

KATWA COLLEGE
3rd SEMESTER HONOURS COURSE
INTERNAL ASSESSMENT EXAMINATION – 2021
DEPARTMENT: CHEMISTRY

SUBJECT: Inorganic Chemistry II

COURSE CODE: CC-VI

FULL MARKS: 10

TIME: 1.00 P.M. – 2.00 P.M.

DATE: 07.01.2022

Answer any two questions.

2 x 5 = 10

1. Construct a Born-Haber cycle for KI. From there, calculate the electron affinity of iodine using the following data:

Lattice energy of KI(s) = 153.0 kcal/mol, Heat of formation of KI(s) = 78.3 kcal/mol, Sublimation energy of K(s) = 21.4 kcal/mol, Ionization energy of K(g) = 100.0 kcal/mol, Dissociation energy of I₂(g) = 51.0 kcal/mol.

2. (a) Write down Bent's rule and apply it to predict the position of oxygen in OSF₄ structure.

(b) What is the possibility of Ne₂ molecule to exist? Explain with the help of molecular orbital theory.

3. (a) "Fission of uranium nucleus is energetically more favourable than fission of oxygen."- Justify the statement on the basis of binding energy curve.

(b) Calculate the average nuclear binding energy for ⁵⁶₂₈Fe nuclide from liquid drop model. Given: values of a_v , a_s , a_c , a_a and a_p are 14.1, 13.0, 0.60, 19.0 and 34.0 MeV respectively.

4. (a) How many hydrogen bonds can a water and a methanol molecule form ?

(b) Why does boiling point of halogen molecules increase as we go down along the group?

(c) What are semiconductors? Why insulators are unable to conduct electricity?

5. (a) Predict the expected change in bond-order of the following transformation: NO → NO⁺ + e using molecular orbital theory.

(b) Compare the bond angles between NH₃ (107°) and PH₃(90°).

Send your answer script in a single .pdf file to the E-mail id: gtm.icbu@gmail.com mentioning your

Roll Number in the subject line.