

2019/TDC/ODD/SEM/CHMHCC-303T/135

TDC (CBCS) Odd Semester Exam., 2019

CHEMISTRY

(3rd Semester)

Course No. : CHMHCC-303 T

(Phase Equilibria and Chemical Kinetics)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

(Marks : 20)

Answer **ten** questions, taking **two** from each Unit

UNIT—I

1. State and explain reduced phase rule equation. 2
2. Define congruent and incongruent melting points. 2
3. Calculate the number of components and degrees of freedom in an aqueous solution of NaCl. 2

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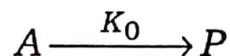
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UNIT—II

4. Explain CST. 2
5. Give a brief idea about minimum boiling azeotropes. 2
6. What is lever rule? Give one example. 1+1=2

UNIT—III

7. For a zero-order reaction



show that half-life period $t_{1/2}$ is equal to $[A]_0 / 2K_0$. 2

8. Write two limitations of collision theory of bimolecular gaseous reactions. 2
9. Define and explain temperature coefficient of a reaction. 2

UNIT—IV

10. What is auto-catalysis? Give one example. 1+1=2
11. "A catalyst provides an alternate path of lower or higher activation energy." Explain the statement. 2

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(3)

12. Give one example each of an acid-base and enzyme catalysis reaction. 1+1=2

UNIT—V

13. "Chemisorption is irreversible but physisorption is reversible." Explain why. 2
14. Write four factors which influence adsorption. $\frac{1}{2} \times 4 = 2$
15. Define adsorption isostere and explain it graphically. 1+1=2

SECTION—B

(Marks : 30)

Answer **five** questions, taking **one** from each Unit

UNIT—I

16. Discuss and draw the phase diagram for sulphur system. What are metastable equilibria? Explain. 4+2=6
17. (a) Derive Clausius-Clapeyron equation for either solid-vapour or liquid-vapour equilibrium. 3

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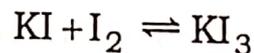
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- (b) Explain Pattinson's process for the desilverization of lead, using Ag-Pb phase diagram. Also mention how you can obtain argentiferous lead. 2+1=3

UNIT—II

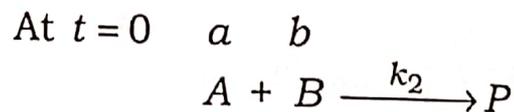
18. (a) Derive Gibbs-Duhem-Margules equation. 4
(b) Write the two essential prerequisites for validation of the Nernst distribution law. 2
19. (a) Determine the equilibrium constant of the following reaction using distribution law : 4



- (b) Explain steam distillation with a suitable example. 2

UNIT—III

20. Derive rate constant expression for the following second-order reaction :



Show that if $a \gg b$ or $b \gg a$, then the reaction will follow first-order kinetics. 4+2=6

(5)

21. Write 5-step mechanism for H_2-Br_2 chain reaction and derive expression for rate of formation of HBr, using steady-state approximation. 2+4=6

UNIT—IV

22. (a) Derive Michaelis-Menten equation. 4
(b) Differentiate between catalytic promoter and poison with suitable example. 2
23. (a) A hydrogenation reaction is carried out at 500 K. If the same reaction is carried out in presence of a catalyst at the same rate, the temperature required is 400 K. Calculate the activation energy of the reaction, if the catalyst lowers the activation energy of the reaction by 20 kJ. 4
(b) Give the mechanism of catalyzed reactions at solid surfaces. 2

UNIT—V

24. Give the main points of Langmuir theory of adsorption and hence deduce the Langmuir adsorption isotherm equation. Show that Freundlich isotherm is a special case of Langmuir isotherm. 2+3+1=6

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25. (a) Show different types of adsorption isotherm with the help of diagrams. 4
- (b) What do you understand by positive and negative adsorptions? 2
