

系所組別：化學系

考試科目：有機化學

考試日期：0306，節次：2

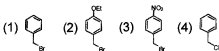
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一、選擇題 (90 分，每題 3 分)

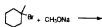
- Calculate the degree of unsaturation of the compound with the molecular formula $C_{10}H_{11}BrClNO_2$.
(1) 4 (2) 5 (3) 6 (4) 7
- Which one has the **strongest** basicity for the following bases?
(1) $NaNH_2$ (2) $NaOEt$ (3) $MeLi$ (4) $CH_2=CHLi$
- Which of the following compounds is the **strongest** acid?
(1) 1,3-pentadiene (2) 1,3,5-heptatriene (3) cyclopentadiene (4) cycloheptatriene
- Which of the following compounds would exist in an enol form to the **greatest** extent? (1) acetone (2) ethyl acetoacetate (3) 2,4-pentanedione (4) ethyl acetate
- What is the relationship between the following two structures?



- (1) diastereomers (2) identical (3) enantiomers (4) constitutional isomers
- A compound with the molecular formula C_8H_9BrO gave the following 1H NMR spectrum δ 1.4 (t, 3H), 3.9 (q, 2H), 7.0 (m, 4H). The most likely structure for this compound is (1) $C_6H_5OCH_2CH_2Br$ (2) $p-HOC_6H_4CH_2CH_2Br$ (3) $p-BrC_6H_4OCH_2CH_3$ (4) $p-CH_3OC_6H_4CH_2Br$
- The IR absorption at 2200 cm^{-1} indicates the presence of (1) acetyl chloride (2) acetamide (3) n-butylamine (4) CH_3CN
- Which of the following species is an ylide?
(1) $Ph_3P^+CH_2Br^-$ (2) $\bar{C}H(CO_2CH_3)_2$ (3) CH_3Li (4) $Ph_3P^+CH_2^-$
- Which of the following compounds is the **easiest** one to react through S_N1 mechanism?



- For the reaction shown below, the major product is formed by



- (1) $E1$ (2) $E2$ (3) S_N1 (4) S_N2
- The product for the ester formation between $CH_3O^{18}H$ and CH_3CO_2H is:
(1) $H_3C-C(=O)-O^{18}CH_3 + H_2O^{18}$ (2) $H_3C-C(=O)-OCH_3 + H_2O^{18}$ (3) $H_3C-C(=O)-O^{18}CH_3 + H_2O$
(4) $H_3C-C(=O)-OCH_3 + H_2O$
- What is the IUPAC name of the compound A?

(背面仍有題目,請繼續作答)

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A

- (1) 4-bromo-2-methylhexane (2) 3-bromo-5-methylhexane
(3) 2-methyl-4-bromohexane (4) 5-methyl-3-bromohexane

13. What is the IUPAC name of the compound B?



B

- (1) *cis*-3-chlorocyclohexanol (2) *trans*-3-chlorocyclohexanol
(3) *cis*-5-chlorocyclohexanol (4) *cis*-3-chloro-1-hydroxycyclohexane

14. What is the IUPAC name of the compound D?



D

- (1) 3-bromo-6-fluoro-4-methylphenol (2) 5-bromo-2-fluoro-4-methylphenol (3)
2-fluoro-4-methyl-5-fluorophenol (4) 2-bromo-4-hydroxy-5-fluorotoluene

15. What is the IUPAC name of the compound E?



E

- (1) 3-ethyl-5-methyl-1-heptene (2) 3-vinyl-5-methyl-1-heptane (3) 3,5-diethyl-1-hexene (4)
2-ethyl-4-vinylhexane

16. What is the IUPAC name of the alkyl group?



- (1) 1-propyl-4-methylpentyl (2) 4-methyl-1-propylpentyl (3) 2-methyloctyl (4)
(3-methyl-1-butyl)-butyl

17. For isopentanol: (1) it is a secondary alcohol. (2) it shows a characteristic absorption at 1720 cm^{-1} in the IR spectrum. (3) it has four signals in the broad band decoupled ^{13}C NMR spectrum. (4) it is a stereoisomer of pentanol.

18. What is the major product for the addition of Br_2 to *trans*-2-butene?

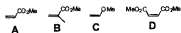
- (1) 2-bromobutane (2) meso-2,3-dibromobutane (3) racemic mixture of (2R,3R) and (2S,3S)-2,3-dibromobutane (4) 1,2-dibromobutane

19. Arrange the following dienophiles in the order of **increasing reactivity** toward cyclopentadiene in Diels-Alder reaction.

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(1) C<B<A<D (2) A<B<C<D (3) D<B<C<A (4) D<A<B<C

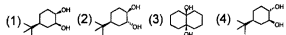
20. Which of the following addition reactions of alkenes occur specifically in an **anti**- fashion (1) dihydroxylation using OsO₄, H₂O₂ (2) addition of Br₂ (3) hydroboration-oxidation (4) hydrogenation using H₂-Pt

21. How would you carry out the conversion of CH₃CH₂CH₂CH=O into CH₃CH₂CH₂CHDOH?

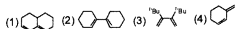
(1) a. LiAlH₄/THF, b. D₂O (2) a. LiAlD₄/THF, b. D₂O (3) a. LiAlD₄/THF, b. H₂O (4) a. LDA/THF b. D₂O⁺

22. Treatment of *p*-chlorotoluene with NaNH₂ in NH₃ gives (1) *p*-methylaniline (2) *o*-methylaniline (3) *m*- and *p*-isomers of methylaniline (4) *m*- and *o*-isomers of methylaniline

23. Which of the following compounds cannot be cleaved by HIO₄?



24. Which of the dienes **can** undergo a Diels-Alder reaction?

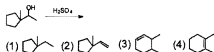


25. The conversion of 2-pentanone to butanoic acid is best accomplished with: (1) I₂, NaOH (2) NaBH₄ (3) CrO₃ (4) Ag₂O

26. Reaction of cyclohexene with peracetic acid CH₃CO₃H, followed by treatment in strong acidic aqueous solution gives (1) cyclohexanone (2) *cis*-1,2-cyclohexanediol (3) *trans*-1,2-cyclohexanediol (4) 2-cyclohexenol

27. Which compound reacts **most rapidly** with Lucas reagent (ZnCl₂/HCl)? (1) *n*-butanol (2) *sec*-butanol (3) *tert*-butanol (4) isobutanol

28. Which is the **major product** for the following reaction?



29. What would be the **major product** for the following reaction?



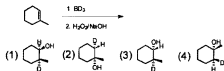
30. What is the **major product** for the following reaction?

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二、反應機構：(10 分，每題 5 分)

