

International Islamic University Chittagong

Department of Computer Science and Engineering

Mid Examination, Spring 2022

Course Code: CHEM- 2301

Course Title: Chemistry

Total Marks: 30

Time: 1.5 Hours

Semester: 3rd

Answer the following questions

1. a) How will you distinguish between Isotope and Isobar? 3 CO1

OR

Fill in the gaps of the following table and Find out the isotopes, isobars and isotones from it and also write their chemical formulae.

Name	Atomic number (Z)	Mass number(A)	Proton number (p)	Neutron number(n)
A	6			6
B		64		36
C		30	14	
D		14		8
E			30	34
F		32		16

- b) Na and K are in the same group in the periodic table. Based on their locations show the differences in their a) Atomic Radius b) Ionization potential c) Electronegativity. 3 CO2

OR

Discuss the classification of elements based on electronic configuration. Find out the period and group of the following elements-

a) Ar (18)

b) Zn (30)

- c) Write a note on Octet theory of valency and its limitations. 2 CO2

OR

Discuss the electronic configuration of Cr (24) and Cu (29)

- d) Write the difference between orbit and orbital. 2 CO1

2. a) Arrange the following orbitals according to order of higher energy- 3 CO2
7p, 6d, 3u, 5d, 4f, 4s

OR

Write a note on Aufbau Principle and its limitations.

- b) Which of the following sets of quantum numbers are allowable or not allowable and why? 3 CO2
- | | | | | |
|------|-----|-----|-------|---------|
| i. | n=4 | l=1 | m=+1 | s= +1/2 |
| ii. | n=2 | l=0 | m=-2 | s= -1/2 |
| iii. | n=3 | l=3 | m= 0 | s= +1/2 |
| iv. | n=4 | l=2 | m=+2 | s= -1/2 |
| v. | n=1 | l=0 | m= 0 | s= +1/2 |
| vi. | n=4 | l=3 | m= +4 | s= -1/2 |

OR

Show the formation of N₂ using MOT. Is it paramagnetic or diamagnetic?

- c) Why 3f is not possible? 2 CO2
- d) Suppose an electron is in 4f electrons. Find out the probable four quantum number values for it. 2 CO3
3. a) State the Modern Periodic Law. What are its features? 2 CO1
- b) Why and how atoms combine together? 2 CO1
- c) Define Hybridization of orbitals. Discuss the SP² and SP Hybridization process and draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C₂H₄ and C₂H₂ molecules. Also mention the bond angles, shapes, s-character and p-character. 4 CO3

OR

Define Hybridization of orbitals. Find the number of sigma and pi-bonds in the following molecules:

H₂O b) C₂H₄ c) C₂H₂ d) SO₃

- d) Discuss the ionic bond with suitable example and necessary diagrams. 2 CO3