



Uva Wellassa University of Sri Lanka
Faculty of Science & Technology

Science & Technology Degree Program
1st Semester Examination - March/April 2013



SCT 232-1 Organic Chemistry

Instructions to candidates

No. of questions: six (06)

Answer all questions

Time allocation: one (01) hour

Total marks allocated: 100 marks

1. Compound A is an asymmetric organic molecule. It has the molecular formula of $C_5H_{10}O$ and contains two methyl groups and a tertiary (3^0) functional group. It has a strong broad infrared absorption band in the region $3300 - 3600\text{ cm}^{-1}$ and no absorption in the region $1630 - 1780\text{ cm}^{-1}$. Propose a structure for A. Explain how you deduce the structure for compound A.

(10 marks)

2. Consider an elimination reaction of $CH_3(CH_2)CHBr$ in dil. HBr solvent. Concentration of HBr is $1.0 \times 10^{-5}\text{ mol L}^{-1}$ and concentration of $CH_3(CH_2)CHBr$ is 0.30 mol L^{-1} .

a) By giving reasons, write the type of the reaction.

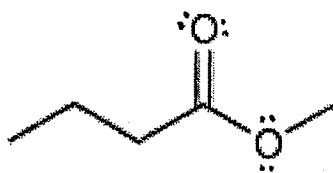
b) Write the complete mechanism of the above reaction.

c) If rate constant for the reaction at 50°C is $6.8 \times 10^{-4}\text{ s}^{-1}$, what is the reaction rate?

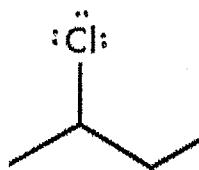
(20 marks)

3. Sketch the approximate ^1H NMR spectra of the following compounds and assign the peaks to the relevant hydrogen atoms.

a)



b)



(15 marks)

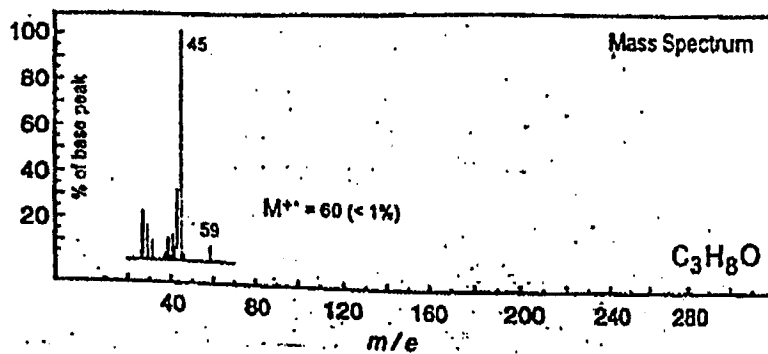
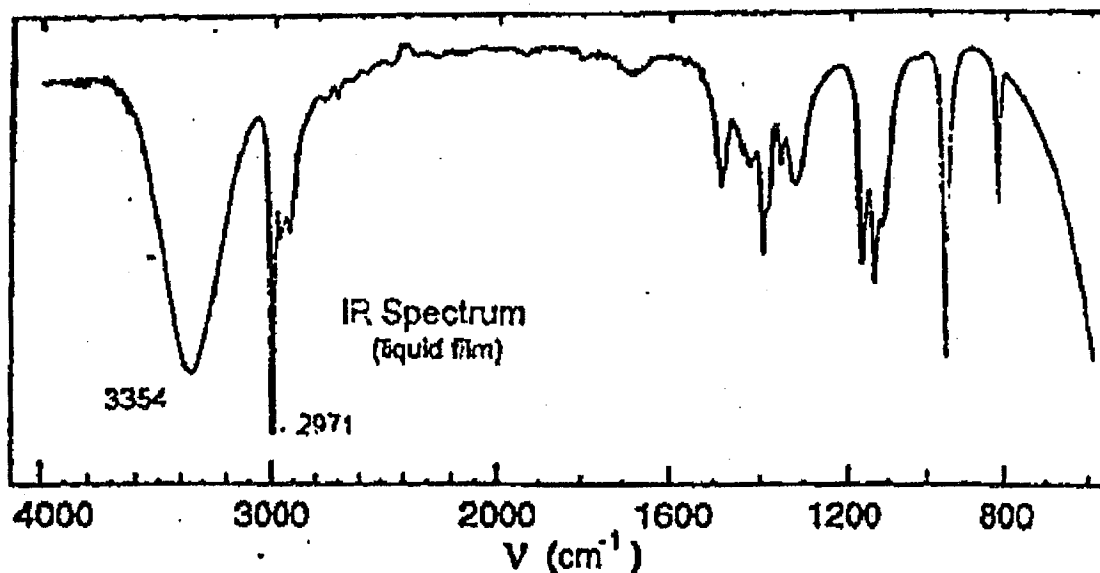
4. Predict the major product (or products) formed when each of the following compounds undergo **electrophilic aromatic substitution reaction**. Write the full mechanism (with resonance structures) and indicate the reagents required for each reaction.

