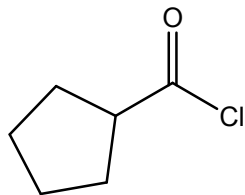


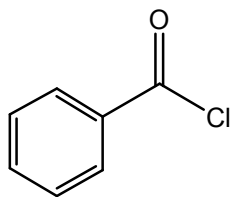
I. Multiple choice questions. (3 points each). Please put your answers on Scantron sheet. Your score will be graded based only on your answers from Scantron sheet.

1. What is the name for the following compound?



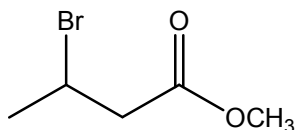
- (a) cyclopentylcarbonyl chloride
- (b) cyclopentanecarbonyl chloride
- (c) cyclopentylacyl chloride
- (d) cyclopentaneacyl chloride
- (e) None of the above

2. What is the name for the following compound?



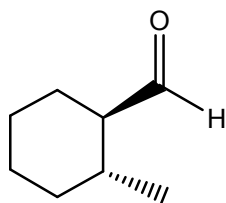
- (a) benzyl chloride
- (b) benzoyl chloride
- (c) benzene chloride
- (d) phenyl chloride
- (e) None of the above

3. What is the name for the following compound?



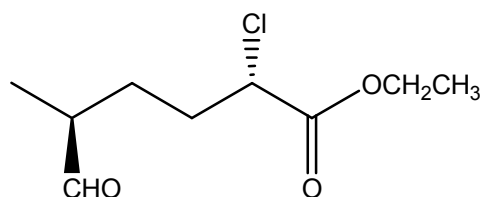
- (a) methyl 3-bromobutanoate
- (b) methyl 4-bromobutanoate
- (c) 4-bromopentanoate
- (d) 5-bromopentanoate
- (e) None of the above

4. What is the name for the following compound?



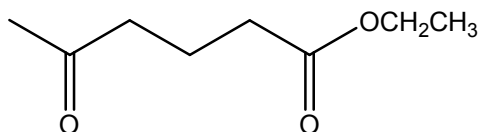
- (a) *anti*-2-methylcyclohexanecarbaldehyde
- (b) *trans*-2-methylcyclohexylcarbaldehyde
- (c) *trans*-2- methylcyclohexylcarbonyl aldehyde
- (d) *trans*-2-methylcyclohexanecarbaldehyde
- (e) None of the above

5. What is the name for the following compound?



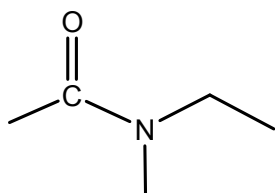
- (a) ethyl (2*S*,5*S*)-2-chloro-5-formylhexanoate
- (b) ethyl (2,5*S*)-2-chloro-5-carbonylhexanoate
- (c) ethyl (2*R*,5*S*)-2-chloro-5-oxohexanoate
- (d) ethyl (2*R*,5*S*)-2-chloro-5-formylhexanoate
- (e) None of the above

6. What is the name for the following compound?



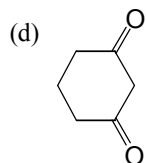
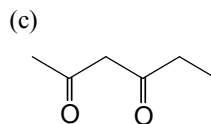
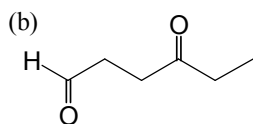
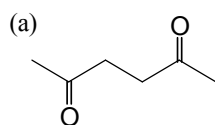
- (a) ethyl 5-oxopentanoate
- (b) ethyl 6-oxopentanoate
- (c) ethyl 5-oxohexanoate
- (d) ethyl 6-oxohexanoate
- (e) None of the above

7. What is the name for the following compound?



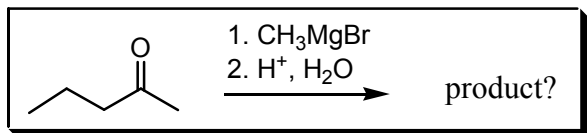
- (a) *N*-ethyl-*N*-methylacetamide
- (b) *N*-isopropylacetamide
- (c) *N*-ethyl-*N*-methylpropanamide
- (d) *N*-ethyl-*N*-methylethylamide
- (e) None of the above

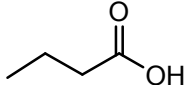
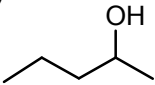
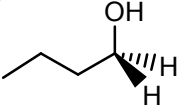
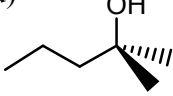
8. What is the structure of 2,4-hexanedione?



