靜宜大學 104 學年度碩士班招生考試試題

學系：化粧品科學系　　科目：有機化學

Part I (50%)

一、單選題 (30 pts, 3 pts/ each)

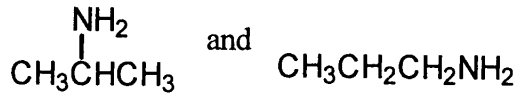
1. Which atom is described by the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^3$?
   (A) phosphorus (B) oxygen (C) calcium (D) aluminum

2. Which molecules are polar ?
   CO_2 (I), CH_3Cl (II), CCl_4 (III), NH_3 (IV)
   (A) I, III (B) II, III (C) II, IV (D) II, III, IV

3. Which compound has ionic and covalent bonds?
   (A) CH_3OH (B) KBr (C) HCl (D) $NaHSO_4$

4. Which chemical bond is the most polar?
   (A) O-H (B) C-H (C) F-F (D) N-H

5. What is the relationship between these two structures?



(A) diastereomers (B) enantiomers (C) conformational isomers (D) constitutional isomers

6. Rank the following groups in order of increasing priority (least first)?
   $-CH(CH_3)_2$ (I), $-OCH_3$ (II), $-CO_2H$ (III), $-CH{=}CH_2$ (IV)
   (A) I, II, III, IV (B) II, I, III, IV (C) I, IV, III, II (D) IV, I, III, II

7. Which compound reacts most readily in the nitration reaction?
   (A) benzene (B) phenol (C) nitrobenzene (D) benzoic acid

8. Which compound has the strongest acidity?
   (A) ethanol (B) phenol (C) *p*-nitrophenol (D) *p*-methylphenol

9. Which compound is secondary alkyl halide?
   (A) 2-bromo-2-methylpropane (B) 1-bromo-2-methylpropane
   (C) 1-bromobutane (D) 2-bromobutane

10. Which is the structural formula for heptanoic acid ?
    (A) $CH_3(CH_2)_4CH_2OH$ (B) $CH_3(CH_2)_5CHO$ (C) $CH_3(CH_2)_4CO_2H$ (D) $CH_3(CH_2)_5CO_2H$

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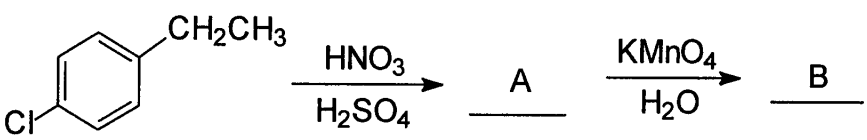
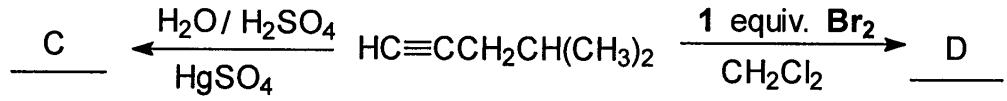
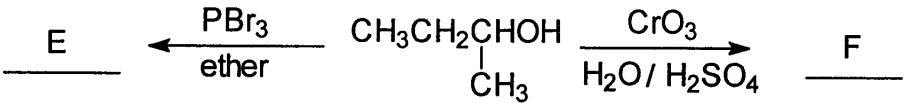
Part I

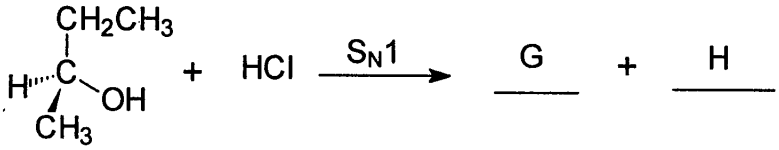
二、非選擇題

1. Please write the structural formula for the **major product** in each of the following reactions. (**Note**: Please give the correct stereochemistry, if necessary.) (20 pts, 5pts/each)

1) 

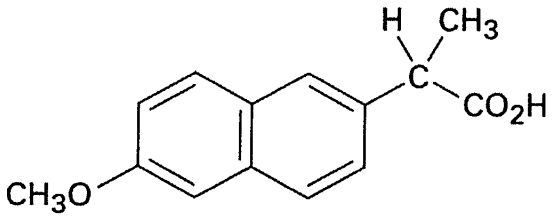
2) 

3) 

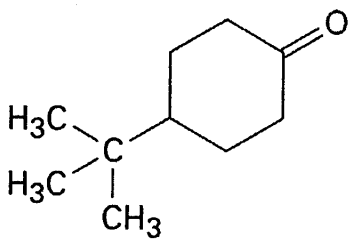
4) 

Part II (50%)

1. Calculate the number of sigma (σ) and pi (π) of the following compounds? (8%)



2. Calculate the number of primary carbon, secondary carbon, tertiary carbon and quaternary carbon of the following compound? (12%)



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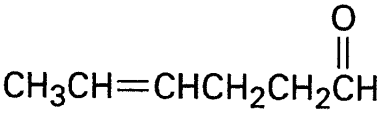
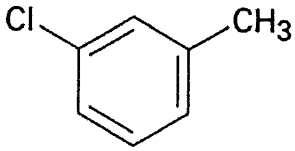
3. Give the IUPAC name of the following compound? **(16%)**

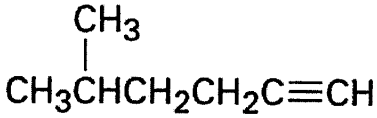
(i)



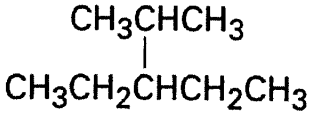
(ii) hint: Cl (chloro)



(iii)

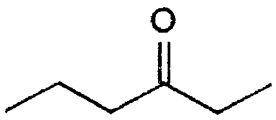


(iv)

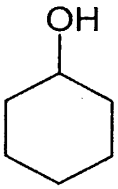


4. Which one of the following compounds is most consistent with the IR spectrum given in Figure-1? Explain your reasoning. **(6%, 8%)**

(i)



(ii)



(iii)