八十五學年度 原子科學 系（所） 乙 組碩士班研究生入學考試

科目 有機化學 科號 4103 共 4 頁第 1 頁 *請在試卷【答案卷】內作答

1. Give products for each of the following reactions. (20%)

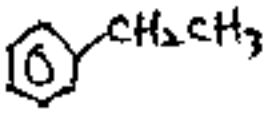
(a) $CH_3(CH_2)_3CHBr_2 \xrightarrow{KOH,\ heat}$

(b) $CH_3CH_2CCCH_2CH_3 \xrightarrow{Na,\ NH_3}$

(c) $CH_3CHCCH_3CH_3 + KMnO_4 \xrightarrow{warm}$

(d) $(CH_3)_3CCl \xrightarrow[heat]{acetone/water}$

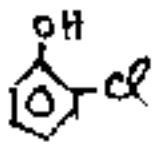
(e) $CH_3CCCH_2CH_3 \xrightarrow[H_2O,\ neutral]{KMnO_4}$

(f)  $\xrightarrow[NH_3(l),\ ROH]{Na\ or\ Li}$

(g) $CH_3COH \xrightarrow{base}$

(h) $CH_3(CH_2)_4CONH_2 \xrightarrow[H_2O]{Cl_2,\ OH}$

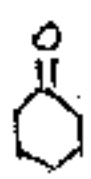
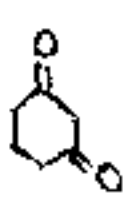
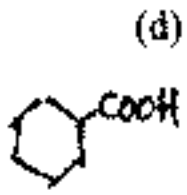
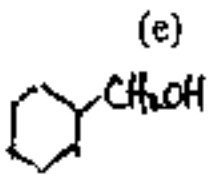
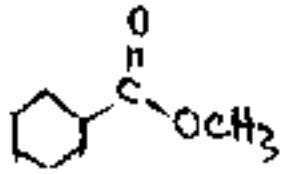
(i) $CH_3COOH + CH_3NHCH_3 \xrightarrow{heat}$

(j)  $\xrightarrow[H_2SO_4]{Na_2Cr_2O_7}$

2. Draw the structure of the following compounds. (a) Freon-12; (b) nicotine; (c) Agent Orange; (d) amphetamine; (e) TCDD. (10%)

3. Explain the following terms with examples. (a) homologs; (b) paraffins; (c) isomers; (d) enantiomers; (e) diastereomers. (5%)

4. Rank the following compounds in order of decreasing acidity. (5%)

(a)  (b)  (c)  (d)  (e) 

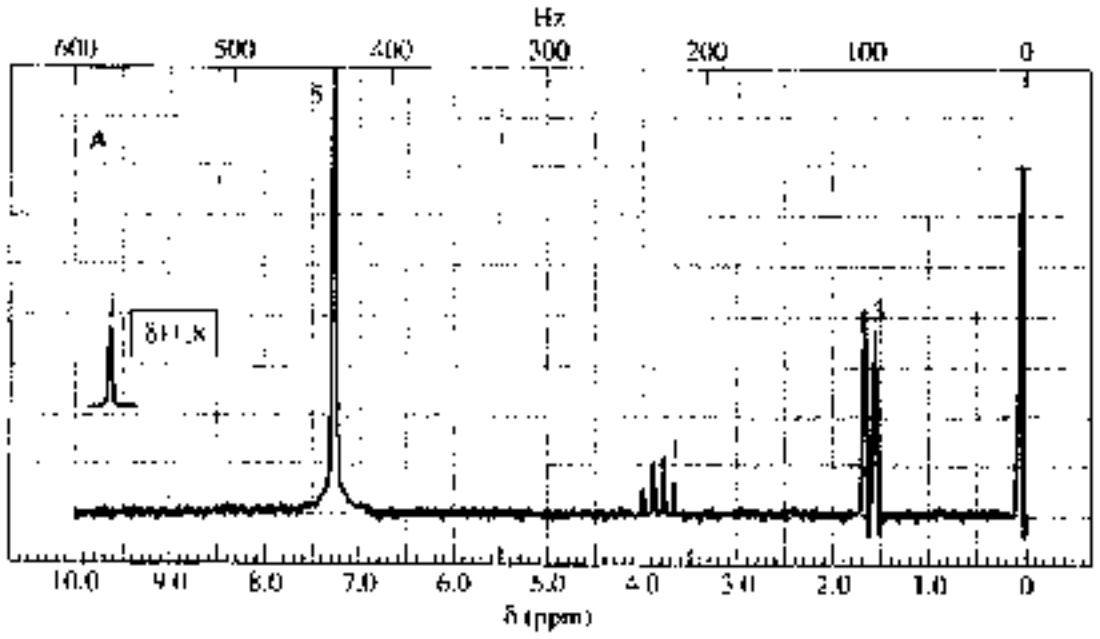
5. Rank the following carbocations in increasing order of stability and classify each as primary, secondary, or tertiary. (a) isopentyl cation; (b) 3-methyl-2-butyl cation; (c) 2-methyl-2-butyl-cation. (10%)

