Gibbs Phase Rule

- The number of variables which are required to describe the state of a system:
- p+f=c+2 f=c-p+2
  - Where p=# of phases, c= # of components, f= degrees of freedom
  - The degrees of freedom correspond to the number of intensive variables that can be changed without changing the number of phases in the system

Variance and f

- f=c-p+2
- Consider a one component (unary) diagram
- If considering presence of 1 phase (the liquid, solid, OR gas) it is divariant
- 2 phases = univariant
- 3 phases = invariant

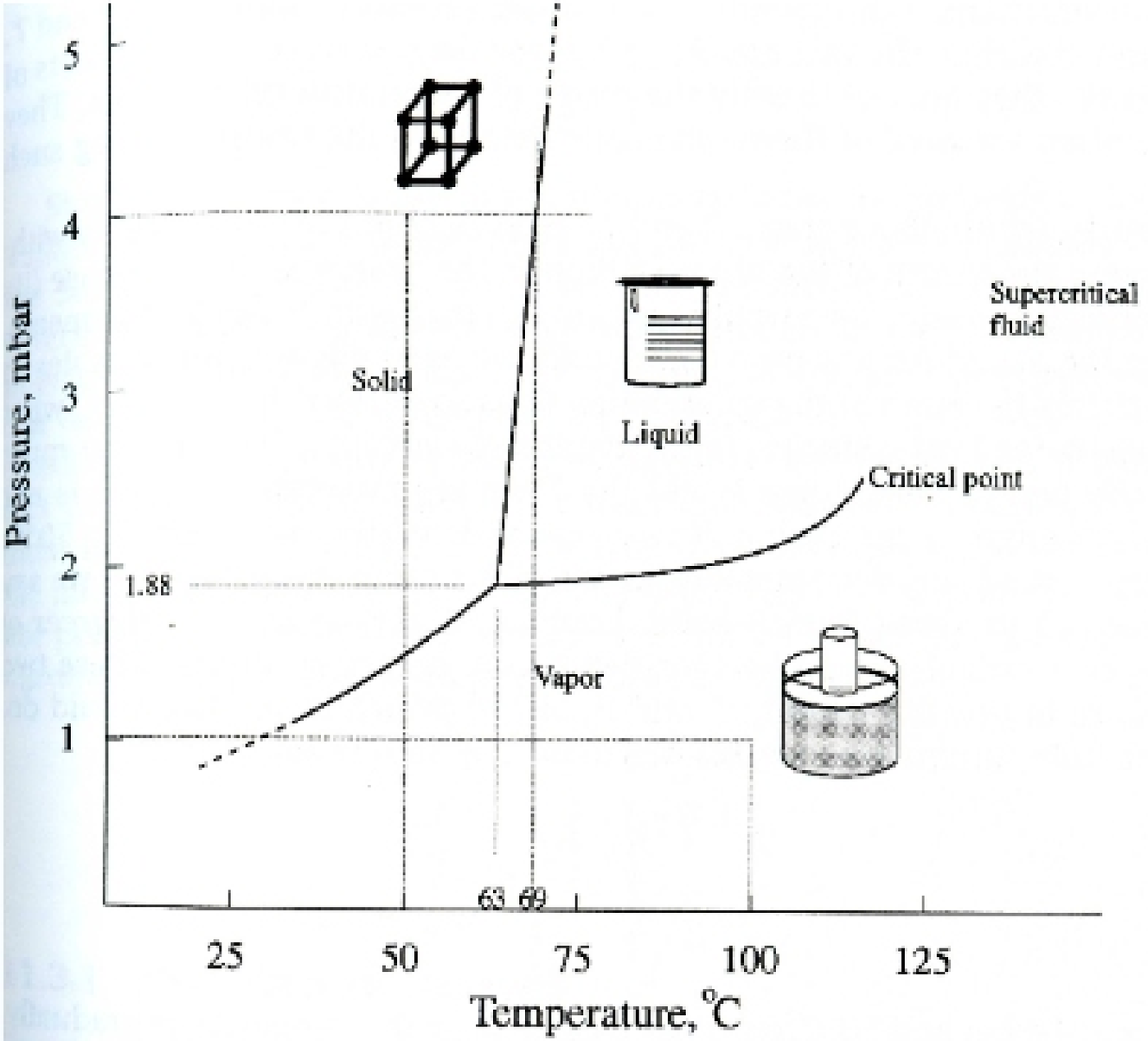

Figure 11.1: Phase diagram for hypothetical compound α.

Free Energy

- Gibbs realized that for a reaction, a certain amount of energy goes to an increase in entropy of a system.
- G = H –TS or $\Delta G^0_R = \Delta H^0_R - T\Delta S^0_R$
- Gibbs Free Energy (G) is a state variable, measured in KJ/mol

$$\Delta G^0_R = \sum_i n_i G^0_i(products) - \sum_i n_i G^0_i(\text{reactants})$$

- Tabulated values of ΔG^0_R are in Appendix