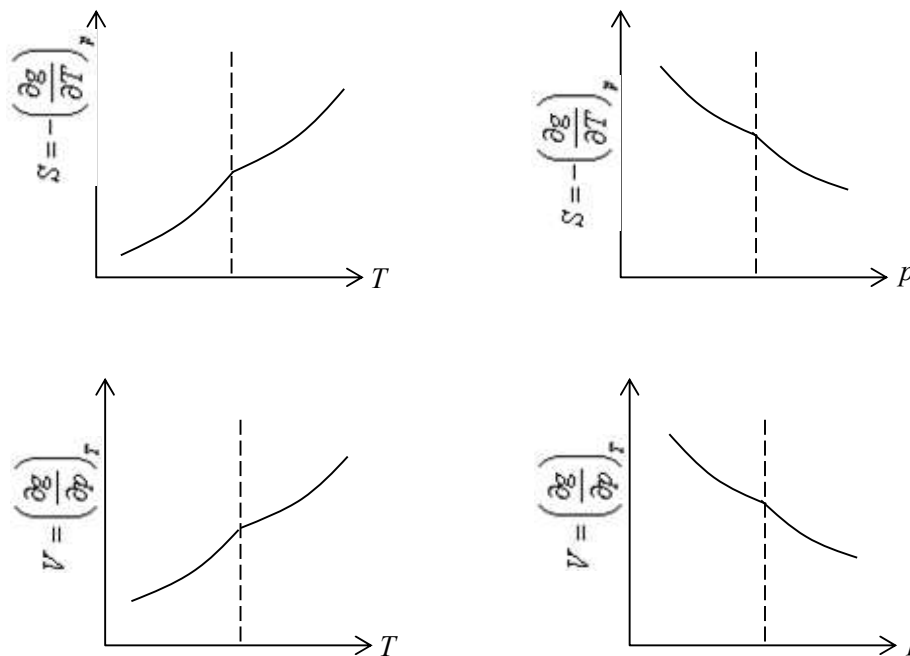
3. Second order differential of Gibbs energy with respect to temperature ie specific heat and second order differential of Gibbs energy with respect to pressure ie isothermal and isobaric expansivity have finite discontinuity at critical temperature.
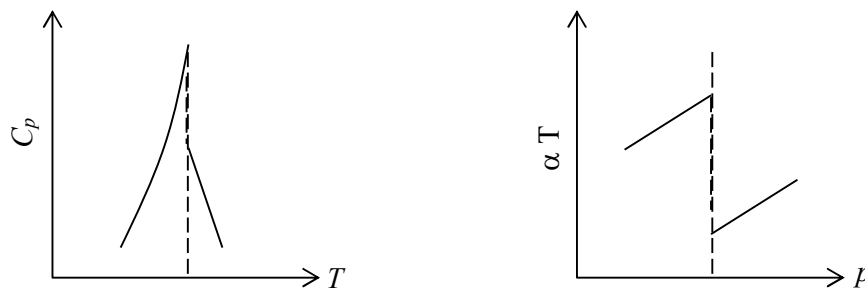

Figure 5: A schematic representation of a second order phase transition

4. The thermodynamic property which are determine by more than second order derivative will be infinite at critical temperature,
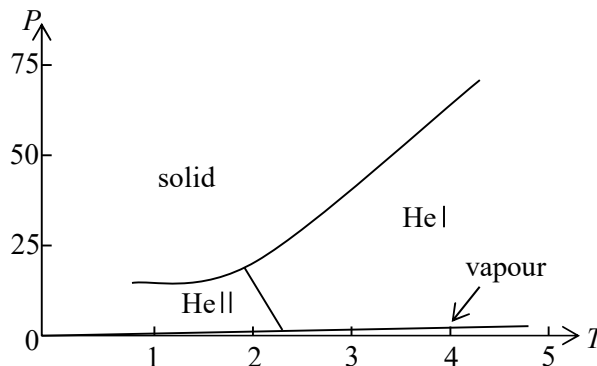

Figure: Phase diagram of helium

H.N. 28 A/1, Jia Sarai, Near IIT-Delhi, Hauz Khas, New Delhi-110016
#: +91-89207-59559
Website: www.pravegaa.com | Email: pravegaaeducation@gmail.com

2