

國立勤益科技大學 102 學年度研究所碩士班招生筆試試題卷

所別：化工與材料工程系

組別：材料科技組

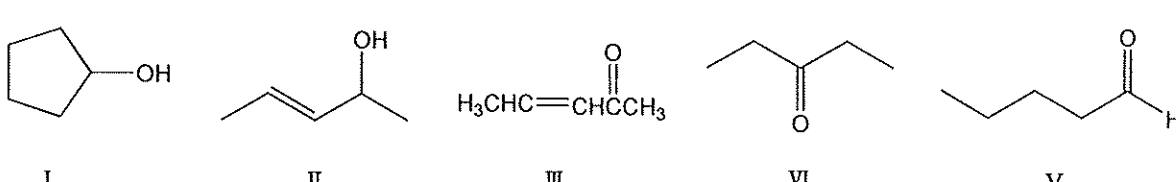
科目：有機化學

准考證號碼：□□□□□□□□ (考生自填)

考生注意事項：

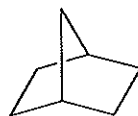
一、考試時間 80 分鐘。

試題一：Choose the right answers. (25 分)

- () 1. Which molecule has a zero dipole moment?
(a) CCl_4 (b) SO_2 (c) CO (d) NH_3 (e) CH_3OCH_3
- () 2. Which of these compounds would have the highest boiling point?
(a) $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_2\text{OCH}_3$ (b) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{OCH}_3$
(c) $\text{CH}_3\text{OCH}_2\text{CH}_2\text{OCH}_3$ (d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ (e) $\text{HOCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- () 3. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ and $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$ are examples of what are now termed:
(a) structural isomers (b) resonance structures (c) functional isomers
(d) stereo isomers (e) constitutional isomers
- () 4. Which compound is not an isomer of the others?
- 
- (a) I (b) II (c) III (d) IV, V (e) III, IV, V
- () 5. How many constitutional isomers are possible with the formula $\text{C}_4\text{H}_{10}\text{O}$?
(a) 3 (b) 4 (c) 5 (d) 6 (e) 7
- () 6. Which of the following are likely to act as Lewis acids?
(1) H_2S (2) $(\text{CH}_3)_3\text{P}$ (3) FeBr_3 (4) $(\text{CH}_3)_2\text{NH}$ (5) AlCl_3 (6) NaNH_2
(a) (1),(6) (b) (3),(5) (c) (1),(2),(6) (d) (2),(3),(5) (e) (3),(4),(5)
- () 7. Which of these substances contains both covalent and ionic bonds?
(a) HBr (b) H_2O_2 (c) NaCl (d) NH_4Cl (e) CH_4
- () 8. Which of the following elements has the highest electronegativity?
(a) C (b) N (c) B (d) Br (e) S

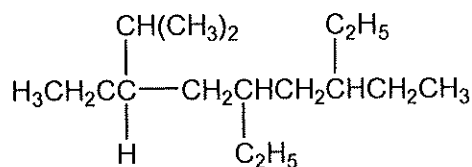
() 9. What is the name of this compound?

- (a) bicyclo[2,2,1]hexane
 (b) bicyclo[2,2,1]heptane
 (c) bicyclo[2,2,0]hexane
 (d) dicyclo[2,2,0]hexane
 (e) bicyclo[2,2,0]octane

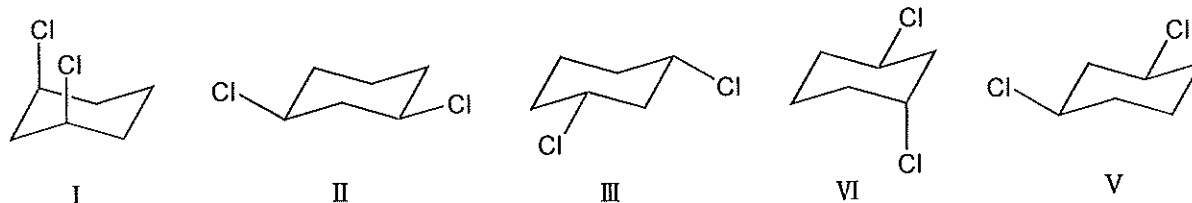


() 10. The IUPAC name for the following compound is :

- (a) 3,5-diethyl-7-isopropylnonane
 (b) 3-isopropyl-5,7-diethylnonane
 (c) 2-methyl-3,5,7-triethylnonane
 (d) 3,5,7-triethyl-2-methylnonane
 (e) 3-isopropyl-5,7-diethyloctane



