M.Sc.-III/CHEM-303C/18

M.Sc. 3rd Semester Examination, 2018

CHEMISTRY

(Physical Chemistry)

Paper : CHEM 303C

Course ID : 31453

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five*: 2×5=10

(a) "All the collisions are not effective for reaction"— Justify.

(b) What is 'Rearrangement Theorem'? Explain it.

(c) Write down Taft equation and explain the terms involved in it.

(d) What do you know about abelian group? Give an example.

(e) State the effect of pressure on reaction rate of a bimolecular gaseous reaction.

(f) Explain 'Similarity Transformation' with proper example.

(g) What is meant by the entropy of activation? How is it related to the frequency factor?

2. Answer *any four*: 5×4=20

(a) Discuss about the class of the elements in D_{4h} point group. 5

(b) Write down the expression of Hammett equation. Explain the significance of σ* value. 'Hydrolysis of ethyl *m*-nitro benzoate is 63·5 times faster than ethyl benzoate.' Explain. 1+2+2=5

(c) Give the stereographic projection with its group multiplication table for C_{2V} point group. 5

(d) Derive the expression of rate constant of a bimolecular unlike gaseous molecules. 5

(e) Comment on collision theory of reaction kinetics. 5

(f) State the mechanism for micelle formation. 5

3. Answer *any one* question: 10×1=10

(a) (i) Explain the effect of solvent on rate constant in terms of single sphere activated complex.

(ii) What is its usefulness?

(iii) Two reaction of same order have identical frequency factor and activation energy differ by 10 KCal. Find out the ratio of their rate constant. 5+1+4=10

(b) (i) What is character of matrices?

(ii) Show the character table for C_{3V} point group and explain it.

(iii) How does 'Great Orthogonality Theorem' work in symmetry representation? Explain it with your opinion. 1+4+5=10

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