

※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. The proton-decoupled ^{13}C NMR spectrum of a tribromobenzene ($\text{C}_6\text{H}_3\text{Br}_3$) consists of six signals. Which tribromobenzene is it? Rationalize your answer. (10%)
2. Please place the following solvents (chloroform, toluene, acetone, petroleum ether, and ethanol) in the order of increasing eluting power in chromatography (using silica gel), and rationalize your answer. (10%)
3. An aliphatic diisocyanate ($\text{OCNCH}_2\text{CH}_2\text{-}\Phi\text{-CH}_2\text{CH}_2\text{NCO}$) was synthesized from *p*-xylene. Please write down the intermediate products in each step using various reagents. [note: Φ indicates phenyl ring; hint: start with a brominating step] (15%)
4. Write down the chemical equations and reagents to answer the following questions: (10%)
 - a. Birch reduction of anisole. (reagents and product)
 - b. Sandmeyer Reaction from a *p*-nitroaniline to *p*-iodonitrobenzene?
5. Draw the chemical structures of picric acid and Meldrum's acid and address why they are called acids without having $-\text{COOH}$ group in their respective structures? (10%)
6. What product would you obtain from a base-catalyzed Michael reaction of pentane-2,4-dione with each of the following α,β -unsaturated acceptors? (a) Cyclohex-2-enone (b) Propenenitrile (c) Ethyl but-2-enoate (10%)
7. One would like to prepare 1,4-pentanediol from 3-bromopropan-1-ol and acetaldehyde via Grignard reaction. Please show the synthetic steps (15%)
8. An anionic polymerization is proceeded in tetrahydrofuran and 1,4-dioxane, respectively. Anionic initiators (R^-Li^+ and R^-K^+) comprising lithium or potassium ion as counterions are respectively utilized in each solvent system. Please compare their rate constants for propagation (k_p s), and rationalize your answer. (10%)
9. Show the structure of the polymer that results from heating the following diepoxide and diamine: diglycidyl ether of bisphenol A (2 mole) and 4,4'-methylene dianiline (1 mole). (10%)

試題隨卷繳回