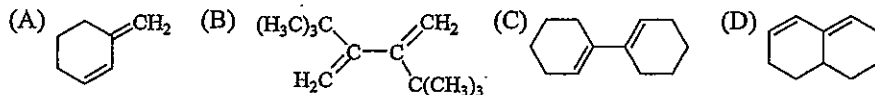
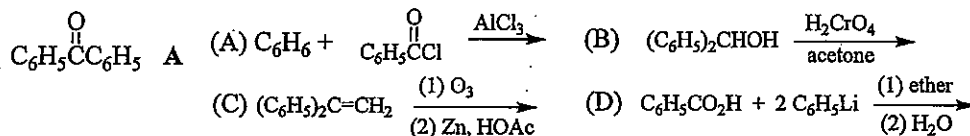


I. Multiple Choices (3 points each question) 選擇題考生應作答於「答案卡」，並請用 2B 鉛筆作答。

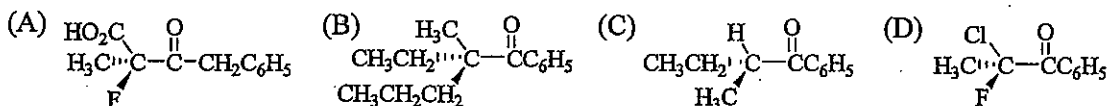
1. Which of the following diene(s) can not be used to undergo Diels-Alder reaction?



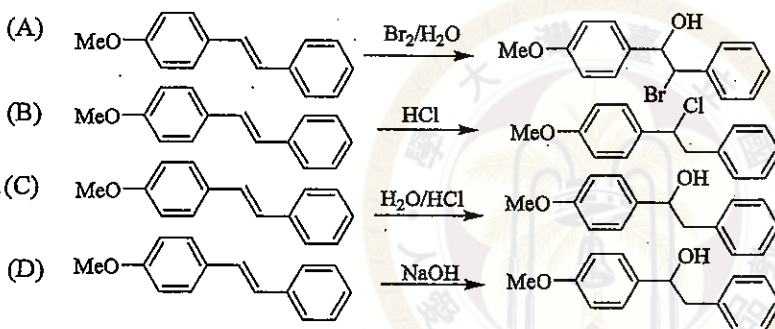
2. Which of the following reactions can be used to prepare compound A?



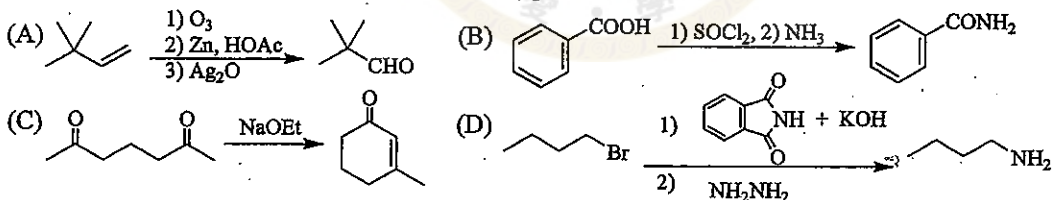
3. Which of the following compound(s) would undergo racemization in the presence of base?



4. Which is/are the correct answer(s)?



5. Which of the following reactions give the correct product?



II. Simple Choice (3 points each question) 選擇題考生應作答於「答案卡」，並請用 2B 鉛筆作答。

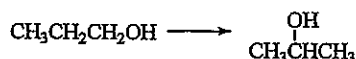
6. Which method can be used to differentiate 1-octyne and 2-octyne?

(A) add two moles of HX (B) add  $KMnO_4$  (C) take infrared spectra (D) add  $H_2O$

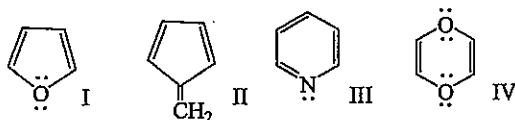
7. Compound B contains halogen atoms. The parent ion peaks  $m/z$  (relative intensity) of its mass spectrum appear at What  $M_r^+$  (51.0),  $M_r^+ + 2$  (100.0), and  $M_r^+ + 4$  (49.0) kind of halogen(s) and how many of it (them) are in compound B?