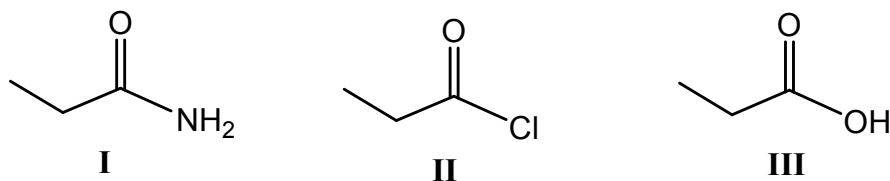
- (e) none of the above

9. What could be the product for the following reaction?



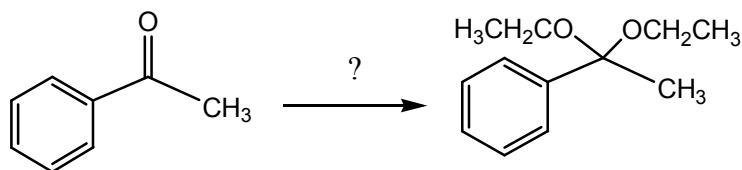
- (a)  (b)  (c)  (d) 
(e) None of the above

10. What is the order of increasing boiling points (from the lowest to highest) for the following compounds?



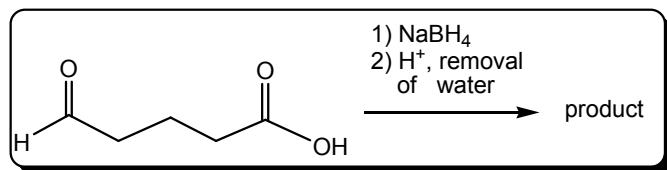
- (a) I, II, III
(b) II, III, I
(c) I, III, II
(d) III, I, II
(e) None of the above

11. What could be the reagent and reaction condition for the following transformation?



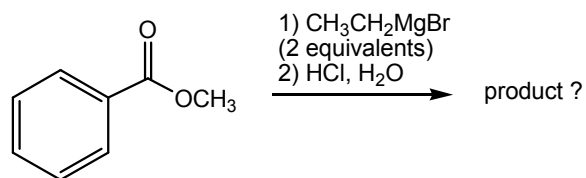
- (a) ethanol, NaOH
(b) ethanol, H^+
(c) methanol, NaOH
(d) methanol, H^+
(e) None of the above

12. What should be the product from the following reaction?



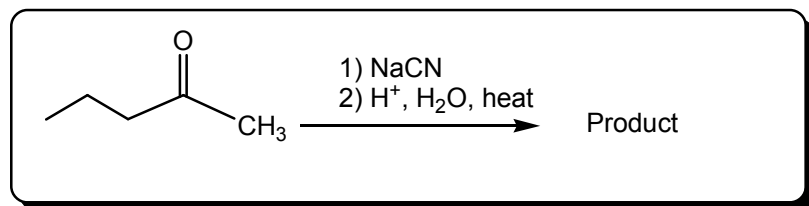
- (a) (b) (c) (d)
- (e) none of the above

13. What could be the product for the following transformation?



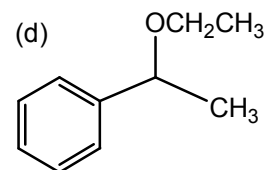
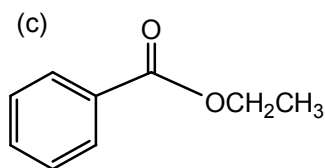
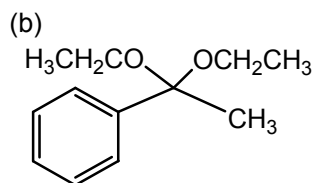
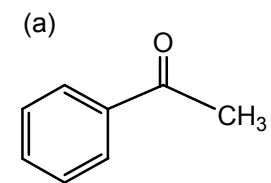
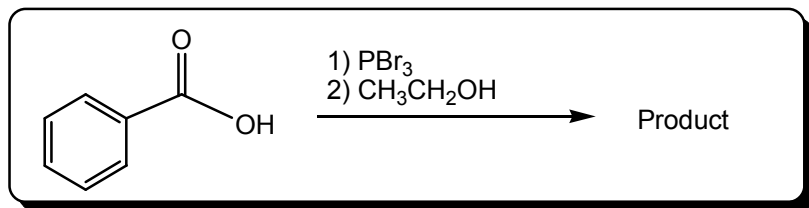
- (a) (b) (c) (d)
- (e) none of the above

