

國立成功大學

111學年度碩士班招生考試試題

編 號：278

系 所：臨床藥學與藥物科技研究所

科 目：有機化學

日 期：0220

節 次：第 1 節

備 註：不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Multiple-Choice Questions (each 2%, total 10 %)

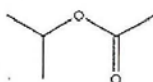
(1) What term describes the structural relationship between *cis*-1,2-dimethylcyclopentane and *trans*-1,3-dimethylcyclopentane?

- A) not isomers
- B) constitutional isomers
- C) enantiomers
- D) diastereomers
- E) conformers

(2) Which of the following compounds is the most nucleophilic?

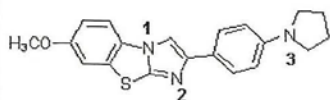
- A) CH₃SH
- B) CH₃OH
- C) H₂O
- D) CH₃CO₂H
- E) BF₃

(3) What ¹H NMR spectral data is expected for the compound shown?



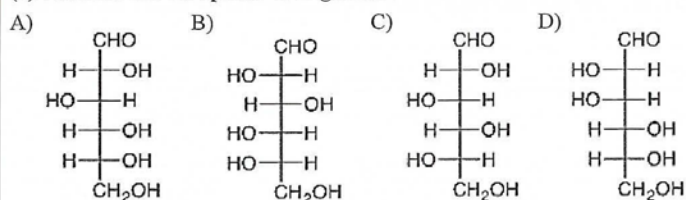
- A) 3.8 (1H, septet), 2.1 (3H, s), 1.0 (6H, d)
- B) 3.8 (1H, septet), 3.3 (3H, s), 1.0 (6H, d)
- C) 3.3 (3H, s), 2.6 (3H, septet), 1.0 (6H, d)
- D) 2.6 (1H, septet), 2.1 (3H, s), 1.0 (6H, d)

(4) The following structure has been used in monitoring the development of amyloid plaques in Alzheimer's patients. Which sequence correctly ranks the following nitrogens in order of increasing p*K*_b value?

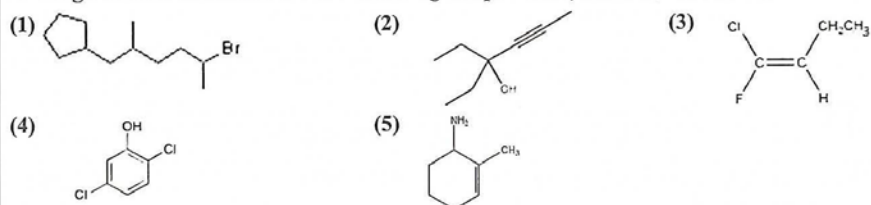


- A) 2 < 3 < 1
- B) 3 < 2 < 1
- C) 2 < 1 < 3
- D) 1 < 3 < 2

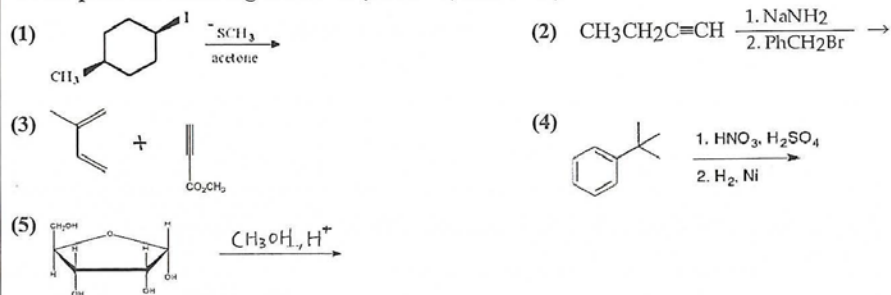
(5) Which is the C2 epimer of D-glucose?



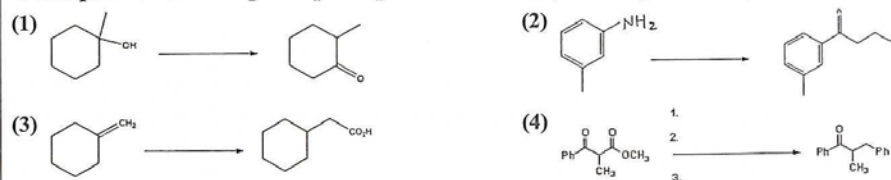
2. Assign the IUPAC names for the following compounds. (each 2%, total 10%)



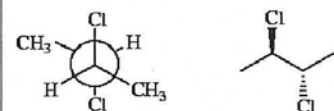
3. Complete the following reactions. (each 2%, total 10%)



4. Complete the following multiple-step transformation. (each 5%, total 20%)



5. Which of the following terms best describes the pair of compounds shown: enantiomers, diastereomers, or the same compound? (5%)

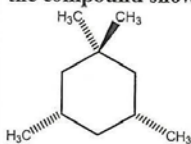


6. Provide the skeletal structures of all the constitutional isomers with molecular formula C_6H_{14} . (5%)

7. Using a Newman projection to predict the product of the following elimination reaction. (5%)



8. Predict the number of distinct *quartets* expected in the off-resonance decoupled ^{13}C NMR spectrum of the compound shown below. (5%)



9. Propose a structure for the ether of formula $C_4H_{10}O$ with the following 1H NMR signals:

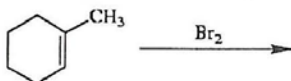
δ 0.95 (triplet, 3H), 1.52 (multiplet, 2H), 3.30 (singlet, 3H), 3.40 (triplet, 2H) (ppm). (5%)

10. Provide a detailed, stepwise mechanism for the acid-catalyzed transesterification of ethyl acetate with *n*-propanol. (5%)

11. What compound is produced in the reaction of cyclopentanone with Br_2 in acetic acid? (5%)

12. Provide the structure of the intramolecular aldol condensation/dehydration product that results when 2,6-heptanedione is heated in base. (5%)

13. Complete the following reaction and provide a detailed, step-by-step mechanism for the process. (5%)



14. Draw the 2 organic products expected from this reaction, label them as thermodynamic or kinetic and tell which predominates at $-80^\circ C$. (5%)

