# U.G. 2nd Semester Examination - 2022

# CHEMISTRY

## [HONOURS]

### Generic Elective Course GE)

### Course Code : CHEM-H-GE-T-2

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

*The figures in the right-hand margin indicate marks.*

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

1. Answer any **five** questions: 2×5=10

   a) $CO_2$ is non-polar, but $SO_2$ is polar - why?

   b) What do you mean by mean free path?

   c) Find out the structure of $XeF_2$ using VSEPR theory.

   d) What do you mean by Boyle Temperature?

   e) Explain pseudo-first order reaction with an example.

   f) KCl has much higher melting point than that of CuCl - why?

   g) Write down Bragg's equation for solid crystals and explain all the terms involved.



2. Answer any **two** questions: 5×2=10

   a) Derive the integrated rate law for a first order reaction and show that the time for the completion of (1/n)-th fraction of the reaction is independent of the initial concentration of the reactant. 3+2=5

   b) Draw M.O. diagram of oxygen molecule and explain why it is paramagenetic. What is the bond order of $O_2^+$ and $O_2^-$ ? 3+2=5

   c) What do you mean by critical temperature, critical pressure and critical volume of a van der waals gas? Between nitrogen and carbon dioxide, who has higher critical temperature and why? 3+2=5

3. Answer any **two** questions: 10×2=20

   a) Write down the basic postulates (maximum of four) of kinetic theory and use these postulates to establish the relation: $PV = (\frac{1}{3})\ mnc^2$ for an ideal gas. 4+6=10

   b) Explain the variation in bond angles in methane, ammonia, water and hydrogen sulphide. Why is the water liquid at room temperature, while hydrogen sulphide is a gas? Explain why $CCl_4$ is fairly inert, whereas $CCl_2$ is extremely reactive; on the other hand, $PbCl_4$ is less stable than $PbCl_2$. 4+2+4=10

c) Write down Born Lande equation and explain its significance. What is Madelung constant? Explain the Lindemann theory for unimolecular reaction. 3+2+5=10

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