

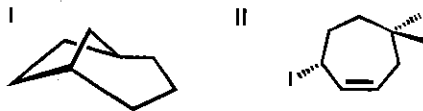
類組：化學類 科目：有機化學(1002)

共 6 頁 第 1 頁

※選擇題請在答案卡內作答，非選擇題請在答案卷內作答

單選題 請選擇一個最適當的答案 (每題 3 分，共 90 分)

1. Give the IUPAC name for the following two compounds.



	Compound I	Compound II
(A)	Tricyclo[1,2,3]octane	(R)-3-Iodo-6,6-dimethyl-cycloheptene
(B)	Tricyclo[3,2,1]octane	(S)-3-Iodo-6,6-dimethyl-cycloheptene
(C)	Bicyclo[3,2,1]octane	(R)-3-Iodo-6,6-dimethyl-cycloheptene
(D)	Bicyclo[1,2,3]octane	(S)-3-Iodo-6,6-dimethyl-cycloheptene
(E)	Cyclo[1,2,3]octane	(R)-3-Iodo-6,6-dimethyl-cycloheptene

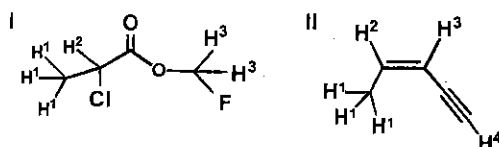
2. Using the following data to calculate the ring strain (kJ/mol) in cyclobutane.

If, the heat of combustion of cyclobutane: 2810 kJ/mol and the heat of combustion of butane: 2830 kJ/mol.

The heat of combustion of cyclopentane: 3500 kJ/mol and the heat of combustion of pentane: 3530 kJ/mol

(A)	10	(B)	20	(C)	30	(D)	40	(E)	50
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3. For the following two compounds, pick up the *most* acidic H in each compound.



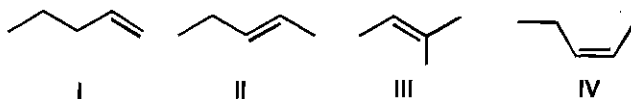
(A)	I: H ³ II H ³	(B)	I: H ³ II H ⁴	(C)	I: H ² II H ²	(D)	I: H ² II H ³	(E)	I: H ² II H ⁴
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4. Calculate the strain difference (ΔE) between the two conformers of *trans*-1-*tert*-butyl-4-isopropylcyclohexane, by how much (kJ/mol) that one is favored than the other?

If each one strain of 1, 3-X-H diaxial interaction in monosubstituted cyclohexane (kJ/mol) is:
X: CH₃ = 3.8; CH₂CH₃ = 4.0; CH(CH₃)₂ = 4.6; C(CH₃)₃ = 11.4

(A)	6.8	(B)	9.2	(C)	13.6	(D)	16.0	(E)	32.0
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5. Which following pentene isomer is more stable?



(A)	IV	(B)	III	(C)	II	(D)	I	(E)	All the same
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注意：背面有試題

參考用

類組：化學類 科目：有機化學(1002)

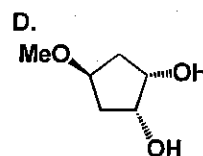
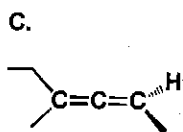
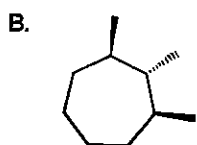
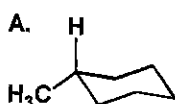
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※選擇題請在答案卡內作答，非選擇題請在答案卷內作答

6. The optically pure tosylate of 2,2-dimethyl-1-phenyl-1-propanol ($[\alpha]_D = -30.3^\circ$) was heated in acetic acid to yield the corresponding acetate ($[\alpha]_D = +5.3^\circ$). If complete inversion had occurred, the optically pure acetate would have had $[\alpha]_D = +53.6^\circ$. What percentage of racemization occurred in this reaction?

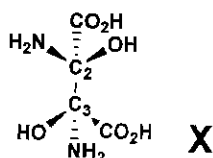
(A)	10	(B)	20	(C)	50	(D)	80	(E)	90
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7. For the following four compounds, how many are chiral compounds?



