國立高雄應用科技大學
100 學年度碩士班招生考試
化學工程與材料工程系

准考證號碼□□□□□□□□□□ （考生必須填寫）

有機化學

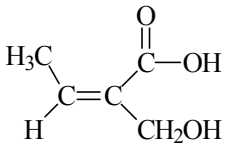
注意：a. 本 I 試題共 15 題，每題 3 分，共 45 分。
本 II 試題共 9 題，每題 5 分，共 45 分。
本 III 試題共 2 題，每題 5 分，共 10 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

1. Which of the following has the lowest *p*Ka?
(a) CH_3OH (b) HCN (c) C_3H_6O (acetone) (d) C_2H_4O (aldehyde).

2. Which can not be act as an Lewis base?
(a) CH_3CH_2OH (b) CH_3OCH_3 (c) CH_3CHO (aldehyde) (d) HNO_3.

3. Which has the highest polarity?
(a) CCl_4 (b) $CHCl_3$ (c) CH_2Cl_2 (d) CH_3Cl.

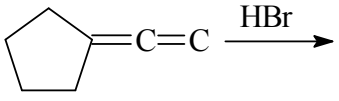
4. What should be filled in the **blank**? (a) E (b) Z (c) cis (d) trans.

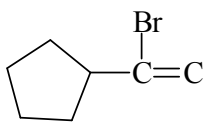


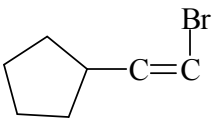
( )-2-Hydroymethyl-but-enoic acid

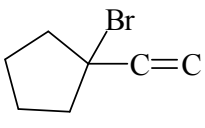
5. Rank the following set of substituents in order of Cahn-Ingold-Prelog properties:
(1) $–CH_2NH_2$ (2) –CN (3) $–CH_2OH$ (4) $–CO_2H$
(a) 4>3>2>1 (b) 3>4>2>1 (c) 2>3>4>1 (d) 1>2>4>3.

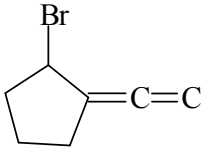
6. Predict the following reaction's product:



(a) 

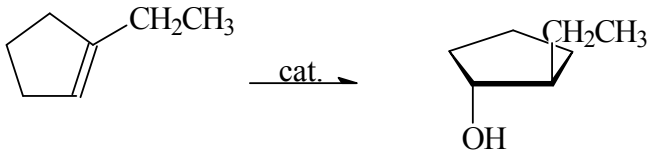
(b) 

(c) 

(d) 

7. There is an unknown compound emitting a gas which will put out a fire if met $KMnO_4$ in acidic solution. Which could be it's the structure?
(a) $R_2C{=}CR_2$ (b) $RHC{=}CR_2$ (c) $RHC{=}CHR$ (d) $R_2C{=}CH_2$. (R: alkyl group)

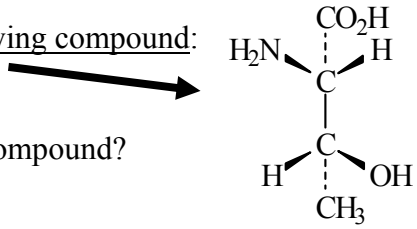
8. What is the suitable catalyst for the following reaction?



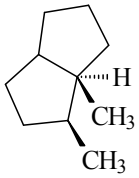
(a) $KMnO_4/H_3O^+$ (b)$OsO_4/NaHSO_3$, H_2O (c) BH_3/H_2O_2 (d) $Hg(OAc)_2/NaBH_4$.

9. What kind of alkenes' structure will be obtained if R-C≡C-R' in **Li/NH_3** environment? (R: alkyl group) (a) an *E*- alkene (b) an *Z*- alkene (c) an cis- alkene (d) an trans-alkene.

10. Identify the **R and/or S** configurations of the following compound:
(a) 2R, 3R (b) 2R, 3S (c) 2S, 3S (d) 2S, 3R.



11. Which of the following structure represents **meso** compound?

(a)


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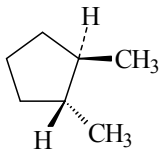

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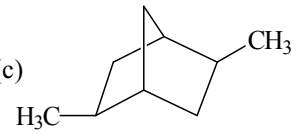

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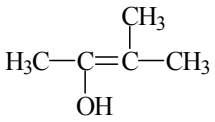
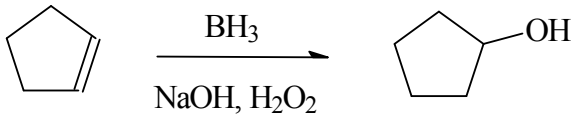


12. Rank the **oxidation level** of the following: (1) CO_2 (2) HCO_2H (3) H_2CO (4) CH_3OH
(a) 1>2>3>4 (b) 4>3>2>1 (c) 2>3>4>1 (d) 1>2>4>3.

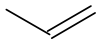
13. Identify the following reaction is an oxidation, a reduction, both or neither:



(a) oxidation (b) reduction (c) both (d) neither.

