

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II B.Tech. II Sem., II Mid-Term Examinations, April – 2014

## METALLURGICAL THERMODYNAMICS AND KINETICS

## Objective Exam

Name: \_\_\_\_\_ Hall Ticket No. 

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**Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.****I Choose the correct alternative:**

1. The Ellingham diagram shows values of which thermodynamic quantity as a function of temperature [      ]  
 (a) Standard electrode voltage                      (b) Standard free energy change of reaction  
 (c) Partial pressure of gas                              (d) Enthalpy change of reaction
2. For a closed system at equilibrium at a temperature  $T$ , which of the following statements are true [      ]  
 (a)  $\Delta G = 0$                       (b)  $\Delta G^\circ = 0$                       (c)  $\Delta H = T\Delta S$                       (d)  $\Delta S = 0$
3. Why are the slopes of many of the lines on the Ellingham diagram almost identical [      ]  
 (a) Most reactions involve the elimination of one mole of gas, so there is a similar standard enthalpy change of reaction  
 (b) Most reactions involve the elimination of one mole of gas, so there is a similar standard entropy change of reaction  
 (c) The activity of most of the metals is the same  
 (d) The partial pressure of the reacting gas is the same for all reactions
4. What thermodynamic quantity does the intercept at  $T=0$  K for any standard free energy vs  $T$  line signify [      ]  
 (a) The approximate value of the standard entropy change  
 (b) The approximate value of the standard enthalpy change  
 (c) The equilibrium constant for the oxidation reaction  
 (d) Heat capacity of the oxide
5. What is the decomposition temperature (to the nearest 50 K) for  $\text{Ag}_2\text{O}$ ? (This question should be completed with the help of the interactive Ellingham diagram included with this TLP) [      ]  
 (a) 460 K                      (b) 500 K                      (c) 540 K                      (d) 600 K
6. What is the decomposition temperature (to the nearest 50 K) for  $\text{PdO}$  [      ]  
 (a) 1050 K                      (b) 1100 K                      (c) 1150 K                      (d) 1200 K
7. Which of the following elements can be used to produce Cr from  $\text{Cr}_2\text{O}_3$  at 1200K [      ]  
 (a) Mg                      (b) Co                      (c) Hf                      (d) Zr
8. Which one of the following processes is endothermic [      ]  
 (a) When concentrated sulfuric acid is added to water, the water gets hot  
 (b) When water is frozen in a freezer  
 (c) When glucose is metabolized to warm the body  
 (d) When Water is boiled in a kettle

9. Refrigerants commonly used for domestic refrigerators are [      ]  
(a) ethyl chloride or methyle chloride (b) freon-12 (c) propane (d)  $\text{NH}_3$  or  $\text{CO}_2$
10. Solid and liquid phases of a substance are in equilibrium at the [      ]  
(a) critical temperature (b) melting point (c) freezing point (d) both (b) and (c)

**II Fill in the blanks:**

11. In the ellingham diagram highly stable oxides are found at \_\_\_\_\_ position
12. The driving potential for diffusion is \_\_\_\_\_
13. A reaction for which the driving force is large then  $\Delta G$  is \_\_\_\_\_
14. Dimensions of diffusion coefficient is \_\_\_\_\_
15. Mass diffusion coefficient is \_\_\_\_\_ property of material
16. The rate equation for mass diffusion is \_\_\_\_\_
17. An increase in temperature tends to \_\_\_\_\_ the concentration polarisation by accelerating the diffusion of ions
18. Chemical reaction rates may be effected by the presence of \_\_\_\_\_
19. An increase in the slope of the curve corresponds to the \_\_\_\_\_ under going phase transformation
20. By increase in porosity the reaction rate \_\_\_\_\_

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