

Term End Examination 2025-2026

Programme – B.Sc.(BT)-Hons-2024/B.Sc.(BT)-Hons-2025

Course Name – Chemistry

Course Code - BBT27102 (T)

(Semester II)

Time : 2:0 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

$$1 \times 10 = 10$$

1. Choose the correct alternative from the following :

- (i) Which color is observed at the end point of complexometric titration of water by EDTA?
- a) white
c) red
- b) blue
d) yellow
- (ii) During complexometric titration the pH of the system is maintained at.....
- a) 5
c) 1
- b) 7
d) 10
- (iii) Which of the following is responsible for the formation of hard scales in boiler?
- a) Calcium carbonate
c) Sodium chloride
- b) Calcium bicarbonate
d) Calcium silicate
- (iv) Rate expression of a chemical change is $-dx/dt = k[A]^2[B][C]^0$. The order of reaction is:
- a) 3
c) 2
- b) 1
d) 0
- (v) Number of α -Hydrogen present in the following species are respectively:
 $\text{CH}_3\text{-C}^+(\text{H})\text{-CH}_3$, Isopropyl- $\text{C}^+(\text{H})$ -Isopropyl, $\text{CH}_3\text{-C}^+(\text{Cyclohexane})\text{-CH}_2\text{CH}_3$
- a) 2, 6, 6
c) 6, 2, 6
- b) 6, 6, 2
d) 6, 2, 5
- (vi) Identify the compound that is better suited for use in a Friedel-Crafts reaction.
- a) Acetyl chloride
c) Methyl chloride
- b) Nitrobenzene
d) Aniline
- (vii) Show which of the following compounds has a meridional isomer.
- a) $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]^{2+}$
c) $[\text{Co}(\text{NH}_3)_4\text{Br}_2]\text{Cl}$
- b) $[\text{Cr}(\text{NH}_3)_4\text{ClBr}]\text{NO}_2$
d) $[\text{Pt}(\text{NH}_3)_4][\text{Pd}(\text{Cl})_4]$

coordination complexes.

a. Geometrical isomers of type MA_2B_2 .

b. Optical isomers of type $M(L-L)_3$.

8. How can a reaction equilibrium be identified as dynamic or static equilibrium? (5)
Utilizing the following equilibrium concentrations for forming NH_3 from N_2 and H_2 at 500K predict the equilibrium constant.

$$[N_2] = 1.5 \times 10^{-2} M \quad [H_2] = 3.0 \times 10^{-2} M \quad \text{and} \quad [NH_3] = 1.2 \times 10^{-2} M$$

Utilizing the following equilibrium concentrations for forming NH_3 from N_2 and H_2 at 500K predict the equilibrium constant.

9. Explain temperature coefficient of a reaction? Justify the modified Arrhenius equation (5)
by considering the collision theory.

The decomposition of hydrogen peroxide into water and oxygen was studied. The $KMnO_4$ solution and the following data were obtained.

(15)

Time (min) 0 10 20 30

Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

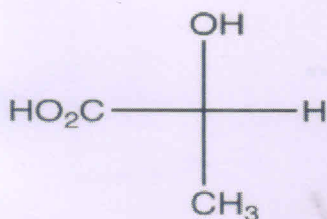
Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

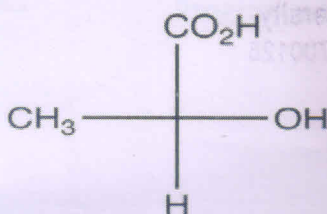
Volume of $KMnO_4$ solution (ml) 10 10 10 10

Volume of H_2O_2 solution (ml) 10 10 10 10

Volume of $KMnO_4$ solution (ml) 10 10 10 10



ii)



Group-C

(Long Answer Type Questions)

5 x 3=15

7. Illustrate each of the following cases by providing a suitable example of a pair of coordination complexes. (5)
- Geometrical isomers of type MA_4B_2 .
 - Optical isomers of type $\text{M}(\text{L-L})_3$.
8. How can a reaction equilibrium be identified as dynamic or static equilibrium? (5)
Utilizing the following equilibrium concentrations for forming NH_3 from N_2 and H_2 at 500K predict the equilibrium constant.
 $[\text{N}_2] = 1.5 \times 10^{-2} \text{ M}$, $[\text{H}_2] = 3.0 \times 10^{-2} \text{ M}$ and $[\text{NH}_3] = 1.2 \times 10^{-2} \text{ M}$.
9. Explain temperature coefficient of a reaction? Justify the modified Arrhenius equation (5)
by considering the collision theory.

OR

The decomposition of hydrogen peroxide into water and oxygen was studied. The concentration of hydrogen peroxide was determined by titrating against standard KMnO_4 solution and the following data were obtained: (5)

Time	0	10	20	30
Conc. of H_2O_2	0.1297	0.1162	0.1045	0.0940

Prove that the reaction is first order. Determine the half-life period of the reaction.