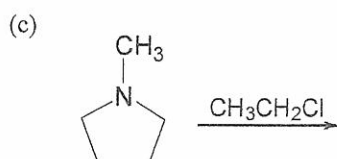
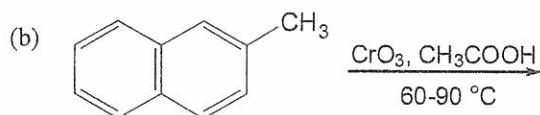
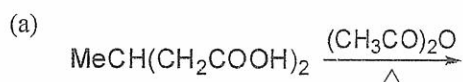
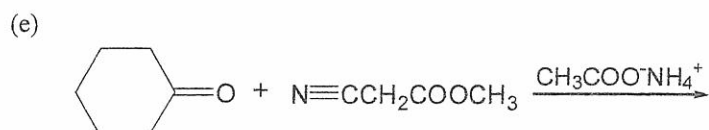
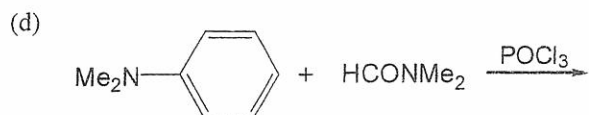


※注意：請於試卷上「非選擇題作答區」作答，並註明作答之題號。

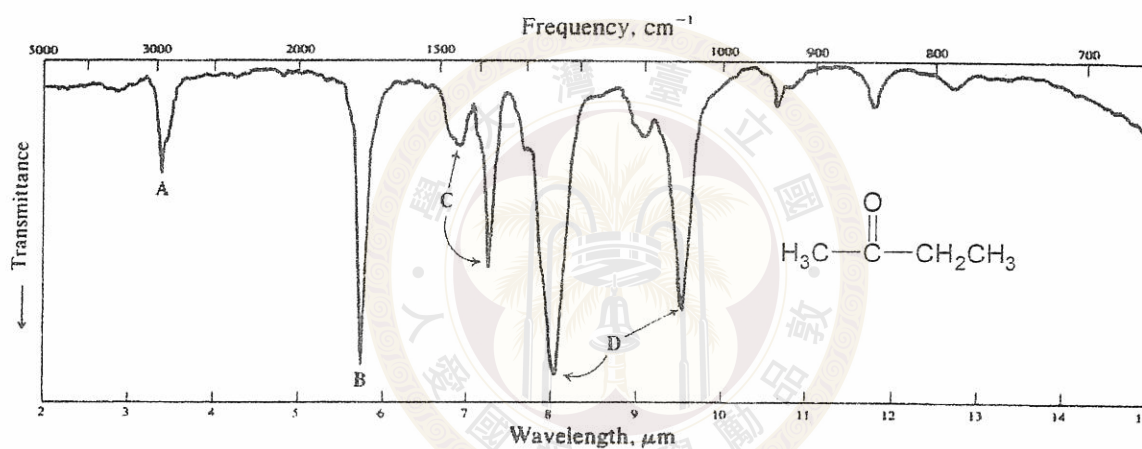
- (8%) Explain why (a) CO_2 has no dipole moment, but SO_2 does; (b) NH_3 has a much higher dipole moment than NF_3 .
- (8%) (a) Write the formula for the alkene hydrocarbon with the fewest number of carbons that exhibits both geometric and optical isomerism. (b) Provide the Fischer structural formulas for each stereoisomer.
- (8%) Explain why (a) CCl_4 does not react with either Ag^+ or OH^- and (b) SiCl_4 reacts vigorously with H_2O .
- (12%) (a) Write the equations for preparing 1,3-butadiene from 1-butene. (b) Give the mechanism for the anionic (Nu^-) induced polymerization of isoprene (2-methyl-1,3-butadiene). (c) As 1,3-pentadiene and 1,4-pentadiene undergo hydrogenation, which one would produce higher heat of hydrogenation? Explain.
- (8%) (a) Explain why benzene and naphthalene do not undergo a Diels-Alder reaction. (b) What is the structure of the Diels-Alder product of anthracene with ethene?
- (6%) Write the equations for preparing 2,5-dimethylthiophene by heating a 1,4-dicarbonyl compound (provide one) with the appropriate inorganic reagent.
- (12%) Bakelite is a phenol-formaldehyde resin formed from the base-catalyzed reaction of phenol and $\text{H}_2\text{C}=\text{O}$. (a) Give the product of the reaction of phenol with two equimolar amounts of $\text{H}_2\text{C}=\text{O}$. (b) Give the structure of the dimers formed when the product in (a) is heated. (c) Further heating (curing) increases polymerization. Show the repeat unit in the final cured resin.
- (6%) Write the equations for the preparation of $\text{HOOCCH}_2\text{CH}_2\text{COOH}$ from $\text{CH}_2=\text{CH}_2$.
- (20%) Draw the structure of the MAJOR product of the following reactions.



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10. (4%) Identify the functional groups and the vibration modes for the peaks A-D in the following IR spectrum of ethyl acetate.



11. (8%) Draw the structure of the unknown compound with $C_{13}H_{16}O$ and 1H NMR data (ppm): 7.54 (1H, d, $J=16$), 7.30 (2H, dd, $J=2, 8$), 7.21 (2H, dd, $J=7, 8$), 7.14 (1H, dd, $J=2, 7$), 6.67 (1H, d, $J=16$), 1.21 (9H, s).

試題隨卷繳回