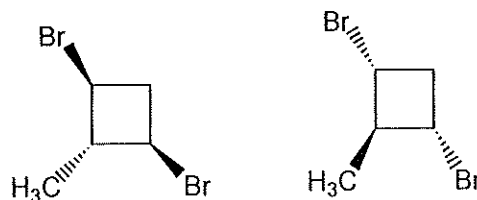
() 11. cis-1,3-dichlorocyclohexane is represented by structure(s) :



- (a) I (b) II (c) III (d) IV, V (e) I, II, III, V

() 12. The two compounds shown below are :

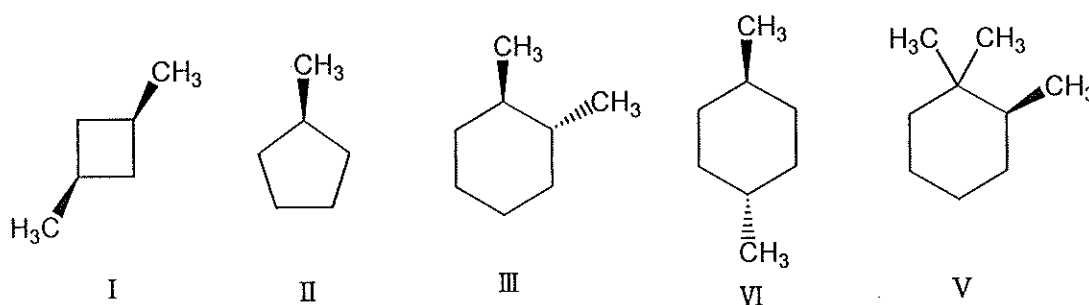
- (a) enantiomers
 (b) diastereomers
 (c) constitutional isomers
 (d) identical
 (e) different but not isomeric



() 13. Which of the following is not true of enantiomers? They have the same :

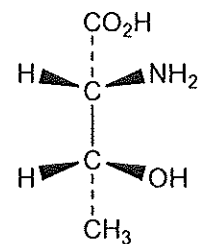
- (a) boiling point (b) melting point (c) specific rotation (d) density
 (e) none of these

() 14. Which of the following compound is/are chiral?



- (a) I, II (b) II, III (c) III, VI (d) III, V (e) VI, V

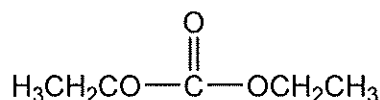
() 15. For the 2-amino-3-hydroxybutanoic acid shown below, the correct stereochemical designation should be :



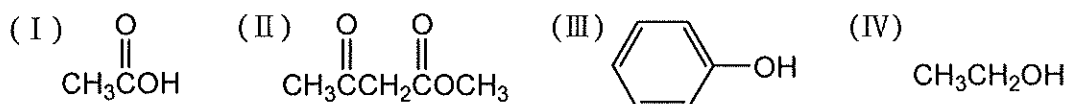
- (a) 2R,3S (b) 2S,3R (c) 2S,3S (d) 2R,3R
(e) none of these

() 16. Reaction of excess Grignard reagent with the following gives a :

- (a) ketone
(b) tertiary alcohol
(c) secondary alcohol
(d) ester

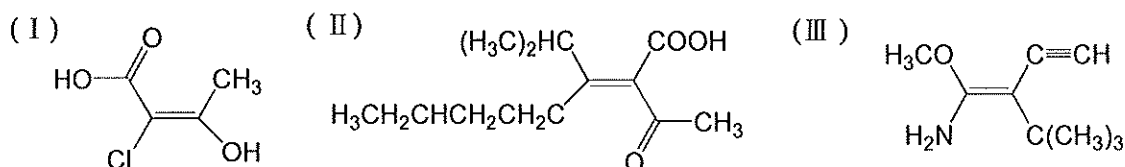


() 17. Rank the following substances in order of increasing acidity :



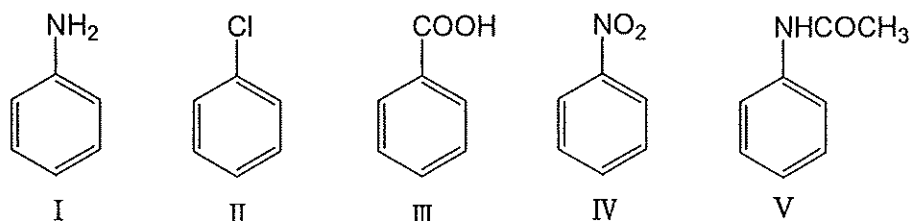
- (a) (IV) > (II) > (III) > (I) (b) (III) > (IV) > (II) > (I)
(c) (II) > (I) > (III) > (IV) (d) (I) > (III) > (II) > (IV)