(A) one Br (B) two Cl (C) two Br (D) one Cl and one Br

8. Which is the best method for making the following conversion?

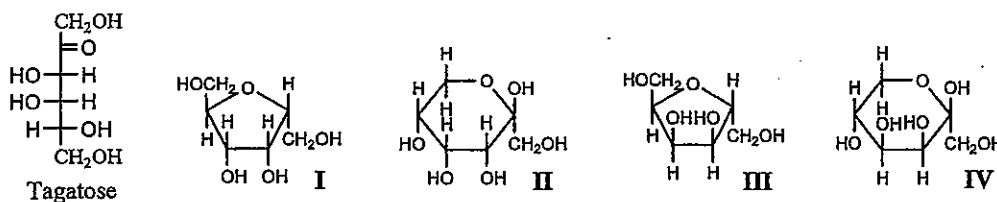


9. Which structures are aromatic?



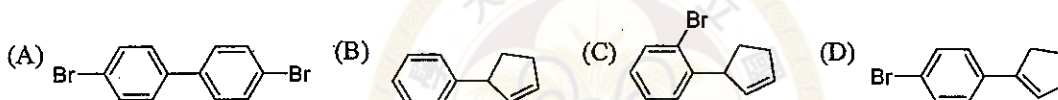
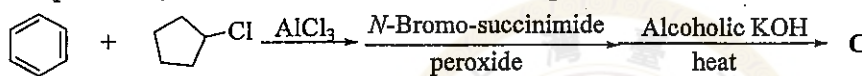
(A) II, III (B) III, IV (C) I, III (D) II, IV

10. Which is a product of the intramolecular cyclization of tagatose shown below to form a furanose?

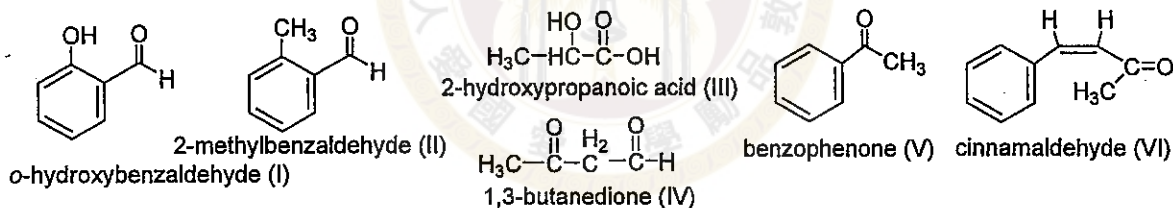


(A) I; (B) II; (C) III; (D) IV

11. The product C, that would result from the following series of reactions. What is C?

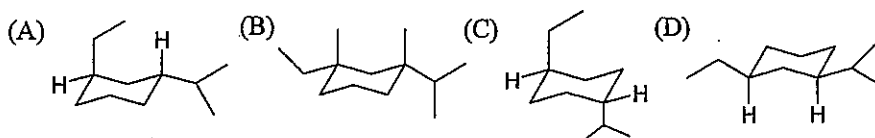


12. Which compounds are named correctly?

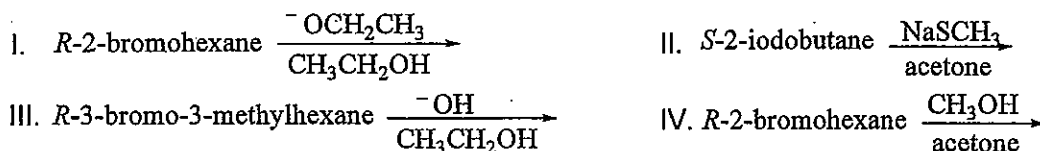


(A) I, II, III; (B) IV, V, VI; (C) II, IV, V; (D) III, IV, VI

13. Which is the structure for trans-1-ethyl-3-isopropylcyclohexane



14. Which reactions will proceed with inversion of configuration?



(A) I, II (B) III, IV (C) II, III (D) I, IV

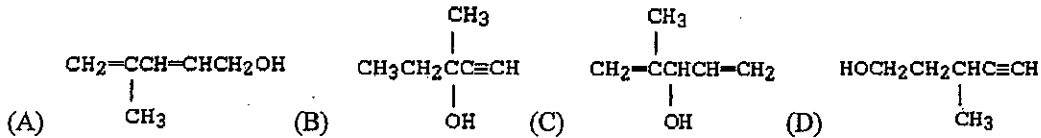
15. Lithium aluminum hydride is a good reducing agent. However, it can NOT reduce

(A) ester to alcohol; (B) ketone to secondary alcohol; (C) epoxide to alcohol (D) alkene to alkane

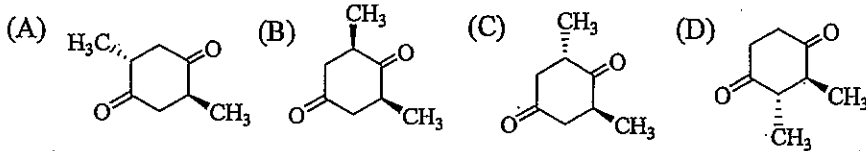
16. A compound has the molecular formula of  $C_6H_{10}O$ . It decolorizes bromine in carbon tetrachloride. The IR spectrum of the compound has a broad peak at  $3500\text{ cm}^{-1}$  and a sharp peak at  $3300\text{ cm}^{-1}$ . The  $^1\text{H NMR}$  spectrum consists of:

triplet,  $\delta$  1.0; singlet,  $\delta$  2.4 (1H); singlet,  $\delta$  1.4; singlet,  $\delta$  3.4 (1H); quartet,  $\delta$  1.6

