1B3N22015 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Chemistry Degree Examination, November 2022

BCH3B03 – Physical Chemistry – I

(2019 Admission onwards)

Time: 2 hours Max. Marks: 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2marks)

1. What is meant by critical pressure of a gas ?
2. Calculate $\frac{k_p}{k_c}$ for the reaction, $N_2(g)+O_2(g) \rightleftharpoons 2NO(g)$ at 27^0C.
3. Define Boyle temperature and write the expression for the calculation of Boyle temperature.
4. What is meant by Joule-Thomson effect? Give any one application of this effect.
5. What is compressibility factor? Explain its significance.
6. Calculate the work done during isothermal expansion of 5 moles of an ideal gas from 5 dm^3 to 15dm^3 at 25^0C.
7. Explain Stirling's approximation
8. What are ensembles?
9. State and explain the van't Hoff equation.
10. What are homogeneous and heterogeneous equilibria?
11. State and explain the improper axis of symmetry with an example.
12. Find the point group and list out the symmetry elements present in water and ammonia.

[Ceiling of marks: 20]

Section B (Paragraph)
(Answer questions up to 30 marks. Each question carries 5 marks)

13. Derive the relation between various equilibrium constants K_c, K_p and K_x.
14. Derive Gibbs- Helmholtz equation.
15. Calculate the entropy change (a) at constant volume and (b) at constant pressure when heating 5 moles of an ideal gas from a temperature 27°C to 527°C. assume C_V= 3/2R
16. Explain the term molecular partition function and explain the significance
17. Explain the terms absolute entropy and residual entropy.
18. Give the Maxwell's equation for the distribution of molecular velocities. Explain the effect of temperature on the distribution of molecular velocities.
19. Construct group multiplication table for C_{2v} point group.

[Ceiling of marks: 30]

Section C (Essay)

(Answer any one. Each question carries 10 marks)

20. Derive the relation between van der waals' constants and critical constants.

21. State *Le Chatelier* principle and predict the effect of pressure, temperature and concentration of the following equilibria,

$$N_2 + 3H_2 \rightleftharpoons 2NH_3\ ,\ \Delta H = -93kJ$$

[1 x 10 = 10 Marks]

13

1B3N22216 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Third Semester B.Sc Degree Examination, November 2022

BCH3C03 – Organic Chemistry

(2019 Admission onwards)

Time: 2 hours Max. Marks: 60

Section A (Short answers) (Answer questions up to 20 marks. Each question carries 2marks)

1. Explain steric effect with example?
2. Which is more stable bute-1-ene or but-2-ene. Why?
3. Explain the aromaticity of pyridine.
4. What is Fittig reaction?
5. Explain iodoform test.
6. What is Kolb's electrolysis?
7. Explain diazotisation reaction.
8. What is meant by vulcanisation?
9. Draw the structure of Nicotine and piperine.
10. What is meant by diastereoisomers?
11. What is Zwitter ion?
12. What is meant by denaturation of protein?

[Ceiling of marks: 20]

Section B (Paragraph)

(Answer questions up to 30 marks. Each question carries 5 marks)

13. Discuss the structure and stability of carbonium ions.
14. Aniline is more reactive towards electrophilic substitution reaction. But nitrobenzene is less reactive. Why?
15. Discuss the optical isomerism in tartaric acids.
16. How do the following compounds prepared and mention their uses
    a. Phenolphthalein b. Methyl orange
17. Explain the following reactions.
    a. Hoffmann's Bromamide reaction b. Carbylamine reaction c. Sandmayers reaction
18. Explain DNA fingerprinting and discuss its applications.
19. Discuss the structure of DNA.

[Ceiling of marks: 30]

Section C (Essay)

(Answer any one. Each question carries 10 marks)

20. Discuss the mechanism and stereochemistry of SN^1 and SN^2 reactions of alkyl halides

21. Explain the mechanism of the following reactions of benzene

a. Nitration b. Sulphonation c. Halogenation d. Friedel- Crafts alkylation

[1 x 10 = 10 Marks]