() 18. Assign E or Z configuration to the following alkenes :



- (a) (I) E (II) Z (III) E (b) (I) Z (II) Z (III) Z
(c) (I) E (II) E (III) E (d) (I) Z (II) E (III) Z

() 19. Place the following in order of reactivity towards electrophilic aromatic substitution.

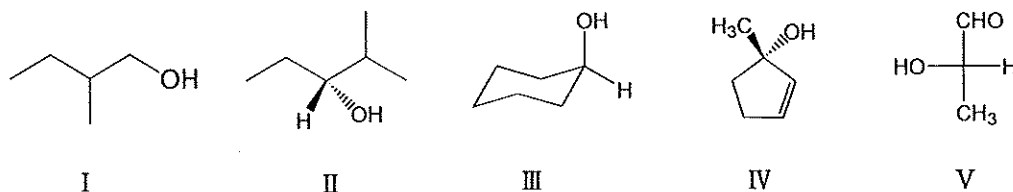


- (a) (IV) > (II) > (III) > (V) > (I) (b) (III) > (IV) > (V) > (II) > (I)
(c) (I) > (V) > (II) > (III) > (IV) (d) (II) > (I) > (III) > (V) > (IV)
(e) (III) > (V) > (IV) > (II) > (I)

() 20. Which reaction would be expected to occur most slowly?

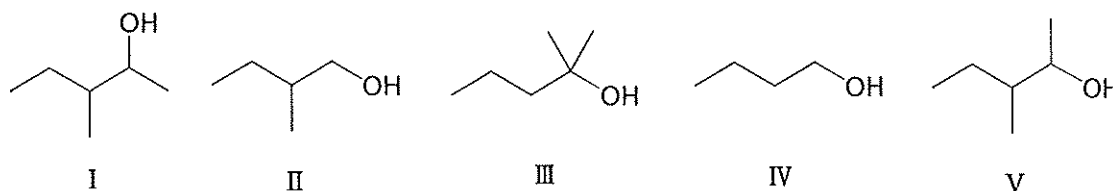
- (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{CN}^-$ (b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{F} + \text{CN}^-$
(c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl} + \text{CN}^-$ (d) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{CN}^-$
(e) $\text{CH}_3\text{CH}_2\text{CH}_2\text{I} + \text{CN}^-$

() 21. Which of the following is/are secondary alcohols ?



- (a) I (b) II, III (c) II, IV (d) III, V (e) II, III, V

() 22. Which alcohol would be most easily dehydrated?



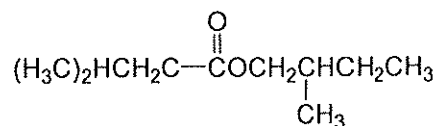
- (a) II, V (b) I, V (c) II (d) III (e) V

() 23. Which compound would be most acidic?

- (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ (b) $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ (c) CH_3COCH_3 (d) Benzene
(e) Cyclohexane

() 24. The IUPAC name for the following compound is :

