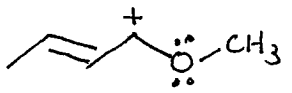
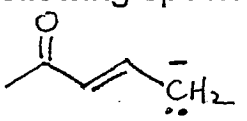
大同大學 九十二 學年度 轉學考試 試題

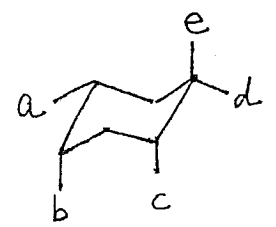
考試科目：有機化學　系別：生物工程學系　　第 1 頁，共 2 頁

註：本次考試不可以參考自己的書籍及筆記；　不可以使用字典；　不可以使用計算器。

1. (a) Give the ground-state electron configuration of carbon (atomic number 6). (2%) (b) How many electrons does carbon have in its valence shell? (2%)
2. Draw as many resonance structures as you can for the following species: (6%)

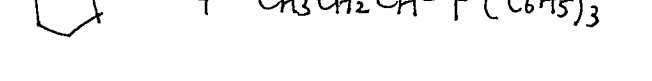
(a) $H_2C=\overset{+}{N}=\ddot{N}:^-$　(b)  　(c) 

3. Refer to the structure below to answer the following questions: (6%)

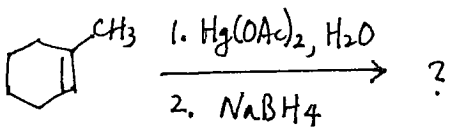


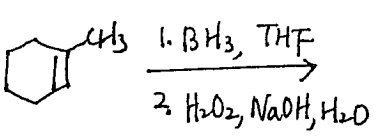
(a) Which of the labeled bonds in the structure are *equatorial* bonds?
(b) Which of the labeled bonds is *trans* to bond b?
(c) Which bonds have a 1,3-diaxial interaction with each other?

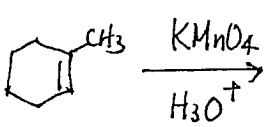
4. Draw the two chair conformations of *cis*-1-*tert*-butyl-4-chlorocyclohexane. Which is more stable? Explain. (4%)
5. Write the complete stepwise mechanism for the following reaction. Show all intermediate structures and all electron flow with arrows.



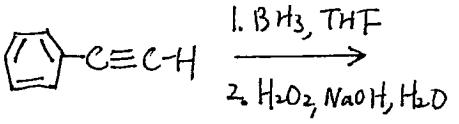
6. Predict the product(s) of each reaction below. Indicate stereochemistry if necessary. (45%)

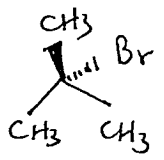
(a) 

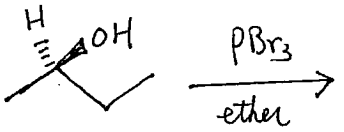
(b) 

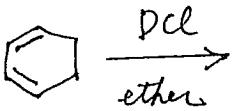
(c) 

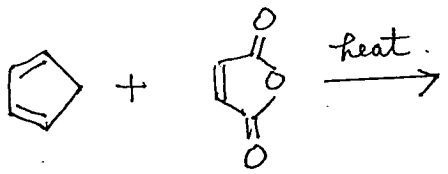
(d) $CH_3CH_2-C\equiv C-CH_3$ $\xrightarrow[\text{Lindlar Catalyst}]{D_2}$

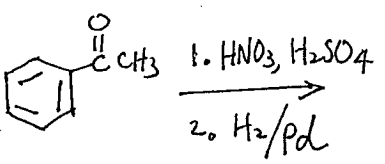
(e) 

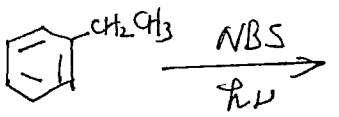
(f) 

(g) 

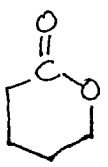
(h) 

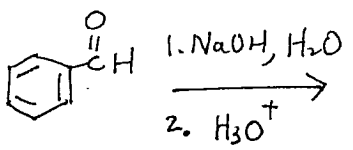
(i) 

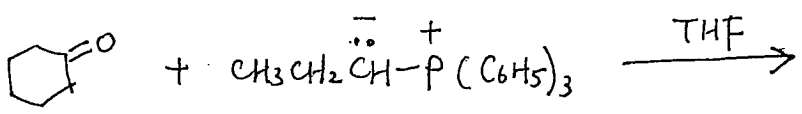
(j) 

(k) 

(l) $CH_3\overset{O}{\overset{\|}{C}}CH_2CH_2\overset{O}{\overset{\|}{C}}OCH_3$ $\xrightarrow[2.\ H_3O^+]{1.\ NaBH_4}$

(m) 

(n) 

(o) 

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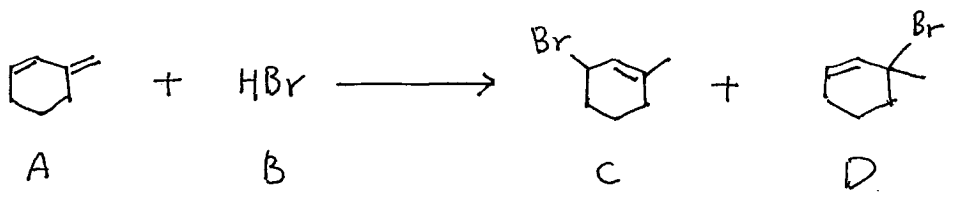
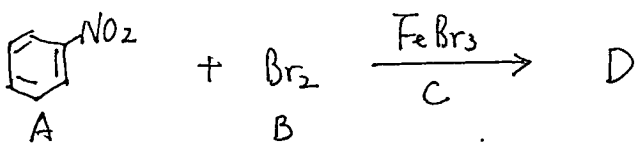
7. Consider the reaction below to answer the following questions:



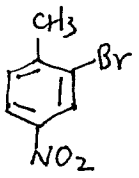
(a) The nucleophile in the reaction is _____. (1%)
(b) The electrophile in the reaction is _____. (1%)
(c) The kinetically controlled product in this reaction is _____. (2%)
(d) The product that results from 1,4-addition is _____. (1%)
(e) Write s stepwise mechanism that accounts for both of the products shown. Show all intermediate structures and all electron flow with arrows. (5%)

8. Consider the reaction below to answer the following questions.



(a) The nucleophile in the reaction is _____. (2%)
(b) The Lewis acid catalyst in the reaction is _____. (2%)
(c) The reaction proceeds _____ (faster or slower) than benzene. (2%)
(d) Draw structure of D. (4%)

9. How would you synthesize the following compounds from benzene? (10%)

(a) 

(b)