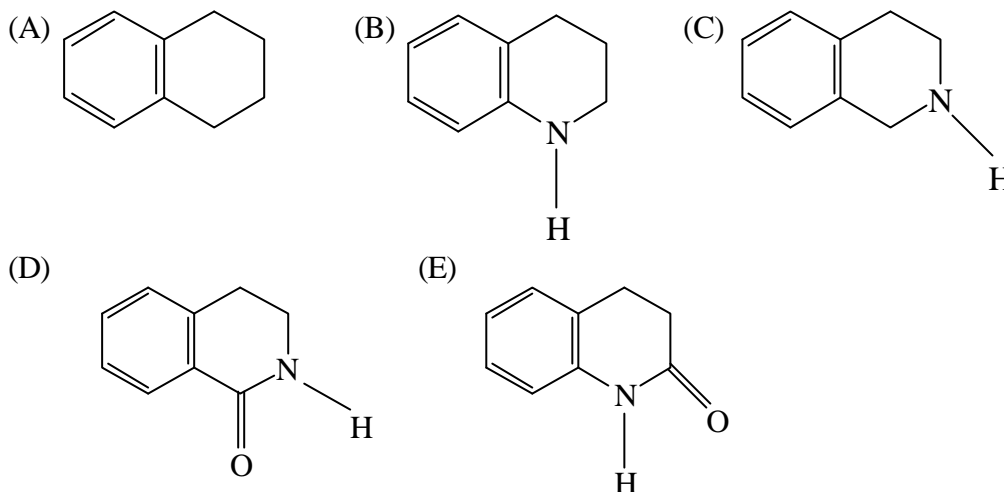


建國補習班 學士後西醫第二回模擬考試題

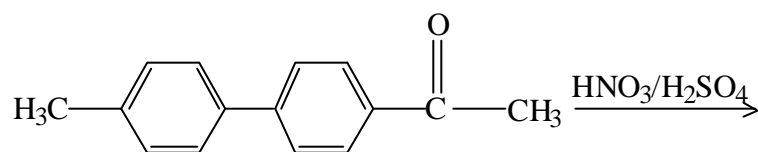
考試科目：化學 考試時間：八十分鐘

一、選擇題：每題 2 分

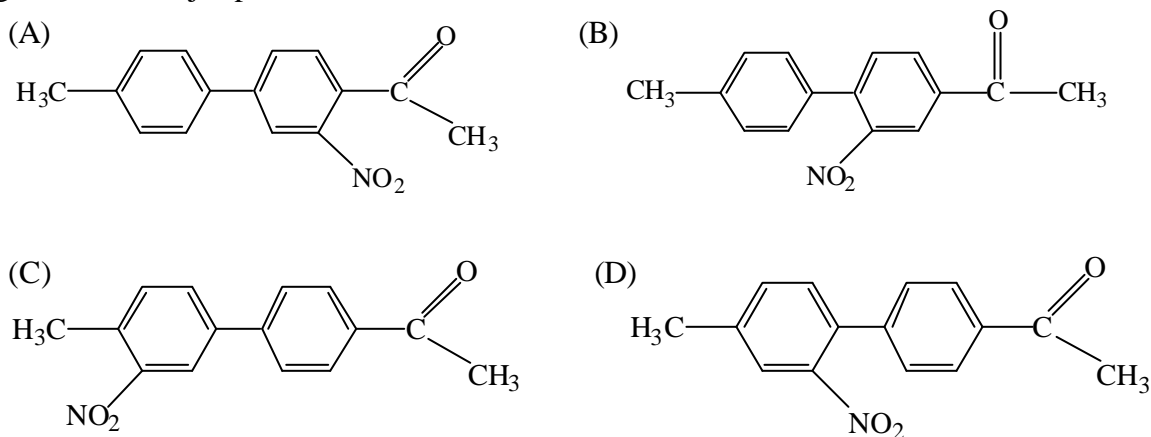
1. Which one of the following compounds undergoes bromination of its aromatic ring at the fastest rate?



