

淡江大學九十二學年度碩士班招生考試試題

系別：化學工程與材料工程學系 科目：有機化學

准帶項目請打「○」否則打「×」
簡單型計算機

本試題共 2 頁

本試題雙面印

1. When acetic acid dissolves in water, the following reaction does not proceed to completion. $CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H_3O^+$. The acidity constant $K_a = K_{eq}[H_2O] = 1.8 \times 10^{-5}$ at 25°C. What percentage of the acetic acid is ionized in a 0.1 M aqueous solution? (10%)
2. Trifluoroacetic acid CF_3COOH has a $K_a = 1$ at 25°C. What percentage of the trifluoroacetic acid is ionized in a 0.1 M aqueous solution? (10%)
3. Amines, like ammonia, are weak bases. While ethylamine and most amines of low molecular weight are very soluble in water, high-molecular-weight amines have limited water solubility. However, such water-insoluble amines dissolve readily in hydrochloric acid because the acid-base reaction produces a soluble salts. Explain the meaning of the previous description and give an example with a stoichiometric equation of reaction. (10%)
4. In the acid-catalyzed ring opening of an unsymmetrical epoxide the nucleophile attacks primarily at the more substituted carbon atom. Give an example of reaction. (10%)
5. Give the reason and the reaction mechanism for the reaction example you have written in previous problem 4. (10%)
6. Primary alcohols can be oxidized to carboxylic acids by potassium permanganate. The first step is usually carried out in basic aqueous solution. Write down the reaction equation of the first step and explain what is the next step to get the carboxylic acid afterwards. (10%)
7. Given ^{13}C NMR spectra of 4-(N,N-diethylamino)benzaldehyde as follows, where the top one is the proton off-resonance decoupled and the bottom one is the proton-decoupled spectrum. Try to elucidate your explanation of assignment of peaks for the molecular structure. (10%)

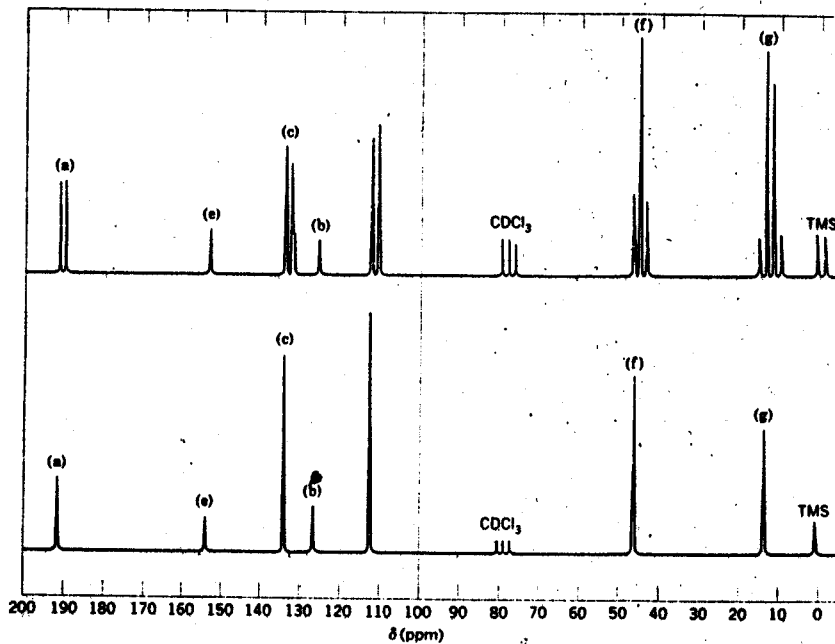
◀ 注意背面尚有試題

淡江大學九十二學年度碩士班招生考試試題

系列：化學工程與材料工程學系 科目：有機化學

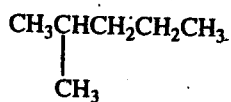
准帶項目請打「○」否則打「x」
簡單型計算機

本試題共 2 頁



8. Draw the structure formula for each of the following compounds. (30%)

For example: isohexane,



- (a) Poly(vinylidene fluoride)
- (b) Hexylamine
- (c) Dimethyl sulfoxide
- (d) trans-2-Pentene
- (e) Toluene
- (f) Poly(ethylene glycol)
- (g) Thiophene
- (h) Tetrahydrofuran
- (i) Poly(caprolactam)
- (j) Methylmagnesium iodide