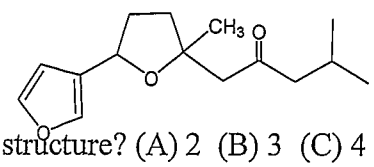
國立中山大學104學年度碩士暨碩士專班招生考試試題

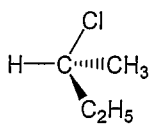
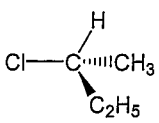
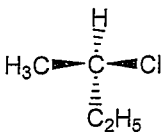
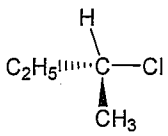
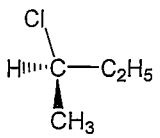
科目名稱：有機化學【海資系碩士班丙組】　　題號：452001

※本科目依簡章規定「不可以」使用計算機(選擇題)　　

Choose one right answer from a list of answers given for each question. (5 points for each)

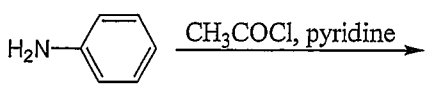
1. For the compound  , please show how many isoprene units are incorporated into the structure? (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

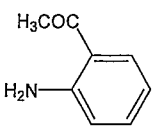
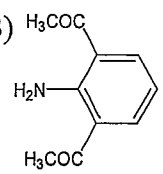
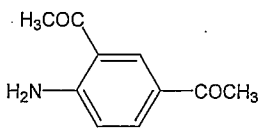
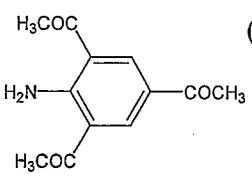
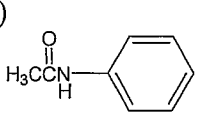
2. Which of the following drawings represents the structure of (*S*)-2-chlorobutane?

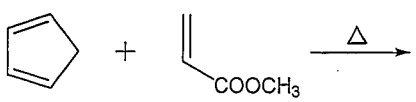
(A)  (B)  (C)  (D)  (E) 

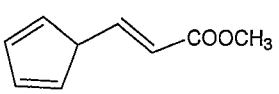
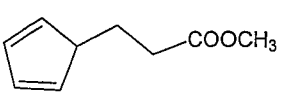
3. How many possible aldol condensation products could be obtained in a 1 : 1 mixture of acetaldehyde and propanal? (A) 8 (B) 6 (C) 4 (D) 2 (E) 1

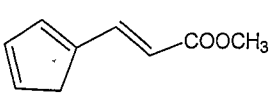
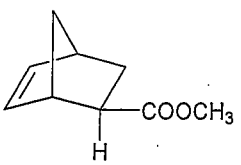
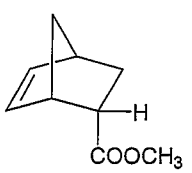
Show the product (or major product) for each of the following reactions (problems 4–10).

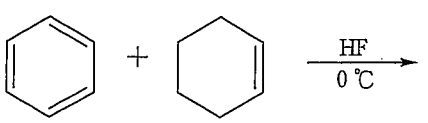
4. 

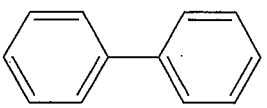
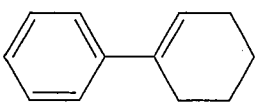
(A)  (B)  (C)  (D)  (E) 

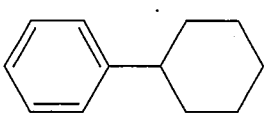
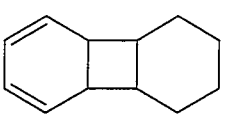
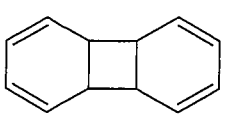
5. 

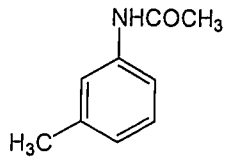
(A)  (B) 

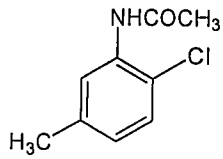
(C)  (D)  (E) 

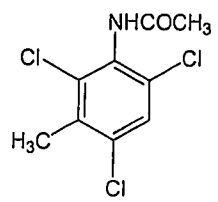
6. 