2. The reaction



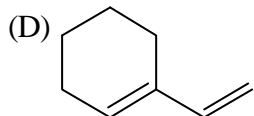
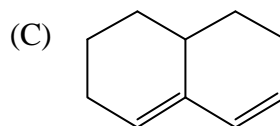
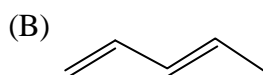
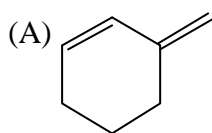
gives as the major product :



(E) None of these

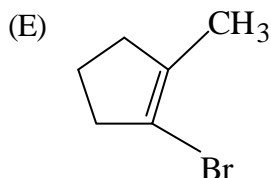
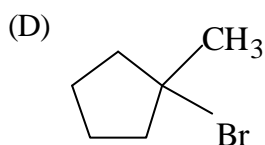
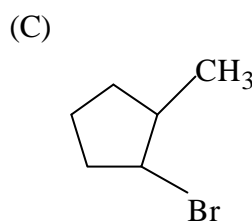
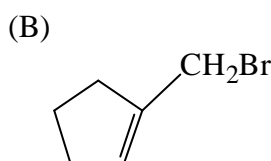
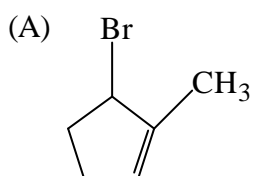
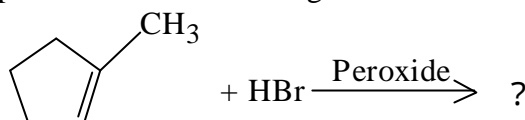
3. Which of the following conjugated dienes would not react with a dienophile in a Diels-Alder

reaction?

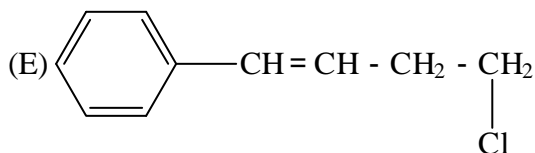
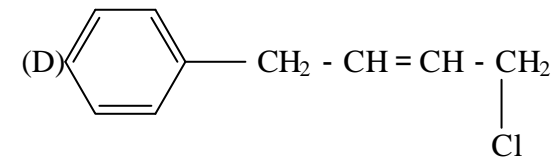
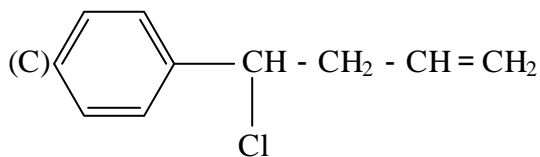
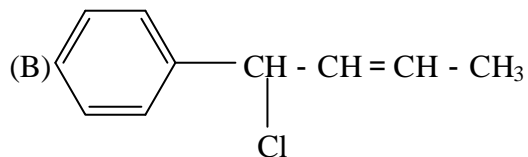
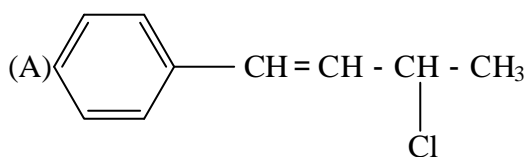
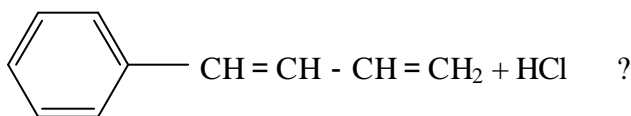


(E) All of the above

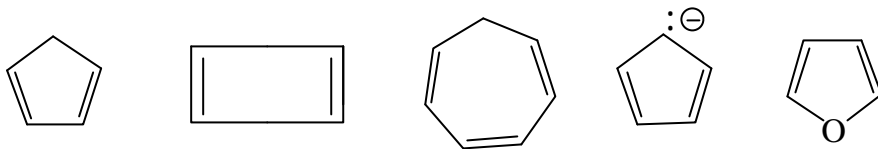
4. What is the major product from the following reaction?



