

Mid-West University
Examinations Management Office
Surkhet, Nepal
End Semester Examinations -2078

Bachelor level/ B.Sc / 5th Semester

Time: 3 hrs

Subject : Advanced Chemistry (CHE 453)

Full Marks : 100

Pass Marks : 50

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

The figures in the margin indicate full marks.

Inorganic Chemistry

Group: A

Answer any Seven questions in very short.

[7X2=14]

1. Define protic and aprotic solvents with examples.
2. Differentiate between homo and co-polymers.
3. Which of them is better solvent liquid ammonia or water.
4. What is organo metallic compound.
5. Write the IUPAC name of the following compound
 - a. $\text{Fe}(\text{C}_5\text{H}_5)_2$
 - b. $(\text{CO})_3\text{Co}(\text{CO})_2\text{Co}(\text{CO})_3$
6. Write the general properties of inorganic polymers.
7. Write the oxidative addition reaction of organometallic compound.
8. What is Wilkinson catalyst. Write its uses.
9. What is borazine.

Group: B

Short questions. (Attempt all questions)

10. Define metallocene? Write the mechanism for the polymerization of alkene by using Ziegler-Natta catalyst? [6]
11. Write short notes on (Any Two) [2X3=6]
 - a. Condensation polymer
 - b. Boron nitride
 - c. Metal alkyls of group I

12. Why liquid NH_3 behaves as better solvent? Write the reaction for

[7]

- a. Acid-base reaction
- b. Precipitation reaction
- c. Complex formation

OR

Why liquid SO_2 behaves as better solvent? Write the reaction for

- a. Acid-base reaction
- b. Precipitation reaction
- c. Complex formation

Organic Chemistry

Group-A

Answer any Seven questions in very short.

[7X2=14]

1. What are heterocyclic compounds? Draw the structure of pyrrole and thiophene.
2. Give any two methods for preparation of pyrrole.
3. Compare the basicity of pyrrole with pyridine.
4. Assign the different regions of electromagnetic spectrum that are useful for UV-VIS, IR and NMR spectroscopic techniques.
5. Define the terms: base peak and fragment ion peaks.

- How does IR spectroscopy help to distinguish between aldehyde and ketone?
- Why TMS is used as a reference standard in NMR spectroscopy?
- Define auxochrome and chromophore.
- Differentiate between ^1H and ^{13}C spectroscopy.

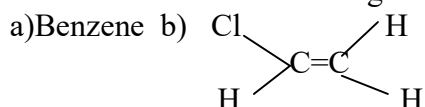
Group B

Short questions. (Attempt all questions)

- Discuss the electrophilic substitution reaction of thiophene. What happens pyridine reacts with nitrating mixture and sulphonation? [4+1+1=6]
- Elaborate the principle of NMR spectroscopy. Write its applications. [4+2=6]
- What is mass spectrometry? Write the basic principle of MS. Neopentane gives fragmentation peaks at $m/z=72, 41$ and 29 among many peaks. Suggest the structure of fragmented ions. [1+4+2=7]

OR

Discuss chemical shift. Define spin-spin coupling and coupling constant. How many ^1H -signals are obtained in the following compounds?



Physical Chemistry

Group A

Answer any Seven questions in very short.

[7X2=14]

- Define the term i) phase ii) triple point
- What is condensed system? Give the phase rule equation for a condensed system.
- State Henry's law and discuss its limitation.
- A mixture of alcohol and water cannot be completely separated by fractional distillation why?
- Define the term critical solution temperature by taking the example of phenol-water system.
- Discuss the theory of solvent extraction.
- Difference between ideal and non ideal solution?
- Write short notes on crystal structure of NaCl.
- State Bragg's law for X-ray diffraction and write any one its application.

Group B

Short questions. (Attempt all questions)

- What are stoichiometric compounds? Describe the defects arise in stoichiometric compounds. [2+4=6]
- Draw the phase diagram of phenol - water system and describe its main features. [6]
- State Nernst distribution law. What are application and limitation of this law? How distribution law is modified when there is association or dissociation of solute in one of the solvents? [2+2+4=8]

OR

Draw a labeled phase diagram for $\text{FeCl}_3 \cdot \text{H}_2\text{O}$ system. Discuss the importance of various points, lines, curves and areas.

THE END