KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Marks Scored:

Level : B.Sc./B.Tech.
Year : I
Exam Roll No. :
Registration No.:

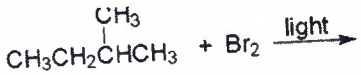
Course : CHEM 103
Semester : II
F. M. : 20
Time: 30 mins.
Date 09 JUL 2024

SECTION "A"
[20Q. × 1 = 20 marks]

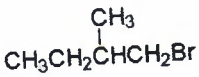
Choose the most appropriate answer and mark [X] in the box.

1. Which of the following alkyl halides would undergo SN2 reaction most rapidly?
[ ] CH_3CH_2-Br [ ] CH_3CH_2- Cl [ ] CH_3CH_2-I [ ] CH_3CH_2-F

2. Bromination of alkanes is a much slower reaction than chlorination. Which of the following is expected to be the major organic product when 2-methylbutane is allowed to react with



Br2 in the presence of light or heat?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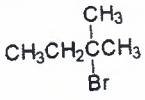
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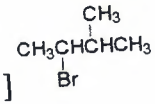
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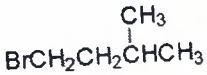

[ ]

3. Which of the following statements is TRUE?
[ ] Enantiomers are mirror images that are not superimposable.
[ ] A molecule that is superimposable on its mirror image is chiral.
[ ] A chiral molecule usually contains a plane of symmetry.
[ ] An achiral molecule does not contain a plane of symmetry.

4. A solution containing 0.4 g/mL of a pure S enantiomer is a 5 cm polarimeter rotates plane polarized light by +5.6°. What is the rotation of a solution containing 0.8 g/mL of the R enantiomer in the same polarimeter
[ ] +22.4 [ ] -22.8 [ ] +11.2 [ ]-11.2

5. The reactions that are favored by the polar aprotic solvent are _____
[ ] S_N1 reaction
[ ] Both S_N1 reaction and S_N2 reaction reactions
[ ] S_N2 reaction
[ ] None of these

6. Hyration of 2-methyl-propene (with H_2O/H_2SO_4) gives:
[ ] $CH_3CH_2CH_2$-OH [ ] $(CH_3)_3C$-OH
[ ] $CH_3CH_2CH_2CH_2$-OH [ ] $(CH_3)_2CH$-OH

7. The hydroboration-oxidation reaction can be characterized as the _____ to an alkene.
[ ] anti-Markovnikov syn addition of water
[ ] anti-Markovnikov anti addition of water
[ ] Markovnikov syn addition of water
[ ] Markovnikov anti addition of water

8. Dehydrohalogenation of 2-bromobutane in the presence of a strong base proceeds via which of the following mechanistic pathways?
[ ] SN1 [ ] SN2 [ ] E1 [ ] E2

9. The correct IPAC name of [$Pt(NH3)_2$ Cl2] is
[ ] Diamminedichloridoplatinum (II) [ ] Diamminedichloridoplatinum (IV)
[ ] Diamminedichloridoplatinum (0) [ ]Dimminedichloridеplatinum (IV)

10. Crystal Field Theory) Strong field ligands such as CN^-:
[ ] usually produce high spin complexes and small crystal field splittings.
[ ]usually produce low spin complexes and small crystal field splittings.
[ ] usually produce low spin complexes and high crystal field splittings.
[ ] usually produce high spin complexes and high crystal field splittings.

11. (Crystal Field Theory) When the valence d orbitals of the central metal ion are split in energy in an octahedral ligand field, which orbitals are raised **least** in energy?
[ ] d_{xy} and $d_x2_{-y}2$ [ ] d_{xy}, d_{xz} and d_{yz}
[ ] d_{xz} and d_{yz} [ ] d_{xz}, d_{yz} and d_z2

12. Primary and secondary valency of Pt in [Pt (en)2Cl2] are
[ ] 4,4 [ ] 4,6 [ ]6,4 [ ] 2,6

13. If the specific rotation of (-)-Fucitol is +50°, and the rotation of a sample of Fucitol is measured to be –10°, what is the percentage composition of (+)-Fucitol and (–)-Fucitol in the sample?
[ ] 60% (+)-Fucitol, 40% (-)-Fucitol [ ]50% (–)-Fucitol, 50% (+)-Fucitol
[ ] 40% (+)-Fucitol, 60% (-)-Fucitol [ ]70% (–)-Fucitol, 30% (+)-Fucitol

14. Which one of the following complexes can exhibit geometrical isomerism?
[ ] $[Pt(NH_3)_2Cl_2]$ (square planar) [ ] $[Zn(NH_3)_2Cl_2]$ (tetrahedral)
[ ] $[Cu(NH_3)_4]^{2+}$ (square planar) [ ] $[Co(NH_3)_5Cl]^{2+}$(octahedral)

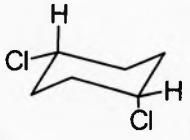
Fill in the blanks.

15. The name of the compound K_2[Cr CO $(CN)_5$] is_____

16. The molecular formula of Diamminetetraaquacobalt (III) chloride is _____

17. The highest to lowest priority order of the groups (CH_2OH, CH_2OCH_3, CH=O and CO_2H) in the Cahn-Ingold-Prelog sequence rules is_____

18. Consider the SN1 reaction of tert-butyl chloride with iodide ion:
$(CH_3)_3C\text{-}Cl + I^- \longrightarrow (CH_3)_3C\text{-}I + Cl^-$
If the concentration of iodide ion is doubled, the rate of forming tert-butyl iodide will:_____

19. 

name of the compound is_____

20. The difference in potential energy between half chair and boat conformations is_____