5. What is the thermodynamic product for the following reaction?

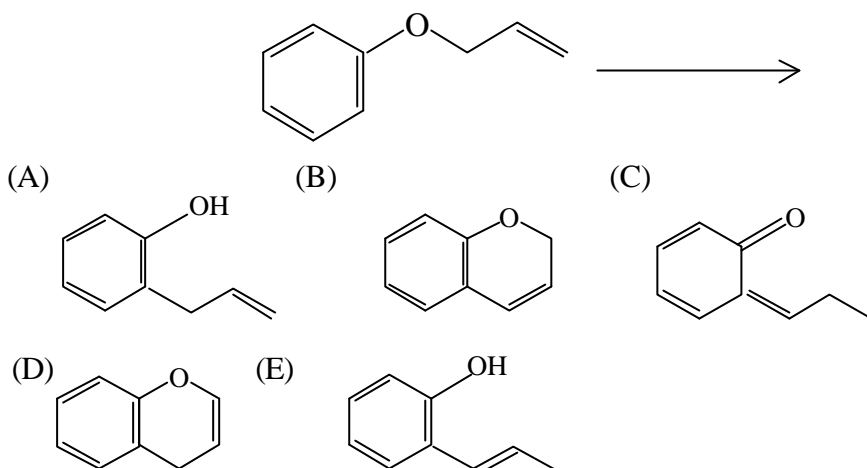


6. Which of the structures below would be aromatic?

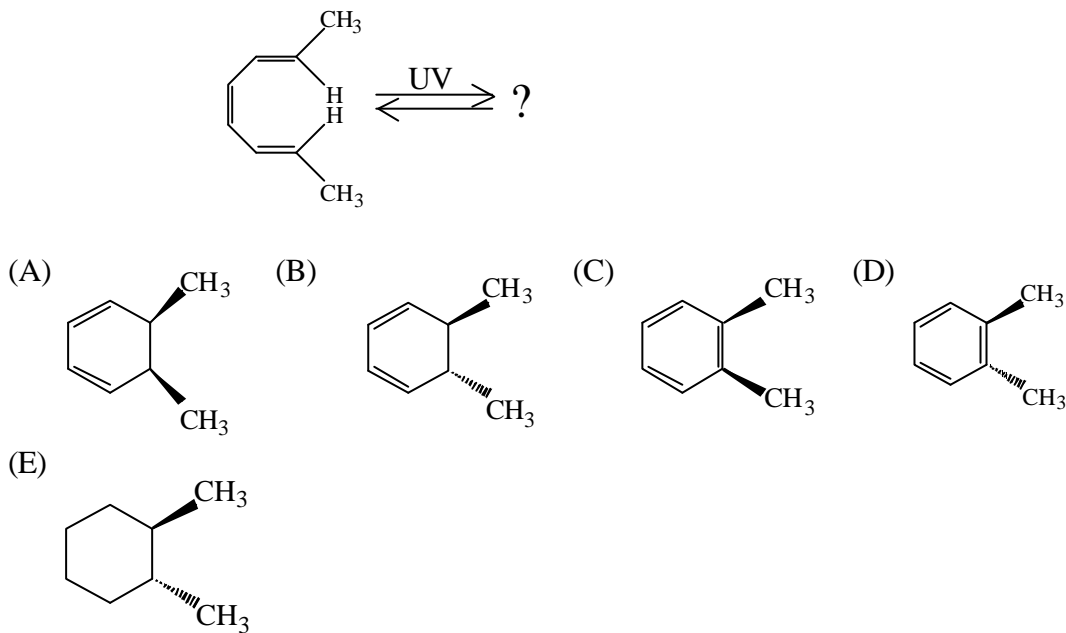


(A) and (B) , and (C) , and (D) (E) 、 、 and

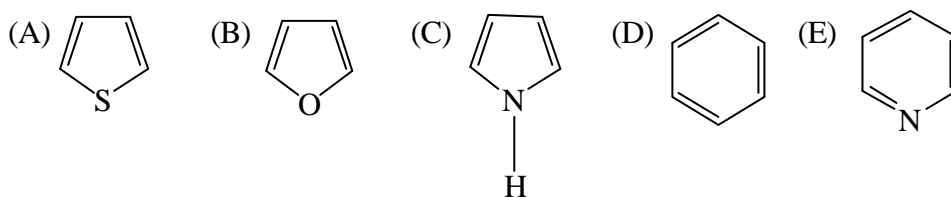
7. What is the major product from the following reaction?



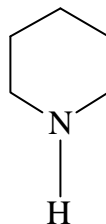
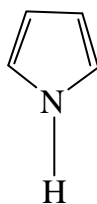
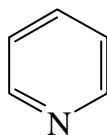
8. What is the major product for the following reaction?



