

※注意：請於試卷上「非選擇題作答區」作答，並註明作答之題號。

1. Provide IUPAC names for (a)  $\text{CH}_3\text{C}(\text{Cl})_2\text{CH}(\text{CH}_3)_2$  and (b)  $\text{CH}_2=\text{CHCOCH}=\text{CH}_2$ . (8%)
2. (a) What is the smallest cycloalkyne that can accommodate a triple bond? (b) Which species is the smallest aromatic substance (*Hint*: It is an ion)? (8%)
3. Discuss how the dielectric constants of solvents affect  $\text{S}_{\text{N}}1$  rates. (6%)
4. (a) Use conformational theory to explain why *trans*-4-*t*-butylcyclohexanecarboxylic acid is more acidic than the *cis*-isomer. (b) Comparing  $\text{PhNH}_2$  and pyridine, which one is more basic? Explain. (8%)
5. Deduce the structure of a compound  $\text{C}_9\text{H}_{11}\text{NO}$  that is soluble in dilute  $\text{HCl}$  and gives a positive test with  $\text{Ag}(\text{NH}_3)_2^+$ . Its IR spectrum has a strong band at  $1695\text{ cm}^{-1}$  and a smaller one at  $2720\text{ cm}^{-1}$ , but no bands in the  $3300$  to  $3500\text{ cm}^{-1}$  region. The proton-decoupled  $^{13}\text{C}$  spectrum shows six signals which display the following splitting patterns in the proton-coupled spectrum: one quartet, two singlets, and three doublets, one of which is very downfield. (10%)
6. When a 2, 6-disubstituted allyl phenyl ether (both ortho positions are occupied by methyl groups) is heated in an attempted Claisen rearrangement, what product will be resulted in? Explain. (10%)
7. Draw structures for the enol tautomers of the following 5 compounds, and how many acidic hydrogens does each of the molecules have? (10%)  
(a) Acetic acid; (b) Methyl thioacetate; (c) Ethyl acetate; (d) Cyclopentanone; (e) Propanal
8. Propose a synthesis of *p*-(dimethylamino)azobenzene from benzene as your only organic starting material. (10%)
9. Draw the reaction product of buta-1,3-diene with methyl (E)-but-2-enoate via Diels-Alder Reaction. (5%)
10. Show the mechanism of the nucleophilic addition reaction of an alcohol with an isocyanate to yield a urethane. (5%)
11. After Dieckmann cyclization of diethyl 3-methylheptanedioate, what product(s) will be resulted in? Explain. (10%)
12. Poly(ethylene terephthalate), or PET is a polyester used to make soft-drink bottles. Typically it is prepared by reaction of ethylene glycol with dimethyl ester of terephthalic acid. Draw the reaction scheme and structure of PET. (10%)

試題隨卷繳回