14. What should be the product from the following reaction?



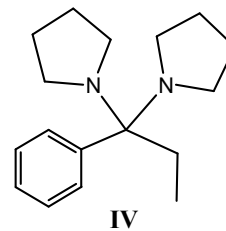
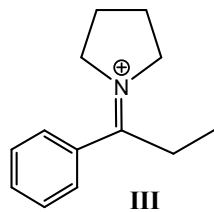
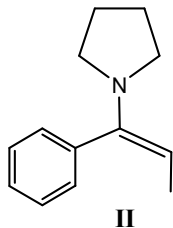
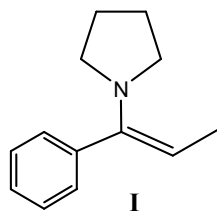
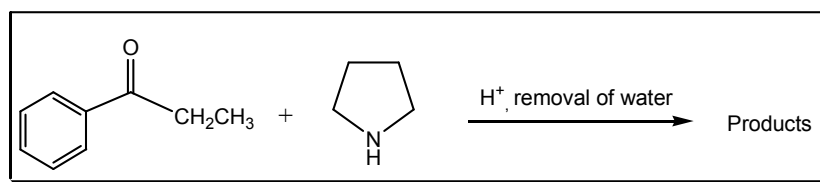
- (a) (b) (c) (d)
- (e) none of the above

15. What could be the product for the following reaction?



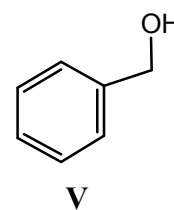
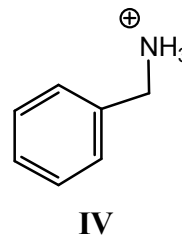
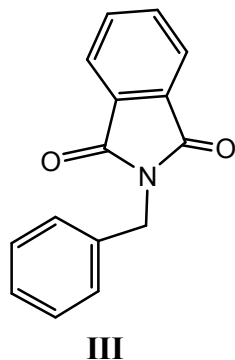
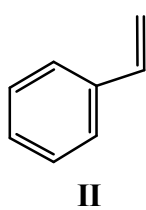
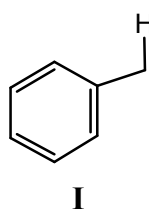
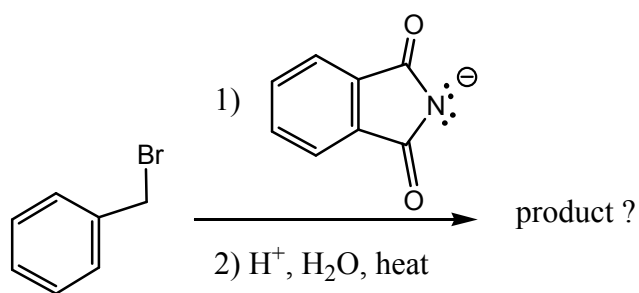
(e) none of the above

16. What could be the products for the following reaction?



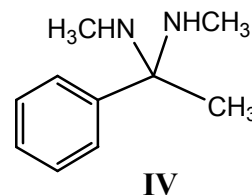
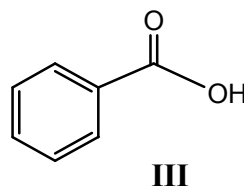
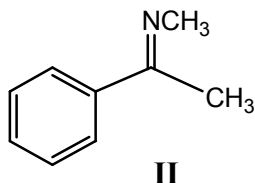
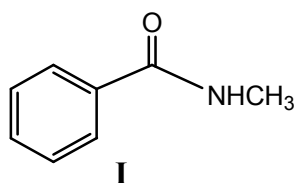
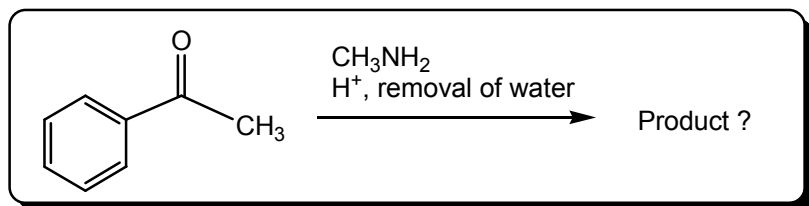
- (a) I, II
(b) I, II, IV
(c) III, IV
(d) II, III
(e) None of the above