9. Which of the following compounds is the most reactive toward electrophile aromatic substitution?



10. The correct order of decreasing basicity of the following compounds



(A) > > (b) > > (C) > > (D) > >

11. Which of the following molecules does not exhibit a net dipole moment of zero ?

(A) CO_2 (B) BrF_4^- (C) I_3^- (D) N_2H_4 (E) C_2H_4

12. Which of the following molecules exhibits the strongest hydrogen bonding ?

(A) CH_3COOH (B) CH_3CHO (C) CH_3OCH_3 (D) $\text{C}_2\text{H}_5\text{OH}$ (E) $\text{C}_2\text{H}_5\text{NH}_2$

13. If the ratio of e/m of X^{2+} is 1.16×10^4 coul/g. Find the molecular weight of X ?

(A) 8.3 (B) 16.6 (C) 24.9 (D) 32.9 (E) none of the above

14. Which of the following compounds is water soluble ?

(A) magnesium carbonate (B) barium sulfate (C) strontium nitrate (D) plumbous sulfide
(E) silver chloride

15. Element X has two isotopes existing in nature. Now in mass spectrometer, we learn that the e/m of X^{2+} are 4.82×10^3 , 4.59×10^3 and 4.38×10^3 coul/g respectively. Besides, the intense of three peaks is 1:8:16, please find the average molecular weight of element X ?

(A) 10.8 (B) 10.2 (C) 20.8 (D) 20.2 (E) none of the above

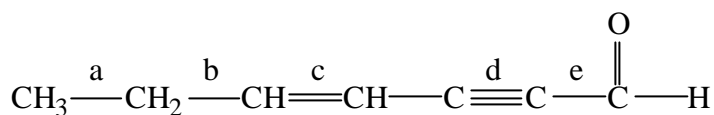
16. The line spectrum of hydrogen

(A) indicates that H_2 is a gas
(B) is identical to that of Neon and Xenon
(C) shows that the electron in H atm can have only certain energies
(D) shows that the electron moves in a circular orbital
(E) none of the above

17. Which of the following is false ?

(A) Zeolites are useful as water softeners
(B) Ions becomes trapped in the cavities and tunnels of the zeolites
(C) When hard water is passed over a zeolite structure, sodium ions present may be exchanged for other ions
(D) Used up zeolite water softeners may be reused after being treated with a concentration salt water solutions
(E) none of the above

18. Arrange the bonds in the molecule in order of increasing C-C bond length ?

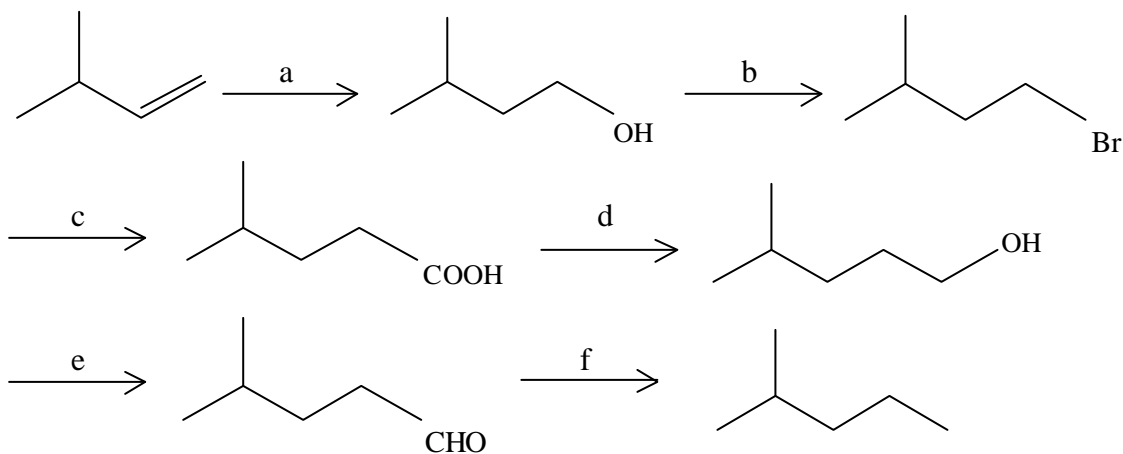


- (A) $d < c < e < b < a$ (B) $d < c < b < e < a$ (C) $d < c < a < b < e$ (D) $d < c < b < a < e$
 (E) none of above

