School of Chemistry and Biochemistry, TIET, Patiala
Applied Chemistry (UCB008); Session: 1718EVENSEM
Tutorial Sheet (Phase rule)

1. State phase rule.
2. Define phase, component and degree of freedom with examples.
3. Give the number of phases, components and degree of freedom for the following:
   (i) Mixture of N_2 and H_2 contained in a vessel
   (ii) Ice, water and vapour in equilibrium
   (iii) An unsaturated sugar solution
   (iv) Dissociation of NH_4Cl in a closed vessel
   (v) Dissociation of NH_4Cl in a closed vessel containing NH_3 also
4. Explain why KCl-NaCl-H_2O system should be regarded as a 3-component system whereas KCl-NaBr-H_2O system should be regarded as 4-component system.
5. Draw well labeled phase diagram of water system.
6. What is the effect of increase of pressure on the melting point of ice?
7. What is an invariant system? Give an example.
8. Differentiate between true and metastable equilibrium.
9. What is the difference between triple point and critical point?
10. What is the condensed phase rule?
11. Draw well labeled phase diagram of Pb-Ag system.
12. What is meant by term eutectic? State the condition in which two substances can form a simple eutectic.
13. Differentiate between triple point and eutectic point.
14. Explain the application of phase rule in Pattinson's process of desilverisation of Pb.
15. What metal will separate out when a liquid alloy of copper and aluminium containing 25 % copper is cooled, if the eutectic mixture includes 32.5 % Cu? How many grams of that metal can be separated from 200 g of alloy? **Ans. Al, 46.15 g**
16. An alloy of tin and lead contains 78% tin. Find the mass of the eutectic in 1 kg of solid alloy, if the eutectic contains 64% tin. **Ans. 611 g**
17. An alloy of Cd and Bi contains 25% Cd. Find the mass of eutectic in 1 kg of alloy, if the eutectic contains 40% Cd. **Ans. 625 g**
18. 1000 kg of a sample of argentiferrous lead containing 0.1 % silver is melted and then allowed to cool. If the eutectic contains 2.6% Ag, what mass of (i) eutectic will be formed and (ii) mass of lead will separate out? **Ans. 38.46 kg, 961.54 kg**