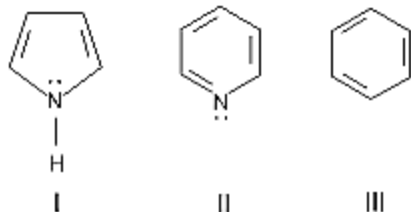


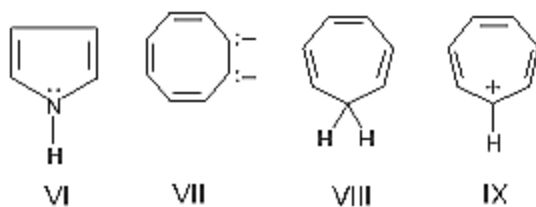
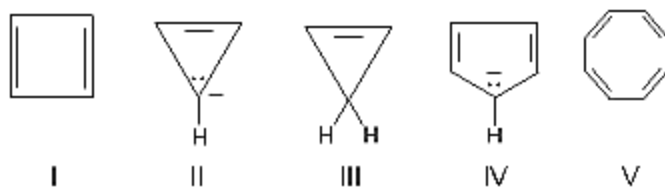
## Practice problems for second exam

1. Which of these would you expect to have significant resonance energy?



- A) I    B) II    C) III    D) All of the above    E) None of the above

2. On the basis of molecular orbital theory and Huckel's rule, which molecules and/or ions should be aromatic?

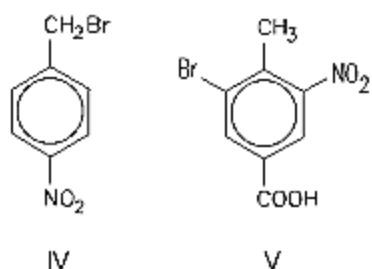
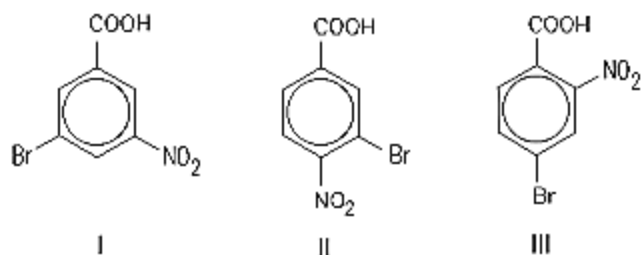


- A) I and V                      D) IV, VI, VII and IX  
 B) III and VIII                E) All of the structures, I-IX  
 C) IV, VII and IX

3. Which is the only one of these reagents which will react with benzene under the specified conditions?

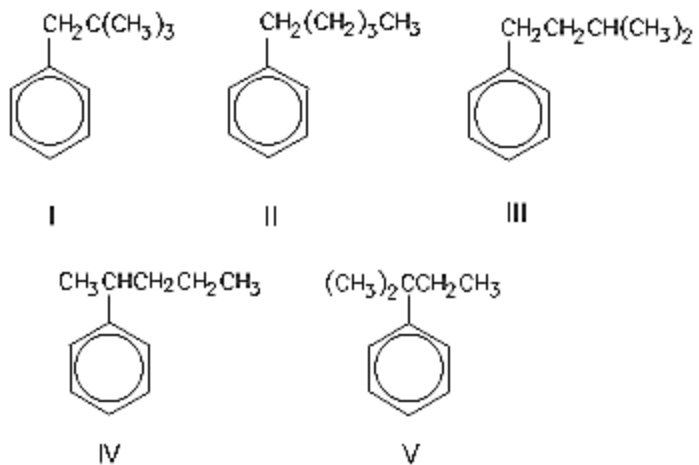
- A)  $\text{Cl}_2$ ,  $\text{FeCl}_3$ , heat                      D)  $\text{KMnO}_4/\text{H}_2\text{O}$ ,  $25^\circ\text{C}$   
 B)  $\text{H}_2$ ,  $25^\circ\text{C}$                                 E)  $\text{H}_3\text{O}^+$ , heat  
 C)  $\text{Br}_2/\text{CCl}_4$ ,  $25^\circ\text{C}$ , dark

4. Toluene is subjected to the action of the following reagents in the order given: (1)  $\text{KMnO}_4, \text{OH}^-$ , heat; then  $\text{H}_3\text{O}^+$  (2)  $\text{HNO}_3, \text{H}_2\text{SO}_4$  (3)  $\text{Br}_2, \text{FeBr}_3$   
What is the final product of this sequence?



- A) I    B) II    C) III    D) IV    E) V

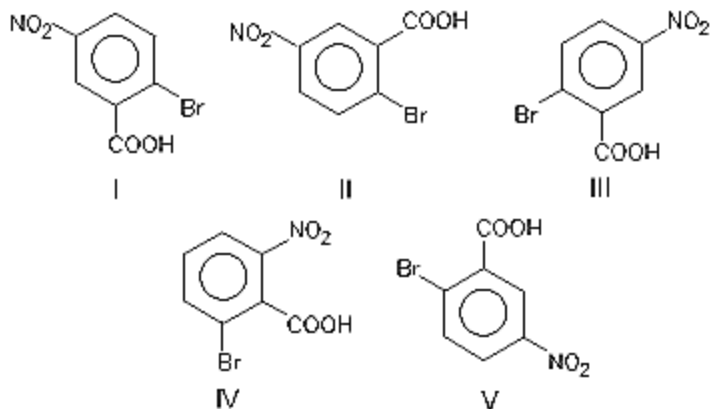
5. The reaction of benzene with  $(\text{CH}_3)_3\text{CCH}_2\text{Cl}$  in the presence of anhydrous aluminum chloride produces principally which of these?



- A) I    B) II    C) III    D) IV    E) V



9. Which of the following is NOT 2-bromo-5-nitrobenzoic acid?

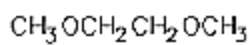
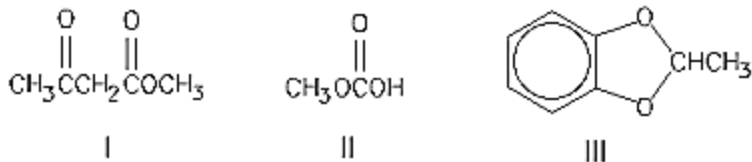


A) I    B) II    C) III    D) IV    E) V

10. In the molecular orbital model of benzene, how many pi-electrons are in bonding molecular orbitals?

A) 6    B) 5    C) 4    D) 3    E) 2

11. Which of the following compounds is an acetal?

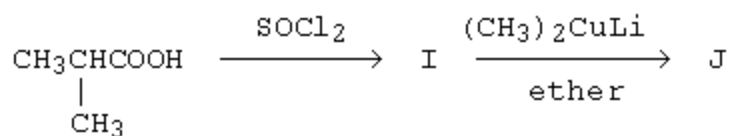


IV

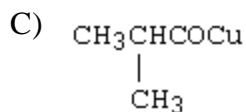
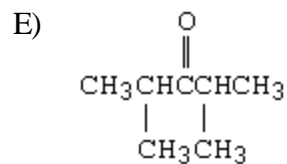
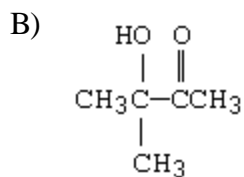
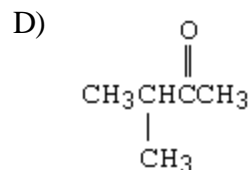
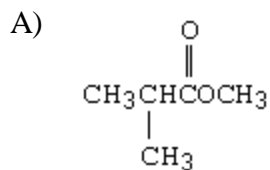
A) I    B) II    C) III    D) IV    E) None of these



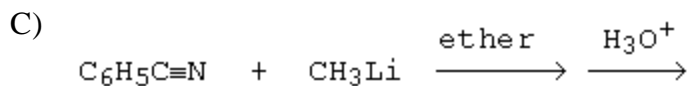
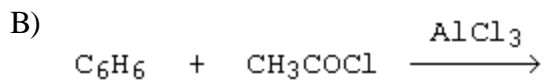
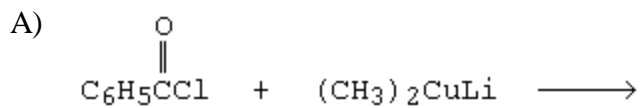
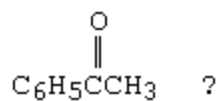
14. The product, J, of the following reaction sequence,



would be:



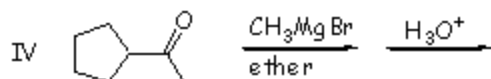
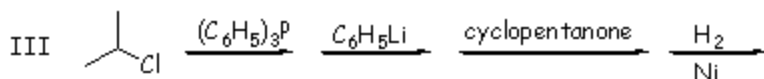
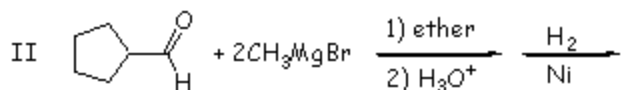
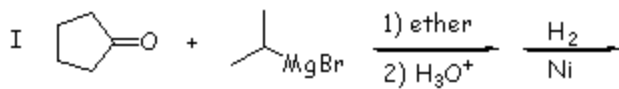
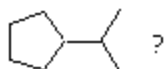
15. Which of the reactions listed below would serve as a synthesis of acetophenone,



D) Answers A) and B) only

E) Answers A), B), and C)

16. Which reaction sequence would be used to prepare

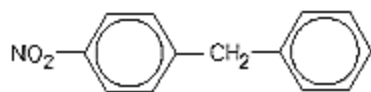


- A) I    B) II    C) III    D) IV    E) All of the above would yield the product.

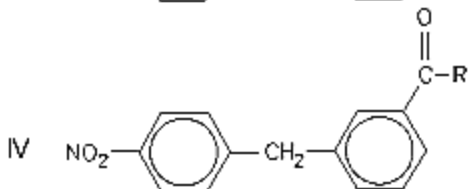
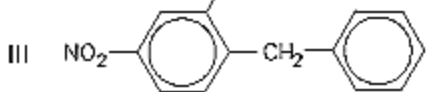
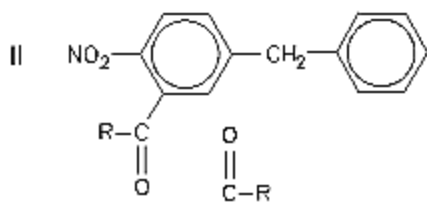
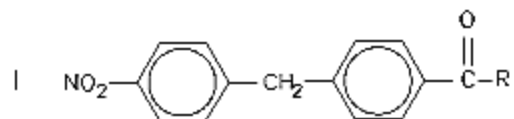
17.  $\text{LiAlH}_4$  (LAH) cannot be used to convert carboxylic acids to the corresponding aldehydes because:

- A) LAH is not sufficiently reactive.    D)  $\text{RCOOH}$  is reduced to  $\text{RCH}_3$ .  
 B)  $\text{RCOOH}$  is converted into  $\text{RCOOLi}$ .    E)  $\text{RCOOH}$  is converted into  $\begin{matrix} \text{RCR} \\ || \\ \text{O} \end{matrix}$ .  
 C)  $\text{RCOOH}$  is reduced to  $\text{RCH}_2\text{OH}$ .

18. When



undergoes Friedel-Crafts acylation, the chief product is which of these?



A) I    B) II    C) III    D) IV    E) None of the above. No reaction will occur.

## **Answer Key**

1. D
2. D
3. A
4. A
5. E
6. E
7. C
8. C
9. D
10. A
11. C
12. A
13. B
14. D
15. E
16. C
17. C
18. A