

TB146170A

Reg. No.....

Name.....

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017

SEMESTER VI - CHEMISTRY

CHE6EK - EQUILIBRIUM AND KINETICS

Time: Three Hours

Maximum Marks: 60

PART A

I. Answer all questions. Each question carries 1 mark.

1. The total differential of a state function is called
2. Which law describes the spontaneity of a process?
3. Name the correction factor used to correct the concentration of non-ideal solution.
4. In an isothermal process, the temperature of the system is maintained constant by exchanging with the surrounding.
5. Find the degree of freedom at triple point of water system.
6. How many components present in sulphur system.
7. The rate of acid catalysed ester hydrolysis in aqueous solution is directly proportional to the concentration of
8. For a reaction, $A \longrightarrow \text{Products}$, what will be the order of reaction if the rate is independent of reactant concentration.

(8x1= 8)

PART B

II. Answer any six questions. Each question carries 2 marks

9. What is meant by chemical potential and give any one of its significance.
10. What is the maximum possible efficiency of a heat engine that has a hot reservoir of water boiling at 125°C under a pressure and cold reservoir at 25°C.
11. Write the Gibbs Duhem equation for a mixture containing two components, which are designated as 'A' and 'B'.
12. Write down an equation that relates enthalpy of reaction, temperature and equilibrium constant.
13. Define a) degree of freedom and b) phase
14. Describe desilverisation of lead.
15. Differentiate congruent melting point and incongruent melting point.
16. Explain autocatalysis with example.
17. What is meant by steady state approximation?
18. What are consecutive reactions?

(6x2 =12)

PART C

III. Answer any four questions. Each question carries 4 marks.

19. Explain the effect of temperature on spontaneity of a process using Gibbs-Helmholtz equation.

20. Show that maximum convertibility of heat to work is less than 1.
21. Why total entropy change for a process under reversible and irreversible conditions are different?
22. State third law of thermodynamics. How it can be used to find the entropy of pure substance at 298K.
23. Explain the mechanism for the $\text{H}_2\text{-Br}_2$ combination to form HBr and write the rate law for the reaction.
24. What are freezing mixtures? Give two examples.

(4 x4 =16)

PART D

IV. Answer any two questions. Each question carries 12 marks

25. Discuss the following a) Reversible and Irreversible process b) Limitations of first law of thermodynamics c) Second law of thermodynamics d) Partial molar properties.
26. Express the free energy change in terms of change in temperature and change in pressure. Calculate the free energy change (ΔG) which occurs when 1 mole of an ideal gas expands reversibly and isothermally at 37°C from an initial volume of 55 dm^3 to 1000 dm^3 .
27. a) Derive equation for half life period of first and second order reaction.
b) Give a brief account on the methods for determining the order of reactions.
28. Draw the phase diagram of water system and explain.

(2x12 =24)