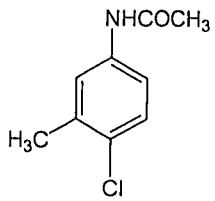
(A)  (B) 

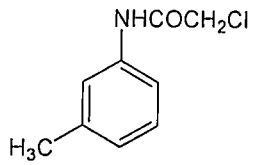
(C)  (D)  (E) 

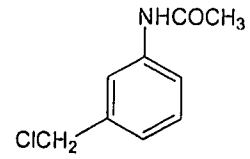
7. 

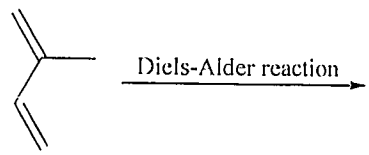
(A) 

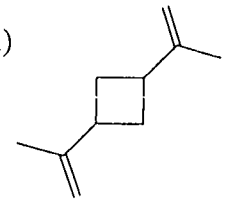
(B) 

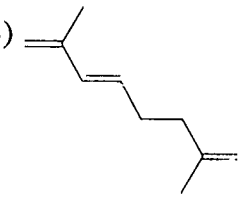
(C) 

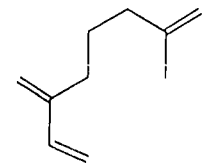
(D) 

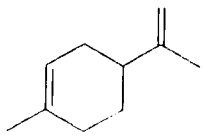
(E) 

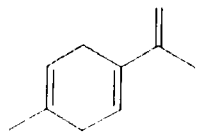
8. 

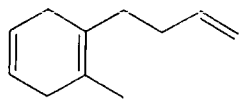
(A) 

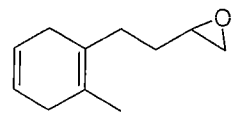
(B) 

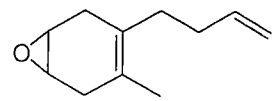
(C) 

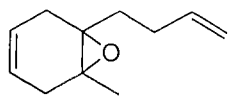
(D) 

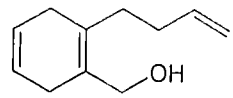
(E) 

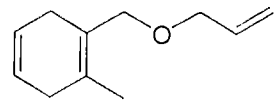
9. 

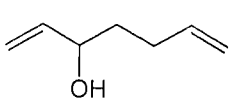
(A) 

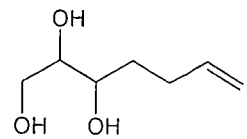
(B) 

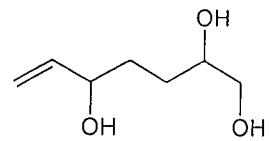
(C) 

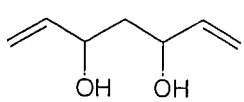
(D) 

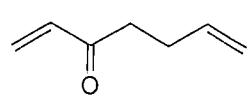
(E) 

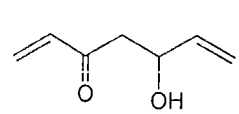
10. 

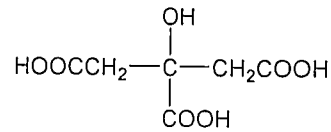
(A) 

(B) 

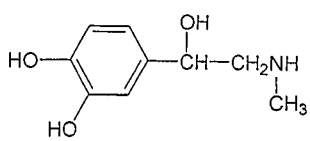
(C) 

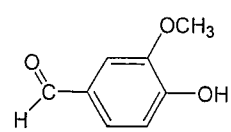
(D) 

(E) 

11. Which of the following compounds is chiral? (A) Citric acid, 

(B) Furan

(C) Epinephrine, 

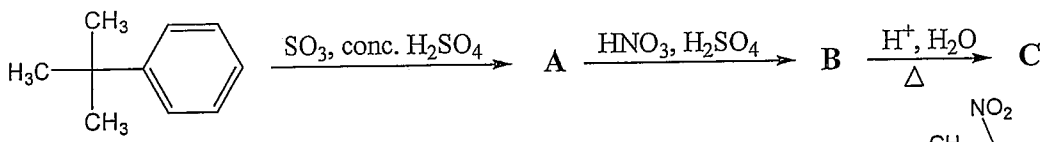
(D) 