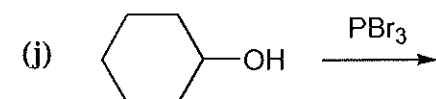
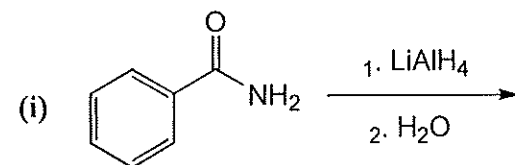
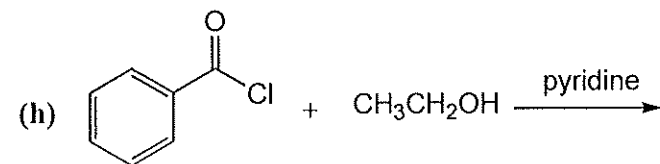
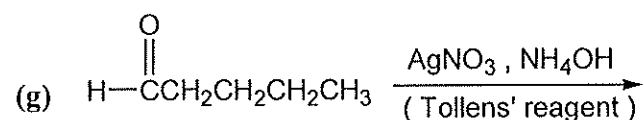
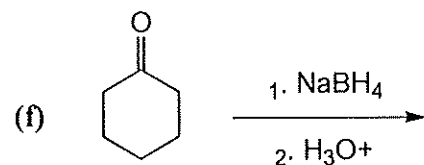
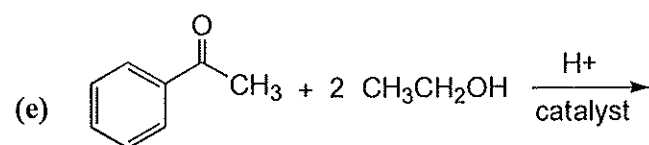
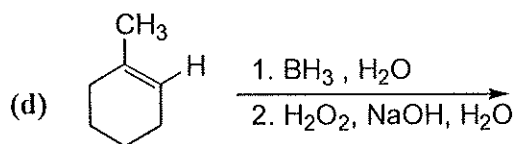
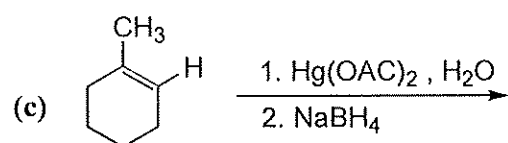
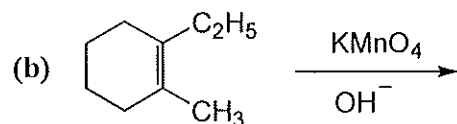
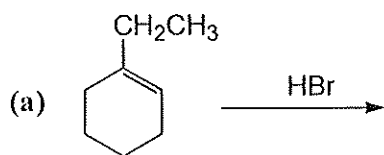
- (a) 2-methylbutyl 2-methylbutanoate
(b) 2-methylbutyl 3-methylbutanoate
(c) 3-methylbutyl 2-methylbutanoate
(d) isopentyl 2-methylbutanoate
(e) isopentyl 3-methylbutanoate



() 25. An acid chloride is prepared from the related carboxylic acid by reaction with which of these?

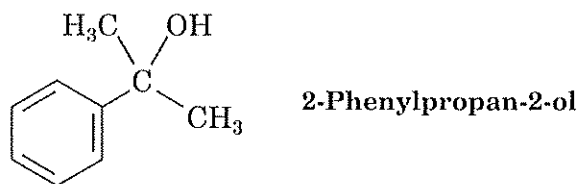
- (a) HCl (b) HOCl (c) Cl_2 (d) AlCl_3 (e) SOCl_2

試題二： Give the major organic product(s) for each of the following reactions. Show all relevant stereochemistry. (20 分)



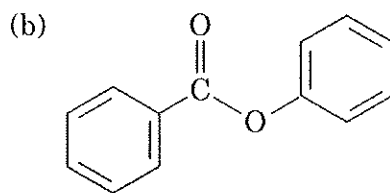
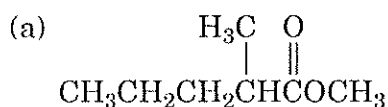
試題三：〈 10 分 〉

How can we use a Grignard reagent to a ketone to synthesize 2-phenylpropan-2-ol?



試題四：〈 12 分 〉

Show the products you would obtain by reduction of the following esters with LiAlH₄:

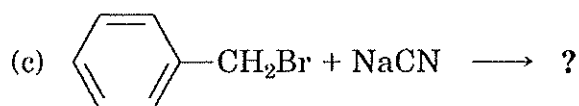
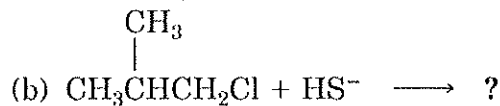
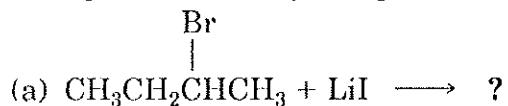


試題五：〈 4 分 〉

What products would you expect to obtain from addition of Br₂ to 1, 2-dimethylcyclohexene? Show the stereochemistry of the product.

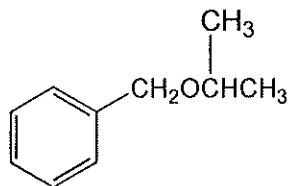
試題六：〈 12 分 〉

What products would you expect to obtain from the following reactions?



試題七：〈 5 分 〉

How would you prepare the following ethers ?



試題八：〈 12 分 〉

Fill in the missing reagents(a, b, b') and product(d) in the following scheme:

