

2016 年硕士学位研究生入学考试试题

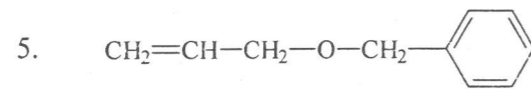
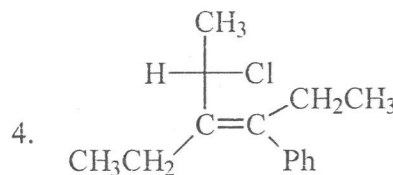
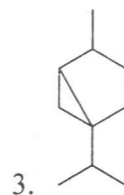
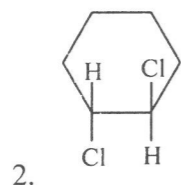
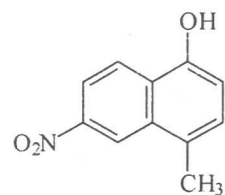
科目代码: 863

科目名称: 有机化学

满分: 150 分

注意: ①认真阅读答题纸上的注意事项; ②所有答案必须写在答题纸上, 写在本题目纸或草稿纸上均无效; ③本试题纸须随答题纸一起装入试题袋中交回!

一、命名下列化合物: (每题 2 分, 共 10 分)



二、写出下列化合物的结构式: (每题 1 分, 共 5 分)

1. 4-甲基-2-庚烯-5-炔

2. 2-硝基对甲苯磺酸

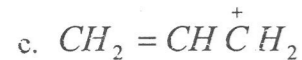
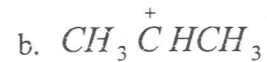
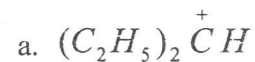
3. 糠醛

4. (E)-2-丁烯-1-醇

5. DMSO

三、基本概念题 (每题 2 分, 共 30 分)

1. 下列碳正离子的稳定性大小正确的是: ( )



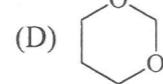
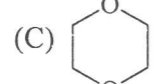
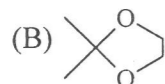
A.  $a>b>c>d$

B.  $c>b>a>d$

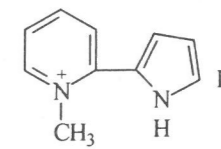
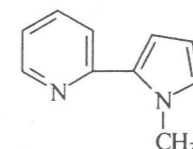
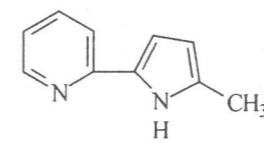
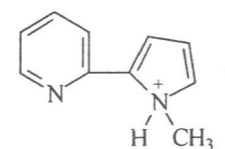
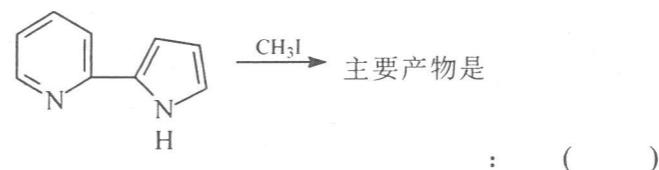
C.  $d>c>a>b$

D.  $c>d>a>b$

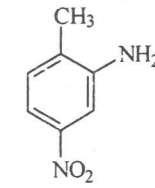
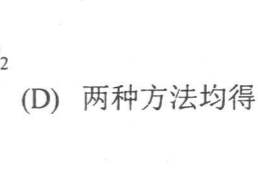
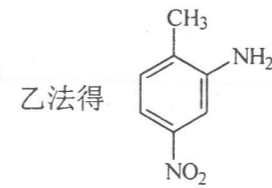
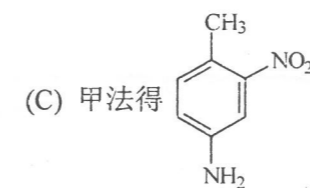
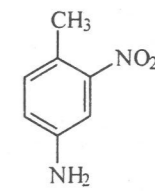
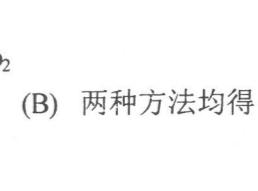
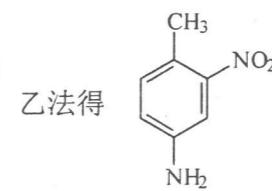
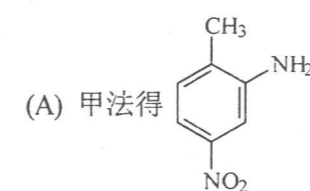
2. 下列四个化合物, 不被稀酸水解的是: ( )



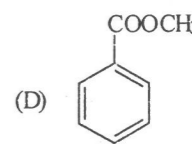
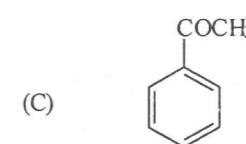
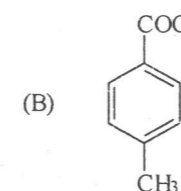
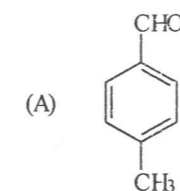
3.



4. 2,4-二硝基甲苯分别用两种方法还原, 甲法用  $\text{NH}_4\text{SH}$ , 乙法用  $\text{SnCl}_2 + \text{HCl}$ , 产物是: ( )



5. 下列四个化合物,  $\text{NaBH}_4$  难以还原的是: ( )



6. 下列哪些不是自由基反应的特征? ( )

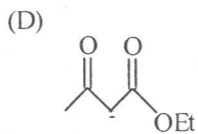
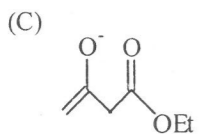
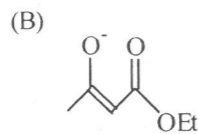
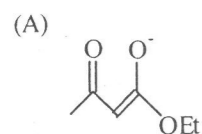
(A) 酸碱对反应有明显的催化作用

(B) 光、热、过氧化物能使反应加速

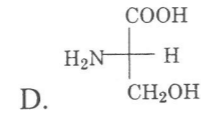
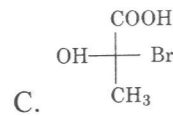
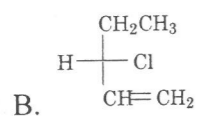
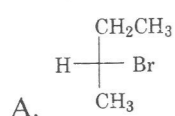
(C) 氧、氧化氮、酚对反应有明显的抑制作用

(D) 溶剂极性变化对反应影响很小

7. 乙酰乙酸乙酯在  $\text{EtONa}$  作用下所生成的共轭碱, 可以写成多种共振式, 其中能量最低的、“贡献”最大的是: ( )



8. 下列化合物中为 R-构型的是: ( )



9. 下列化合物按碱性减弱的顺序排列为: ( )

(1) 苄胺; (2) 萘胺; (3) 苯乙酰胺; (4) 氢氧化四乙铵

A: (4) > (1) > (2) > (3); B: (4) > (3) > (1) > (2);

C: (4) > (1) > (3) > (2); D: (1) > (3) > (2) > (4)

10. 用 KOH/C<sub>2</sub>H<sub>5</sub>OH 处理 (CH<sub>3</sub>)<sub>2</sub>CHCHClCH<sub>2</sub>CH<sub>3</sub>, 主要产物可能是: ( )

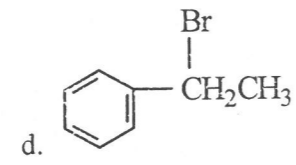
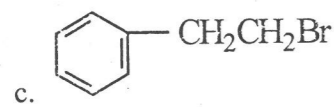
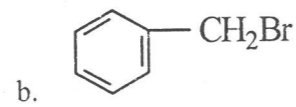
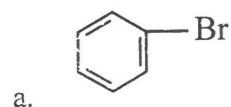
(A) 反-4-甲基-2-戊烯

(B) 顺-4-甲基-2-戊烯

(C) 2-甲基-2-戊烯

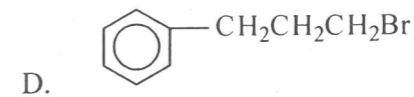
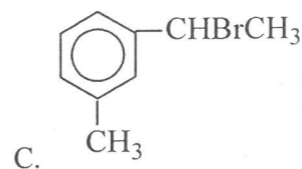
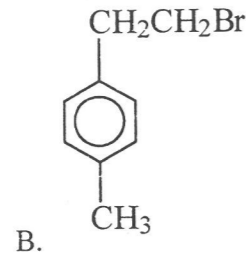
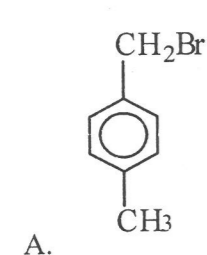
(D) 反-2-甲基-2-戊烯

11. 下列化合物与 AgNO<sub>3</sub> 的醇溶液反应速度快慢顺序为: ( )



A. b > c > d > a B. c > b > d > a C. d > b > c > a D. a > b > c > d

12. 下列异构体中, 能进行 S<sub>N</sub>2 反应, 而无 E2 消除反应的是: ( )



13. 下列化合物与 HBr 加成的相对速度的顺序是: ( )

a. (CH<sub>3</sub>)<sub>2</sub>C=CHCH<sub>3</sub>

b. CH<sub>3</sub>CH=CHCH<sub>3</sub>

c. CH<sub>3</sub>CH<sub>2</sub>CH=CH<sub>2</sub>

d. CH<sub>3</sub>CH<sub>2</sub>CH=CHCl

A. a > b > c > d B. b > a > c > d C. d > c > b > a D. c > b > a > d

14. 下列化合物硝化反应的活性顺序为: ( )

a. 乙酰苯胺

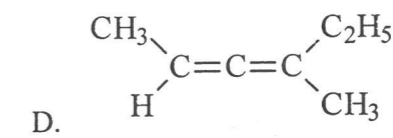
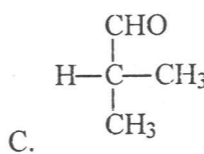
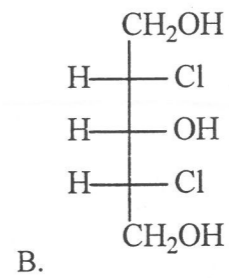
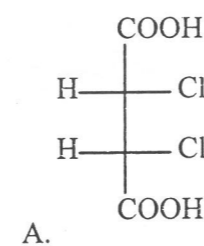
b. 苯胺

c. 苯

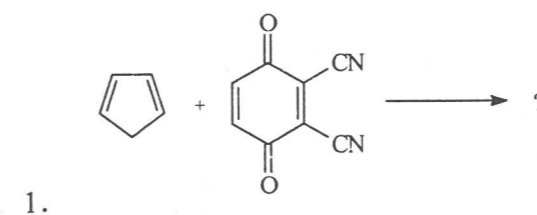
d. 苯乙酮

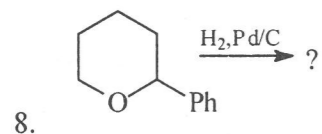
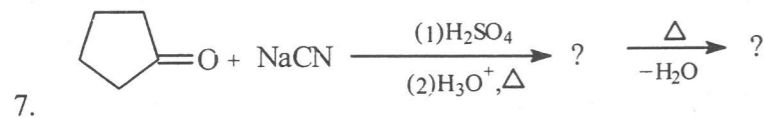
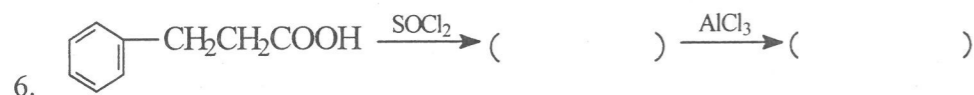
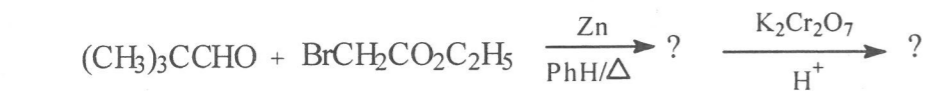
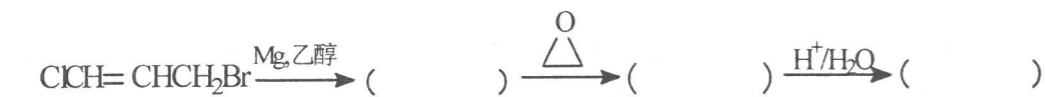
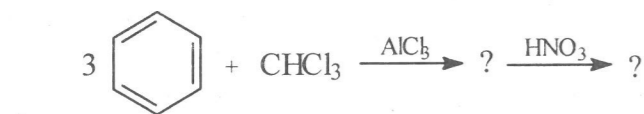
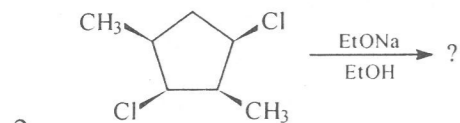
A. a > b > c > d B. d > c > a > b C. b > a > c > d D. b > c > a > d

15. 下列化合物中有旋光性的是: ( )



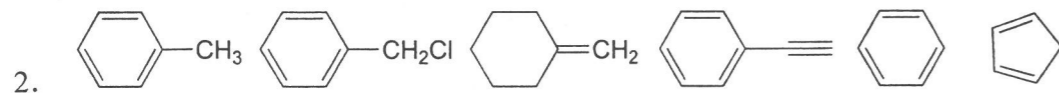
四、填空完成反应式 (每空格 2 分, 共 30 分)