(A)	0	(B)	1	(C)	2	(D)	3	(E)	4
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8. Assign the configuration of compound X's chirality centers

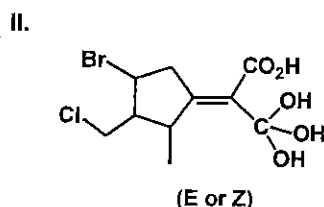
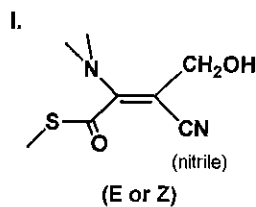


(A)	C ₂ :R C ₃ :R	(B)	C ₂ :S C ₃ :S	(C)	C ₂ :R C ₃ :S	(D)	C ₂ :S C ₃ :R	(E)	No Chirality centers
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9. *meso*-CH(Br)(Ph)-CH(Ph)(Br) was treated with KOH in ethanol, what will be the major product? (Ph is C₆H₅; phenyl group)

(A)		(B)		(C)		(D)		(E)	
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10. For the following two alkenes, assign it's (E,Z) configuration.



(A)	I:Z II:E	(B)	I:E II:Z	(C)	I:E II:E	(D)	I:Z II:Z	(E)	None of above answer
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11. For the following two questions in the S_N2 reaction of alkyl bromide, select the correct answer.

I. Which nucleophile will exhibit higher reactivity?

I-1. OH⁻

I-2. SH⁻

注意：背面有試題

II. Which alkyl bromide will show slower reactivity, when it reaction with Cl⁻?

參考用

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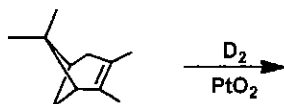
共 6 頁 第 3 頁

※選擇題請在答案卡內作答，非選擇題請在答案卷內作答

II-1. tertiary alkyl bromide (CR₃Br) II-2. neopentyl bromide

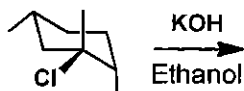
(A)	I:I-1 (OH) II:II-1	(B)	I:I-1 (OH) II:II-2	(C)	I:I-2 (SH) II:II-1	(D)	I:I-2 (SH) II:II-2	(E)	None of above answer
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12. What will be the major product in the following reaction?



(A)		(B)		(C)		(D)		(E)	None of above answer
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13. What will be the major product in the following reaction?



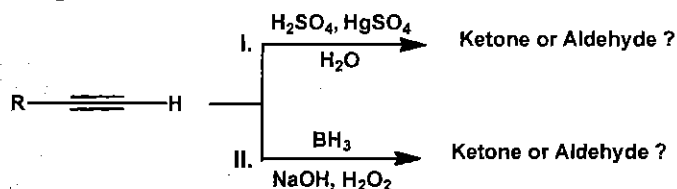
(A)		(B)		(C)		(D)		(E)	
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14. Which following isomer of C₅H₄OS will show the best fitting with the following ¹H NMR data:

δ 9.73 (1 H, s), 8.48 (1 H, dd, J = 5 and 4 Hz), 7.76 (1 H, dd, J = 8 and 5 Hz), 7.41 (1 H, dd, J = 8 and 4 Hz).

(A)		(B)		(C)		(D)		(E)	
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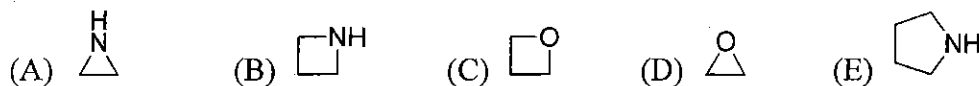
15. Hydration of terminal alkyne via two kinds of procedures (I and II) might produce different products.



	Procedure I	Procedure II
(A)	Ketone	Ketone
(B)	Ketone	Aldehyde
(C)	Aldehyde	Ketone
(D)	Aldehyde	Aldehyde
(E)	No selective	No selective

Select the major product for each procedure.