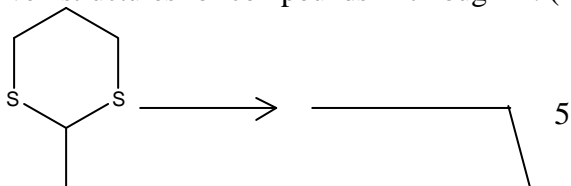
19. The state of matter for an objective that has a definite volume but not a definite shape is
 (A) solid state (B) liquid state (C) gaseous state (D) element state (E) mixed state
20. Naturally occurring copper exists in two isotopic forms : ^{63}Cu and ^{65}Cu . The atomic mass of copper is 63.55 amu. What is the approximate natural abundance of ^{63}Cu ?
 (A) 63% (B) 90% (C) 70% (D) 50% (E) 30%
21. Which of the following are state functions ?
 () energy () work () enthalpy () heat
 (A) , , (B) , , (C) , , (D) , (E) none of above
22. On a planet where the temperature is so high, the ground state of an electron in the hydrogen atom is $n=4$. What is the ratio of IE on this planet compared to earth ?
 (A) 1 : 4 (B) 4 : 1 (C) 1 : 16 (D) 16 : 1 (E) none of above
23. According to VSEPR theory, which of the following species has a square planar molecular structure ?
 (A) TeBr_4 (B) BrF_3 (C) IF_5 (D) XeF_4 (E) SCl_2
24. Which of the following statements is true about p-type silicon ?
 (A) It is produced by doping Si with P or As (B) Electron are the mobile charge carriers
 (C) It does not conduct electricity as well as pure Si (D) All are true (E) None is true
25. If the reaction $2\text{HI} \rightarrow \text{H}_2 + \text{I}_2$ is second order, which of the following will yield a linear plot ?
 (A) $\log[\text{HI}]$ vs time (B) $\frac{1}{[\text{HI}]}$ vs time (C) $[\text{HI}]$ vs time (D) $\ln[\text{HI}]$ vs time (E) none of above