五、用化学方法鉴别下列各组化合物 (5+6 分, 共 11 分)

1. 正丁醛、苯甲醛、2-丁酮、苯乙酮、环己酮



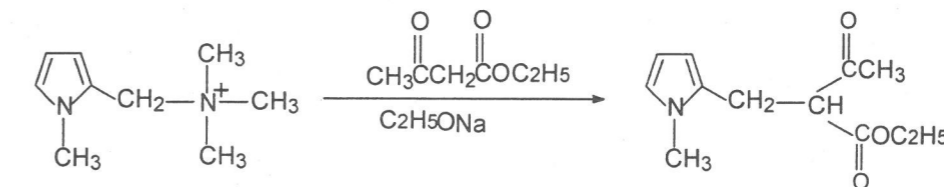
六、推断有机物结构 (6+7 分, 共 13 分)

1. 化合物 A ( $\text{C}_7\text{H}_{12}\text{O}_3$ ), 用  $\text{I}_2/\text{NaOH}$  处理给出黄色沉淀, A 与 2,4-二硝基苯肼给出黄色沉淀。A 与  $\text{FeCl}_3$  溶液显蓝色。A 用稀  $\text{NaOH}$  溶液处理后酸化热解放出  $\text{CO}_2$  得化合物 B 及一分子乙醇。B 的红外光谱在  $1720\text{cm}^{-1}$  处有强吸收峰, B 的  $^1\text{H NMR}$  数据:  $\delta$ : 2.1(单, 3H), 2.5(四重峰, 2H), 1.1(三重峰, 3H)。推断(A), (B)的结构并解释。

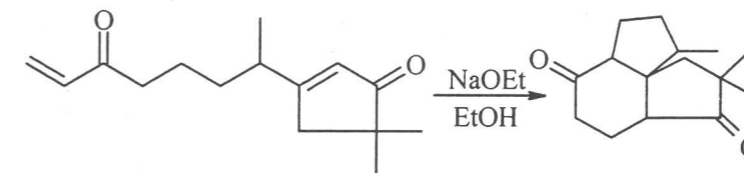
2. 一个中性固体物质 A ( $\text{C}_{13}\text{H}_{17}\text{NO}$ ), 将其与 6mol/L 的  $\text{HCl}$  溶液一起回流, 冷却后, 酸性固体物质 B ( $\text{C}_7\text{H}_6\text{O}_2$ ) 被滤出。滤液碱化后, 用水蒸气蒸馏, 得碱性化合物 C ( $\text{C}_6\text{H}_{13}\text{N}$ )。化合物 B 与  $\text{PCl}_5$  一起回流并加入过量浓氨水, 从反应混合物中可分离出化合物 D ( $\text{C}_7\text{H}_7\text{NO}$ ), D 用  $\text{NaOBr}$  的碱溶液处理得到苯胺。C 和过量  $\text{CH}_3\text{I}$  一起加热, 得到四级铵盐, 用氢氧化银处理得  $\text{AgI}$  和一个四级铵碱, 后者加热到  $250^\circ\text{C}$ , 生成三甲胺、水和一个低沸点液体 E ( $\text{C}_6\text{H}_{10}$ ), E 的臭氧化产物为  $\text{OHCCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$ 。试给出 A、B、C、D、E 的结构式, 并写全反应式。

七、写出下面反应的机理 (7+8 分, 共 15 分)

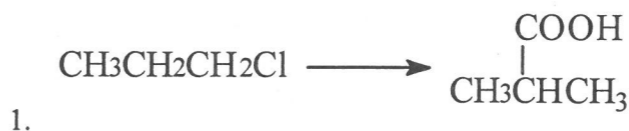
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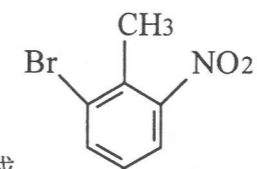
2.



八、由指定原料出发, 合成下列化合物 (无机试剂任选, 每题 6 分, 共 36 分)



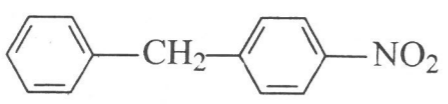
1.



2. 以甲苯为有机原料合成

3. 由乙烯合成仲丁胺

4. 从苯和三个碳以下的有机原料出发合成  $\text{PhC}=\overset{\text{CH}_3}{\text{C}}(\text{CH}_3)_2$

5. 以苯、甲苯为有机原料合成 

6. 以  $(\text{CH}_3)_3\text{CCOCH}_3$  和乙酰乙酸乙酯为原料合成 