16. Which of the following is the structure for aziridine?

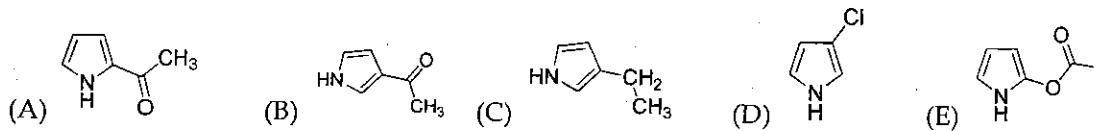
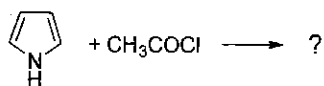


17. Give the major product of the following reaction.

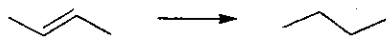
注意：背面有試題

參考用

※選擇題請在答案卡內作答，非選擇題請在答案卷內作答

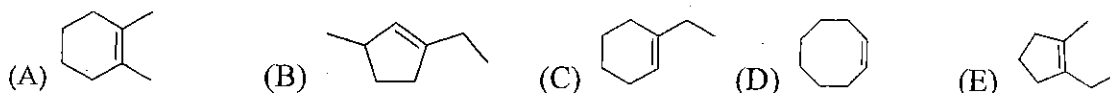


18. The following reaction can be classified as:

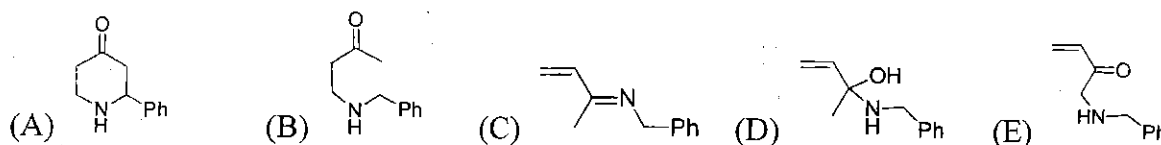
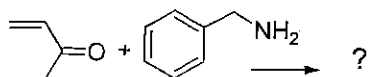


(A) oxidation (B) hydrogenolysis (C) hydration (D) hydrogenation (E) hydrolysis

19. Ozonolysis-reduction of an unknown alkene gives octane-2,6-dione. Give the structure of the original alkene.



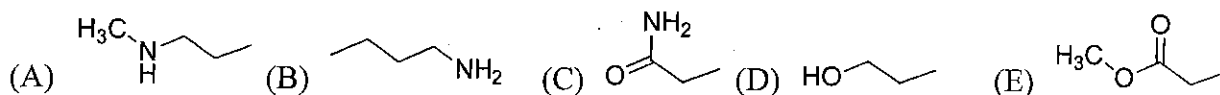
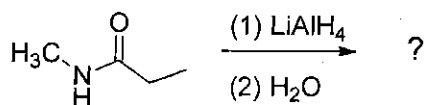
20. Give the major product of the following reaction.



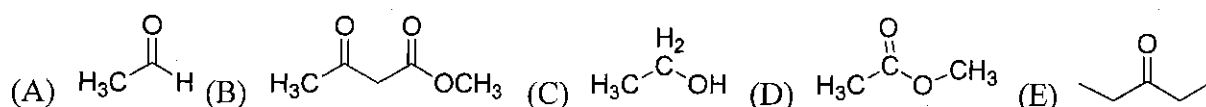
21. Which of the following amino acids does have a hydroxyl group within its side chain?