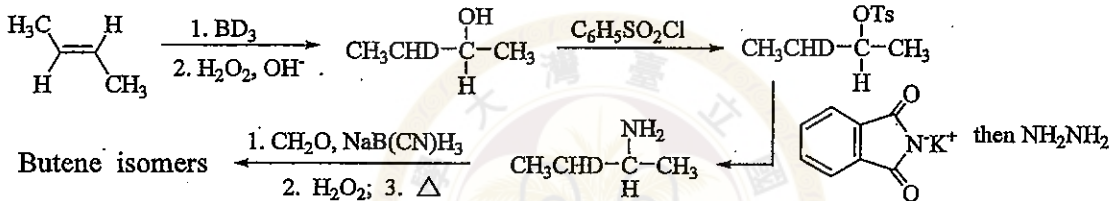
A likely structure for the compound is which of these?



17. Which of the following cyclic compounds can NOT be resolved into the optically pure enantiomer?



18. In the following sequence of reactions,



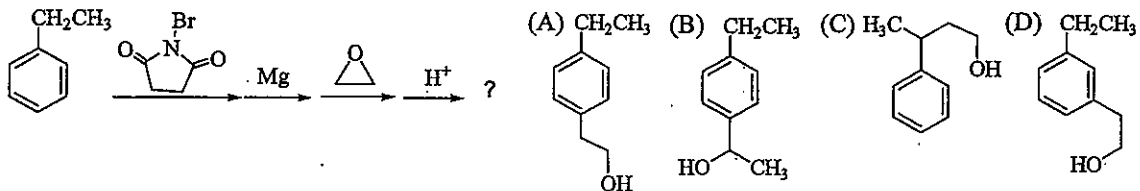
Which of butene isomers contain(s) NO deuterium?

(A) *cis*-2-butene (B) *trans*-2-butene (C) *cis*-2-butene and *trans*-2-butene (D) 1-butene

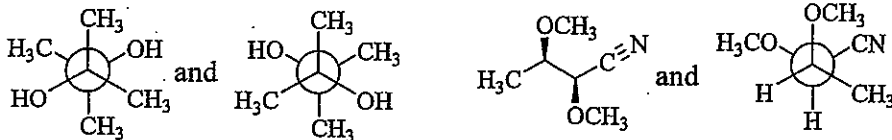
19. Which of the following statement concerning amine is FALSE?

(A) Pyridine is more basic than pyrrole. (B) Both pyridine and pyrrole are aromatic compounds.  
(C) In gas phase, triethylamine is more basic than diethylamine. (D) The inversion barrier for *N*-chlorodiethylamine is higher than *N*-chloroaziridine.

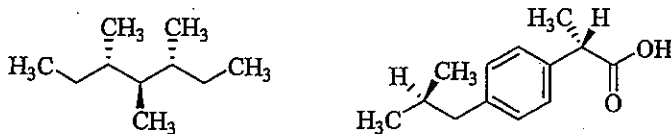
20. What is the major product of the following reaction sequence?



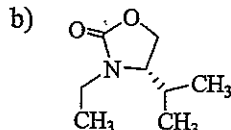
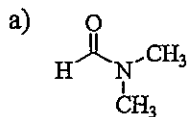
III. a) Label each pair as enantiomers, diastereomers, or same molecule (6 points).



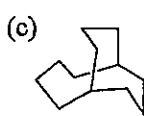
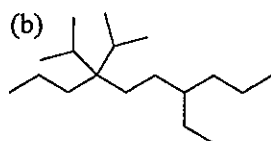
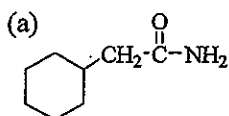
b) Label each molecule as chiral or achiral and label each stereocenter with its *R* or *S* configuration (6 points).



IV. Identify the number of chemically non-equivalent of hydrogens and carbons for the following compounds respectively (8 points).



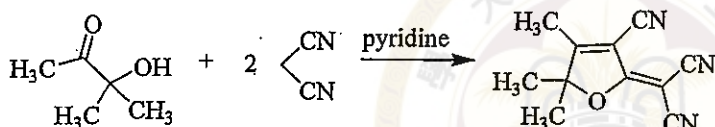
V. Give the IUPAC systematic names for (a) to (c) and draw the chemical structures for (d) to (f) (2 points each; total 12 points)



(d) The Haworth projection formula for the pyranose form of  $\beta$ -D-glucose

(e) Succinic acid; (f) 2-Bromo-4-nitroaniline

VI. Provide a reasonable mechanism for the following transformation (show electron flow by arrow pushing in writing mechanism) (8 points).



試題隨卷繳回