14. Compound A has the IR absorptions at around 1740 and 3400 cm^{-1}. Please identify the possible structure of compound A.
(a) an ester (b) an carboxylic acid (c) an ketone (d) an alcohol type.

15 Which has the longest ultraviolet absorption wavelength?

(a)


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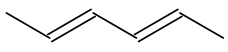

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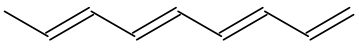

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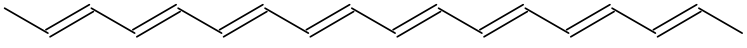
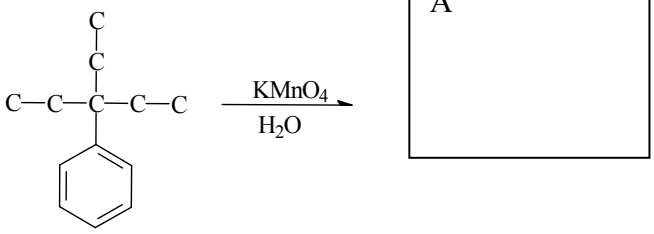


本 II 試題共 9 題，每題 5 分，共 45 分。
請依方格內**英文字母順序**於答案卷上回答問題。
II. What are the major products in the following reactions?

1.



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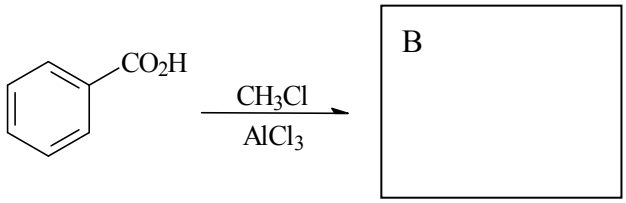

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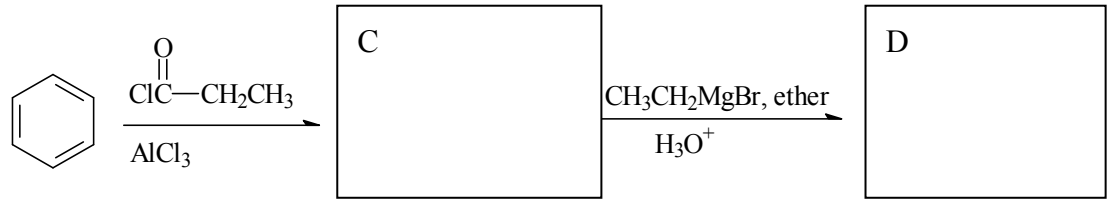

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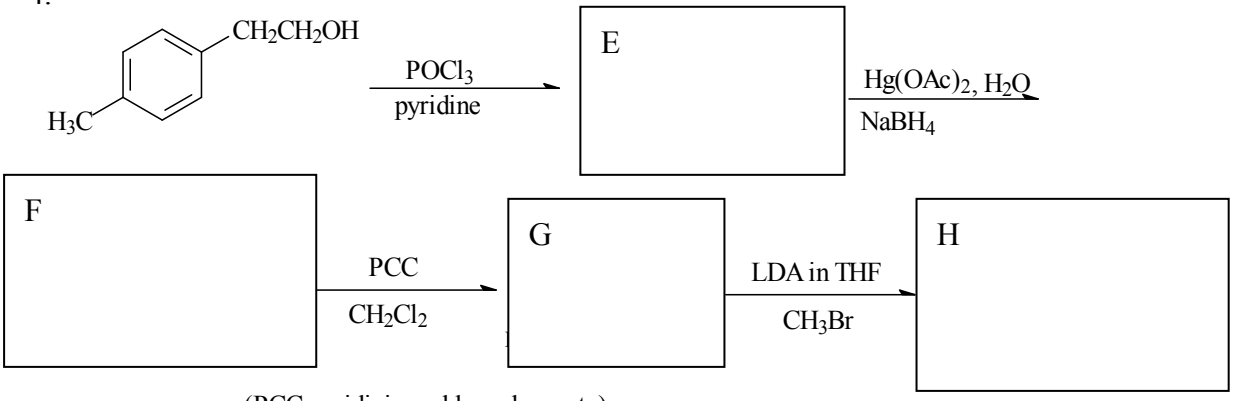
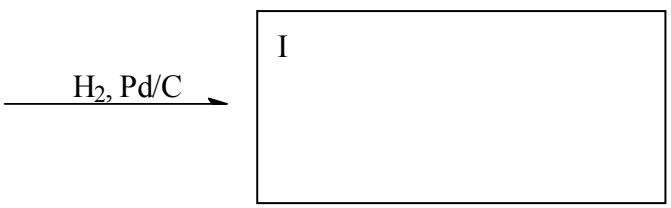


(PCC:pyridinium chlorochromate)

LDA: Lithum diisopropylamide



本 III 試題共 2 題，每題 5 分，共 10 分。

1. **Draw** the Pi (π) molecular orbital of buta-1,3-diene including Ψ_1, Ψ_2, Ψ_3^* and Ψ_4^*.
2. **Draw** the shapes and **rank** the bond angles of the following compounds:
   CH_4, NH_3, H_2O and BF_3.