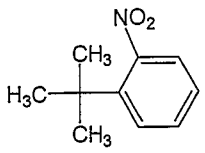
(E) 1,1-Dichloropropane

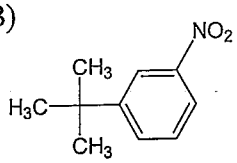
國立中山大學104學年度碩士暨碩士專班招生考試試題

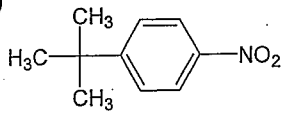
科目名稱：有機化學【海資系碩士班丙組】　　題號：452001

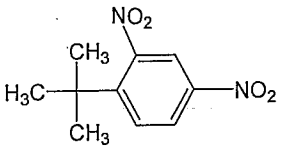
※本科目依簡章規定「不可以」使用計算機(選擇題)　　

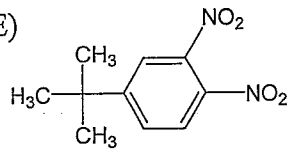
12. 

What is the final product **C** of the above reaction sequence? (A) 

(B) 

(C) 

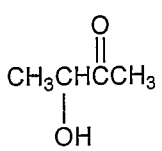
(D) 

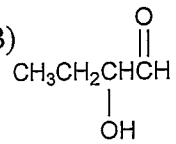
(E) 

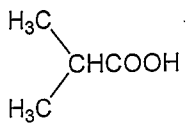
13. Show the degrees of unsaturation (or index of hydrogen deficiency) for a compound with the molecular formula $C_{21}H_{21}BrN_2O_2$. (A) 9 (B) 10 (C) 11 (D) 12 (E) 13

14. A compound C_5H_{10} shows IR absorptions at 3030, 1660 (very weak), 1380 and 965 cm^{-1}. This compound is (A) 1-pentene (B) cyclopentane (C) *cis*-2-pentene (D) 2-methyl-2-butene (E) *trans*-2-pentene.

15. Which of the following compounds could show a molecular ion peak at $m/z = 88$ and a base peak at $m/z = 60$ in EI mass spectrum?

(A) 

(B) 

(C) 

(D) $CH_3CH_2CH_2COOH$

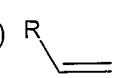
(E) $CH_3CH_2CH_2CH_2COOH$

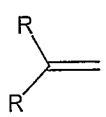
16. The mass spectrum of a compound showed a relative intensity ratio 9 : 6 : 1 for peaks of M (molecular ion), M+2 and M+4. This compound should possess (A) Br_2 (B) Cl_2 (C) BrCl (D) Br_2Cl (E) $BrCl_2$ in the molecular formula.

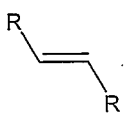
17. The ^{13}C NMR spectrum of a compound with the molecular formula C_6H_{14} showed four peaks at δ 9, 29, 30 and 37 ppm, respectively. The peak at 29 ppm is much larger than the others, whereas the peak at 30 ppm is very weak. What is this compound? (A) 2,3-Dimethylbutane (B) 2,2-Dimethylbutane (C) 3-Methylpentane (D) *n*-Hexane (E) 2-Methylpentane

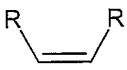
18. The ^1H NMR spectrum of a compound $C_{10}H_{20}$ shows two peaks at δ 0.97 (18H, s) and δ 5.30 (2H, s) ppm. How many carbon signals of this compound could be found in it's ^{13}C NMR spectrum?
(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

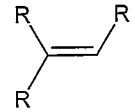
19. Which of the following compounds would you expect to have IR absorptions at 910 and 990 cm^{-1}?

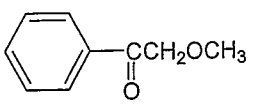
(A) 

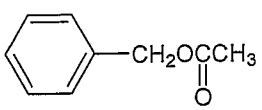
(B) 

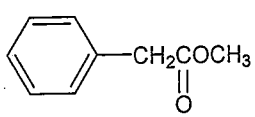
(C) 

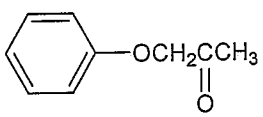
(D) 

(E) 

20. A compound showed ^1H NMR signals at δ 2.0 (3H, s), δ 5.1 (2H, s) and δ 7.3 (5H, br s) ppm. The structure of this compound is (A) 

(B) 

(C) 

(D) 

(E)