24/12/24 A·M

Reg. No.: .....

Name:.....

U7500

University of Kerala

First Semester Degree Examination, November 2024

Four Year Under Graduate Programme

Discipline Specific Core Course

CHEMISTRY

UK1DSCCHE102 - CHEMICAL FRONTIERS – BONDING TO ENVIRONMENTAL PERSPECTIVES

Academic Level: 100-199

Time:1½ Hours **Max.Marks:**

42

Part A.
Answer All Questions, Objective Type. 1 Mark Each.
(Cognitive Level: Remember/Understand)
6 Marks. Time: 6 Minutes

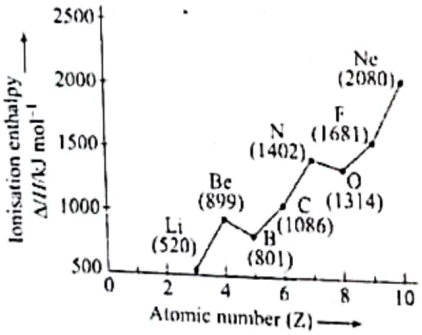
Qn. No.	Question	Cognitive Level	Course Outcome (CO)
1.	Name the block in the periodic table where elements with the outer electronic configuration ns^2np^5 are found.	Remember	CO-1
2.	What is the hybridization in IF_7 molecule?	Remember	CO-2,3
3.	Define an organometallic compound.	Understand	CO-4
4.	What do you understand by the term BOD?	Understand	CO-5,6,7
5.	What do you understand by intramolecular hydrogen bonding?	Understand	CO-2
6.	Name two major causes of air pollution.	Understand	CO-7

Part B.
Answer All Questions, Short Answer. 2 Marks Each.
(Cognitive Level: Understand/Apply)
8 Marks. Time: 24 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
7.	Define oxidation state and give an example of an element that exhibits multiple oxidation states.	Understand	CO-1
8.	Explain briefly the applications of organometallic compounds in agriculture?	Understand	CO-4
9.	Define Born Haber Cycle and explain how it can explain stability of NaCl.	Apply	CO-2,3
10.	Find the molarity of a solution of H_2SO_4 having 4.9g of it dissolved in 500 mL of solution?	Apply	CO-5,6,7

Part C.

Answer all 4 Questions, choosing among options within each question.
Long Answer. 7 marks each. (Cognitive Level: Understand/Apply/Analyze)
28 Marks. Time: 60 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
11.	a. i. Explain Pauli's Exclusion Principle and Hund's Rule, and describe how these principles contribute to the arrangement of electrons in orbitals. (4 marks) ii. Discuss the stability associated with completely filled and half-filled orbitals, providing examples to illustrate this concept. (3 marks) OR b. Define ionization enthalpy. Explain how ionization enthalpy vary across a period in a periodic table. Discuss the trend using the elements of second period as example. 	Understand	CO-1
12.	a. Discuss the biological and environmental aspects of organometallic compounds. OR b. Examine the general characteristics of organometallic compounds that contribute to their medicinal use, and explain how these compounds differ in their therapeutic mechanisms.	Understand	CO-4
13.	a. Apply your understanding of molecular geometry and dipole moments to compare polar and nonpolar molecules, using NH_3 and CO_2 as specific examples. How do their geometries and dipole moments determine their polarity? OR	Apply	CO-2,3

	b. A hypothetical molecule, XY_4, has a tetrahedral geometry. Based on this information, predict the hybridization of the central atom (X), the bond angles within the molecule, and the number of lone pairs on the central atom. Explain your reasoning using VSEPR theory.		
14.	a. How does the redox potential of the $Fe^{2+}/Cr_2O_7^{2-}$ system influence the suitability of diphenylamine as an indicator in redox titration? OR b. Analyze the greenhouse effect and its intensification due to human activities, specifically examining the contributions of CO_2, methane, and CFCs, and assess the potential long-term impacts on global climate.	Analyze	CO-5,6,7