(A) glycine (B) leucine (C) threonine (D) asparagine (E) proline

22. Give the major product of the following reaction.



23. Which of the following compounds is the **most acidic**?



24. What class of organic compounds results when cyclohexanone reacts with diethylamine in the presence of trace acid?

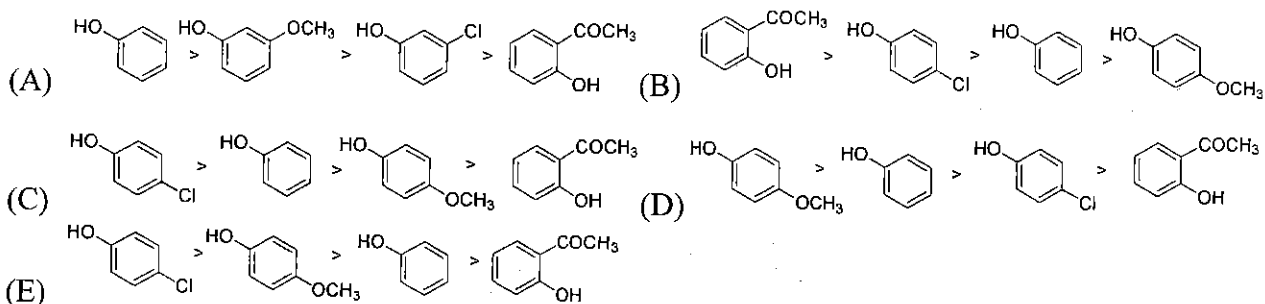
注意：背面有試題

參考用

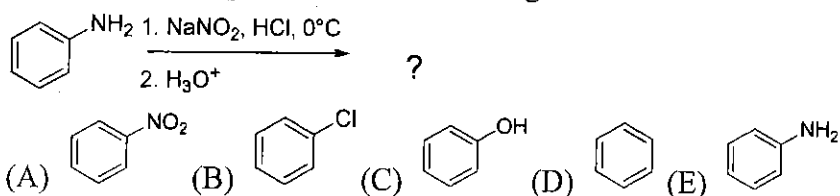
※選擇題請在答案卡內作答，非選擇題請在答案卷內作答

- (A) cyanohydrin (B) semicarbazone (C) imine (D) enamine (E) oxime

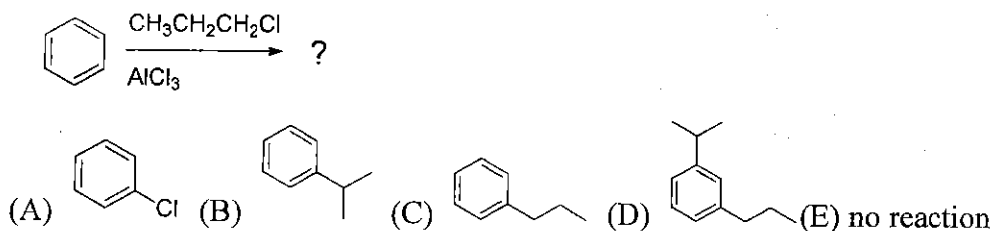
25. Arrange the following phenols in order of the **decreasing acidity**.



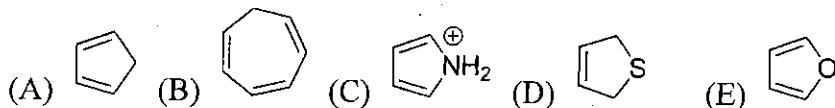
26. Give the major product of the following reaction.



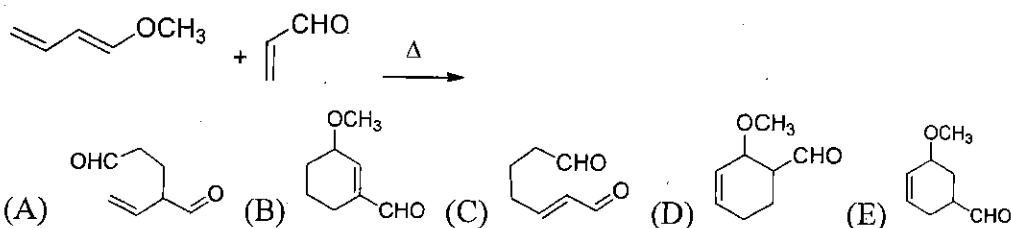
27. Give the major product of the following reaction.



28. Which of the following is aromatic?



29. Give the major product of the following reaction.



30. Anomers of D-glucopyranose differ in their stereochemistry at:

- (A) C1 (B) C2 (C) C3 (D) C4 (E) C5.