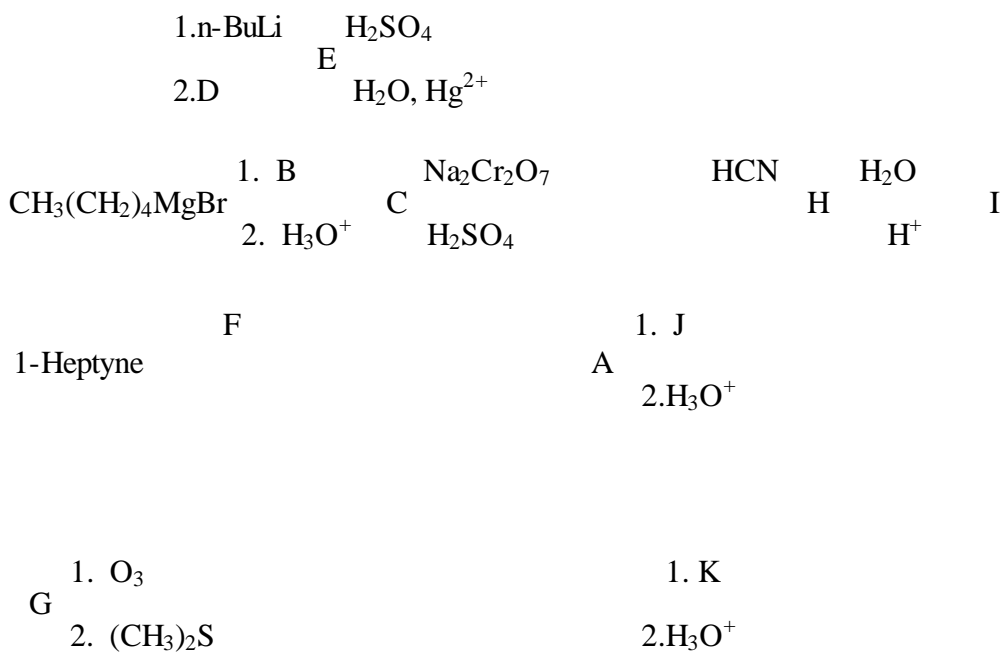
二、計算題：

1. Identify the missing reagents a-f in the following scheme : (12%)



2. Given structures for compounds A through K. (22%)



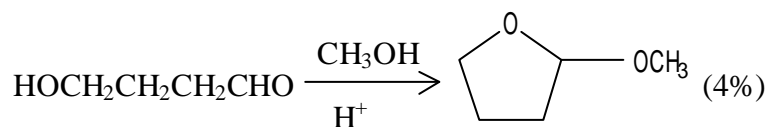


3. Propose a synthesis of p-amino benzoic acid (PABA) starting from toluene.(4%)
4. Rank each of the following sets of the compounds in order of decreasing acid strength.(4%)



5. compound A, C₈H₁₀O₂, has an intense IR absorption at 1750cm⁻¹ and gives the ¹³CNMR spectrum shown at the Fig1. . Propose a structure for A. (4%)

6. Propose a reasonable mechanism for the following transformations.



解答

一、選擇題：

1. (B) 2. (C) 3. (E) 4. (C) 5. (A) 6. (B) 7. (A) 8. (B) 9. (C) 10. (B)
 11. (D) 12. (A) 13. (B) 14. (C) 15. (A) 16. (C) 17. (E) 18. (A) 19. (B) 20. (C)
 21. (C) 22. (C) 23. (D) 24. (E) 25. (B)

二、計算題：

1.a. (1) $\text{BH}_3 \cdot \text{THF}$ (2) $\text{H}_2\text{O}_2, \text{OH}^-$

b. PBr_3 , ether

c. (1) Mg , ether (2) CO_2 (3) H_3O^+

d. (1) LiAlH_4 , ether (2) H_3O^+

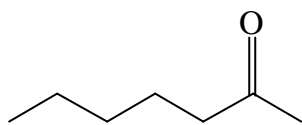
e. CrO_3 2Py

f. $\text{Zn}(\text{Hg})/\text{HCl}$ or $\text{NH}_2\text{NH}_2/\text{KOH}$ or (1) $\text{HS}-\overset{\square}{\text{S}}\text{H}, \text{H}^+$ (2) H_2/Ni

2. A.

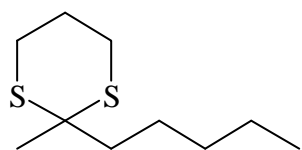
B. CH_3CHO

C.



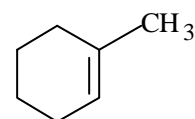
D. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$

E.

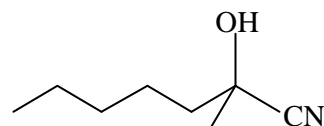


F. $\text{H}_2\text{SO}_4, \text{H}_2\text{O}, \text{HgSO}_4$

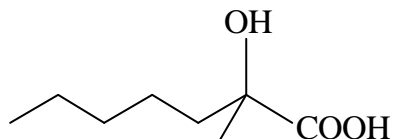
G.



H.

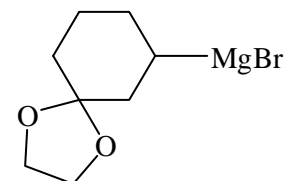


I.

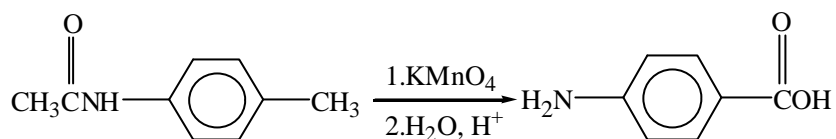
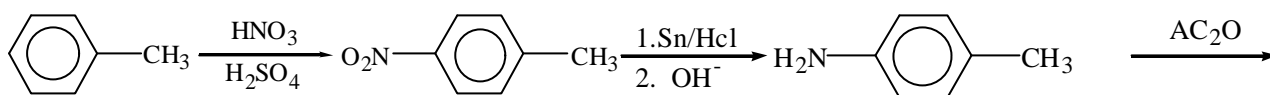


J. PhMgBr or PhLi

K.

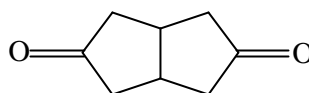


3



4. > > >

5.



6.

