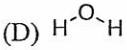
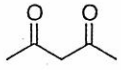
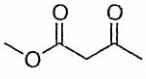
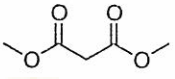
Part I. 單選題. Please select the most appropriate answer for the following questions. There is only one correct answer for each question. 請於試卷內之「選擇題作答區」依序作答。（每題 2 分，共 20 分）

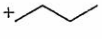
1. Which of the following compounds is the most acidic?

(A) NH_3 (B) (C)  (D)  (E) 

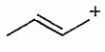
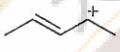
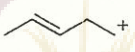
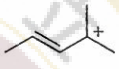
2. Which of the following compounds is the most acidic?

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

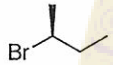
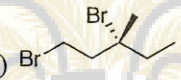
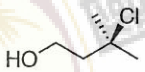
3. Which of the following is the most stable carbocation?

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

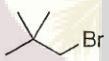
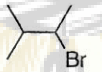
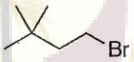
4. Which of the following is the most stable carbocation?

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

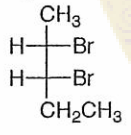
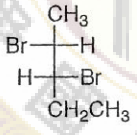
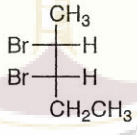
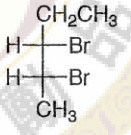
5. Which of the following compounds has an *R* configuration?

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

6. Which of the following is the most reactive electrophile for an S_N2 reaction?

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

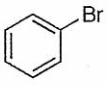
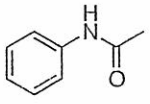
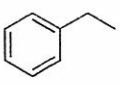
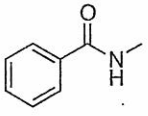
7. When (*S*)-2-bromopentane is brominated, 2,3-dibromopentanes are formed. Which of the following compounds is formed?

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

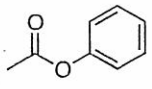
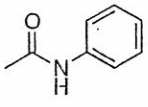
8. Which of the following is an aromatic compound?

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

9. Which of the following compounds is the most reactive towards $Br_2/FeBr_3$?

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

10. Which of the following is the most reactive towards nucleophilic addition-elimination?

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

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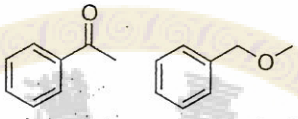
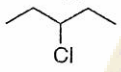
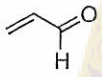
Part II. 問答題. Please provide a short answer for the following questions. 請於試卷內之「非選擇題作答區」依題號順序作答。（共 20 分）

1. Please draw the Newman projections for the following conformers of hexane considering the rotation about the C_3-C_4 bond.（6 分）
   a. The most stable of all the conformers.
   b. The least stable of all the conformers.
   c. One of the gauche conformers.
2. Please draw the most stable conformer of *trans*-1-isopropyl-3-methylcyclohexane.（2 分）
3. Please describe how would you distinguish between the IR spectra of the following compounds.（2 分）



4. Please describe how many signals you would expect to see in the ^{1}H NMR spectrum for each of the following compounds.（4 分）

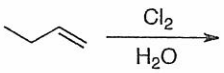
a. 

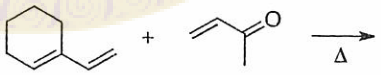
b. 

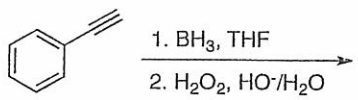
5. Please describe how would you distinguish the following compounds using ^{1}H NMR spectroscopy.（2 分）

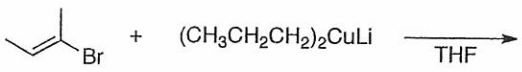
6. Please draw the chemical structure in line angle structure format (also known as skeletal structures) for the following compounds. Please include stereochemistry when necessary（4 分）
   a. (*1S,3R*)-1-Bromo-3-methylcyclopentane
   b. (*3R,4R*)-4-Chloro-3-methylcyclohexene

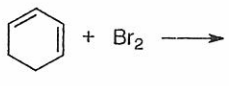
Part III. 簡答題. Please draw the major product(s) for the following reactions. Please include stereochemistry when necessary. Line angle structures (also known as skeletal structures) are preferred. 請於試卷內之「非選擇題作答區」依題號順序作答。（每題 3 分，共 60 分）

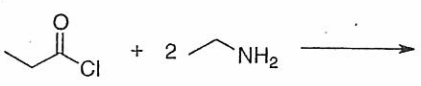
1. 

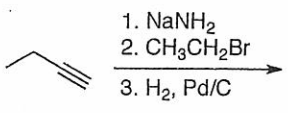
2. 

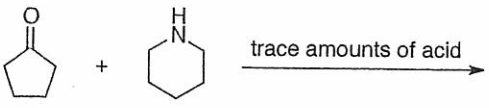
3. 

4. 

5. 

6. 

7. 

8. 

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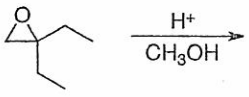
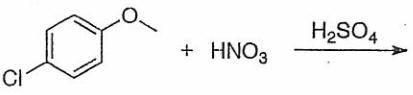
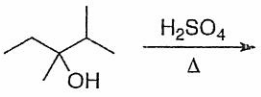
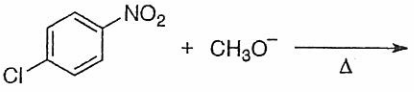
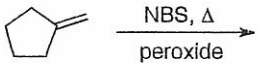
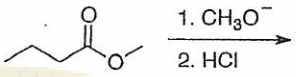
9. 

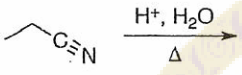
10. 

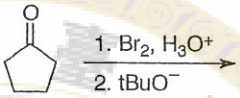
11. 

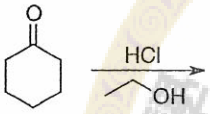
12. 

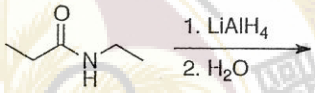
13. 

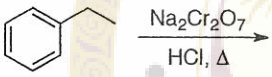
14. 

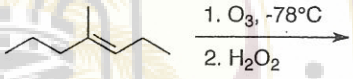
15. 

16. 

17. 

18. 

19. 

20. 

試題隨卷繳回