注意：背面有試題

參考用

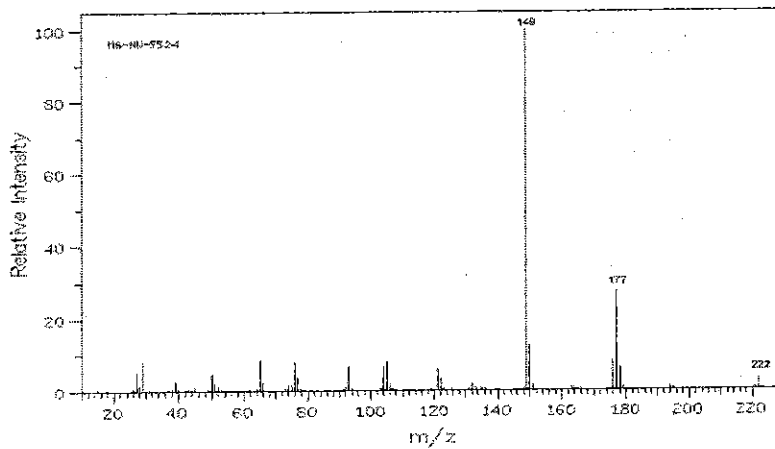
※選擇題請在答案卡內作答，非選擇題請在答案卷內作答

非選擇題 (每題5分，共10分)

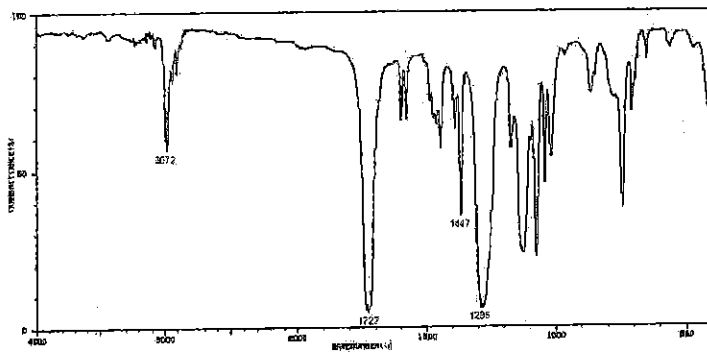
1. For the following reaction, using curved arrow (\curvearrowright) to show the details of the reaction mechanism.

The cationic (for example, BF_3 as catalyst) polymerization of propylene (propene) contains initiation (2%) and propagation (3%). (No need to show termination)

2. According to the following mass, IR and NMR spectra, please provide the structure of this compound. 根據以下的光譜資料提供該化合物的結構

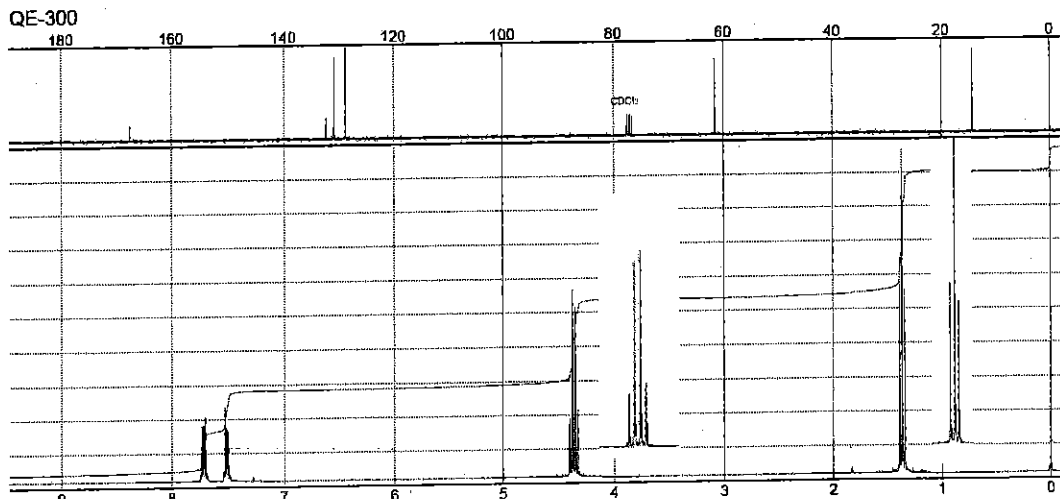


Mass (EI)



IR

^1H & ^{13}C NMR(CDCl_3)



注意：背面有試題

參考用