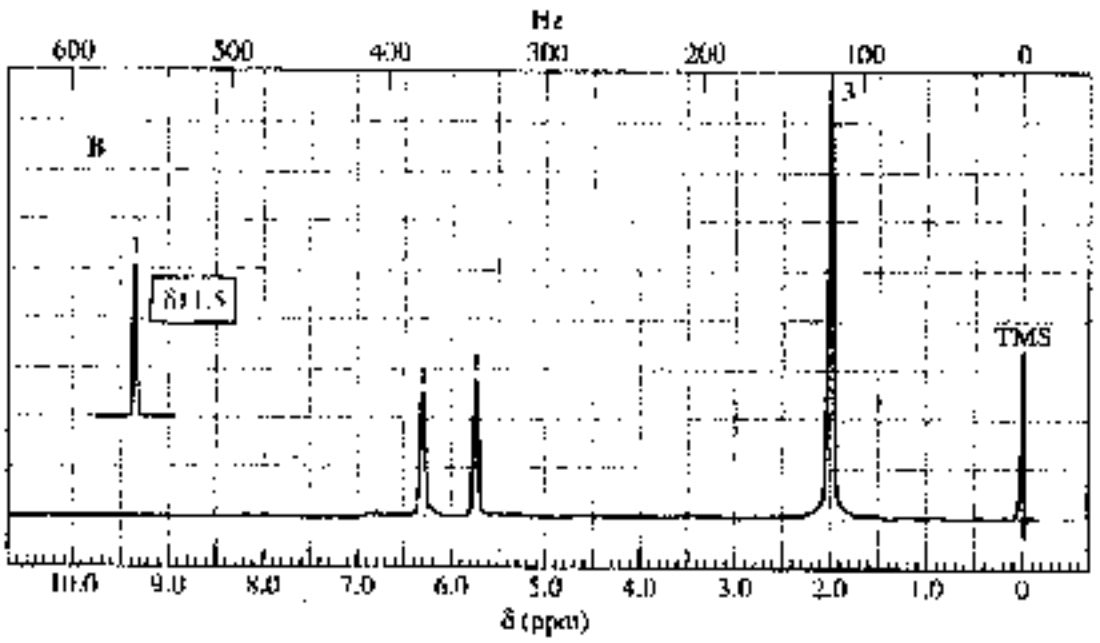
6. Define the following terms and give an example. (a) Tollens test; (b) Collins reagent; (c) Lucas test; (d) Grignard reagent. (10%)

7 Predict which member of each pair has the higher boiling point and explain the reasons. (a) 1-hexanol or 3,3-dimethyl-1-butanol; (b) 2-hexanone or 2-hexanol; (c) 2-hexanol or 1,5-hexanediol. (10%)

8. Predict which member of each pair is more acidic and explain the reasons. (a) cyclopentanol or 3-chlorophenol; (b) cyclohexanol or 2-chlorocyclohexanol; (c) cyclohexanol or cyclohexanecarboxylic acid; (d) 2,2-dimethyl-1-butanol or 1-butanol. (10%)

9. The following NMR spectra correspond to compounds of formula (A) C9H10O2, (B) C4H6O2, respectively. Propose structures and show the consistence with observed absorptions. (10%)





10. The spectra of a pleasant-smelling liquid compound are given below. (10%)
    (1) List the structural characteristics from the spectrum.
    (2) Propose a tentative structure and verify the structure with features of each spectrum.