- a) Nitration of benzaldehyde
- b) Methylation of aniline

(20 marks)

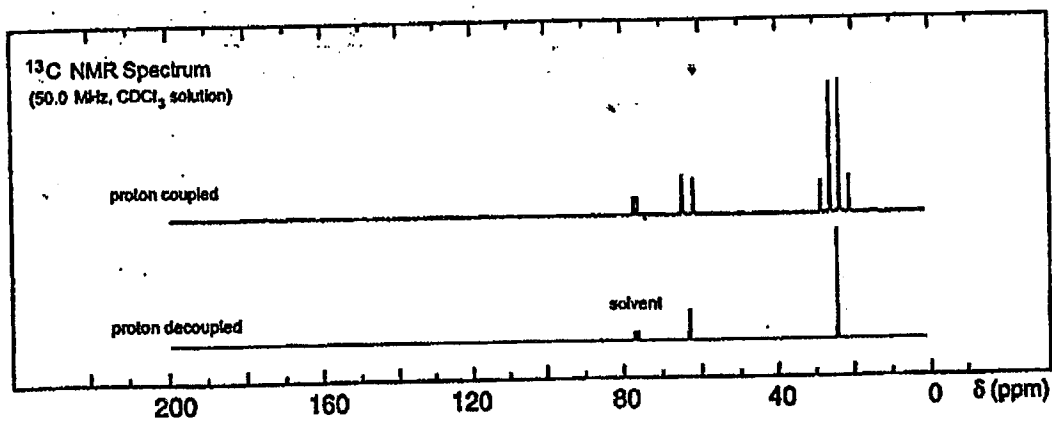
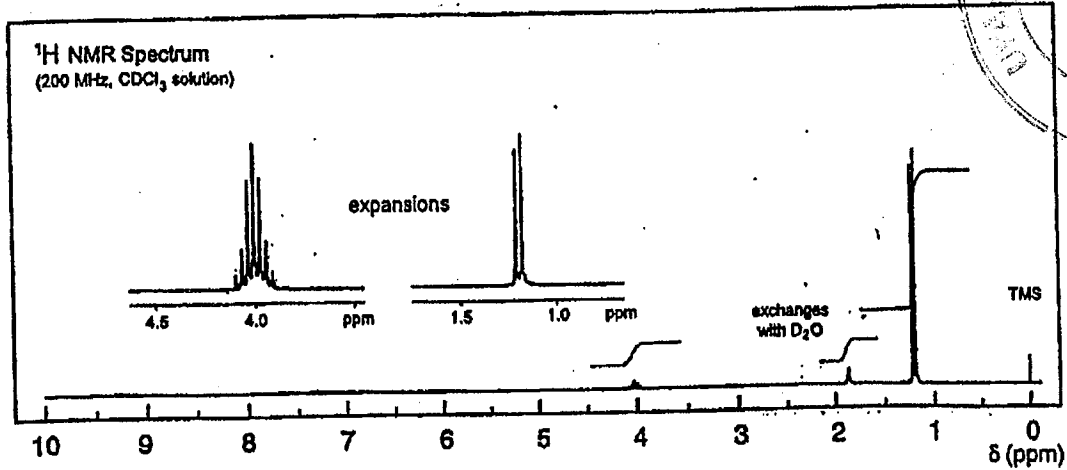
5. Deduce the structure of the compound **M** (C_3H_8O), from its spectra given below. Give reasons using spectral data that you used to deduce the structure of compound **M**.

(20 mark)



No significant UV absorption above 220 nm

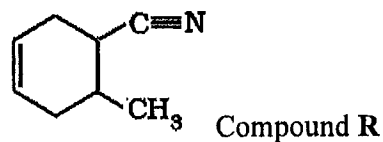




6. The **Diels-Alder reaction** is an organic chemical reaction, between a conjugated diene and a substituted alkene, commonly termed the dienophile, that forms a substituted cyclohexene system.



- a) Which diene and dienophile would employ in the synthesis of the compound R?



- b) Write the complete mechanism for the reaction that synthesis compound R.

(15 marks)