17. What could be the product for the following reaction?



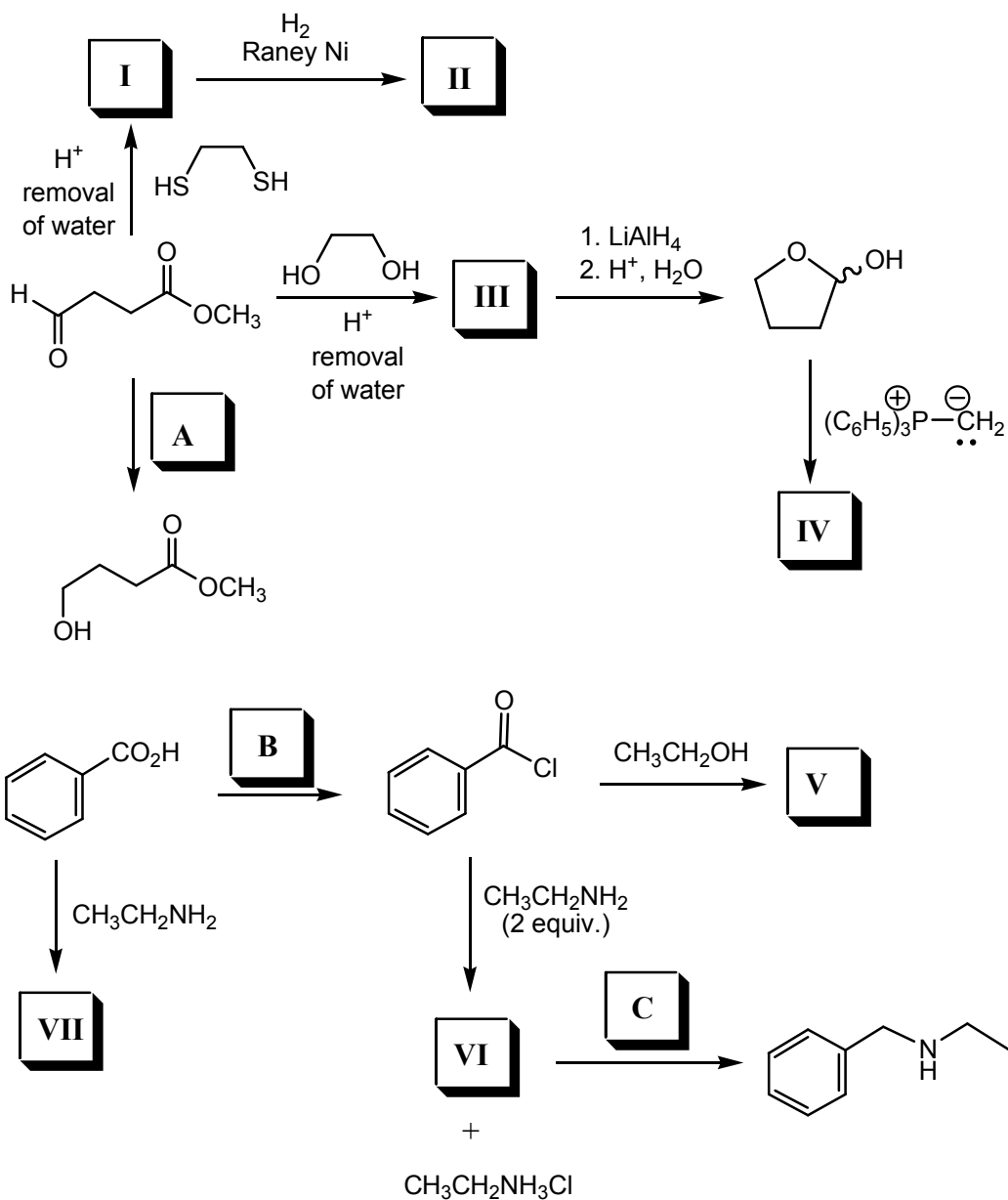
- (a) **I**
- (b) **II**
- (c) **III**
- (d) **IV**
- (e) **V**

18. What could be the product for the following reaction?



- (a) **I**
- (b) **II**
- (c) **III**
- (d) **IV**
- (e) None of the above

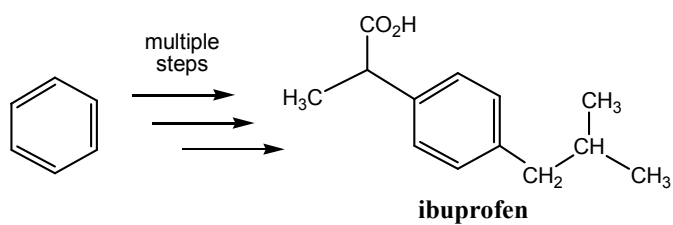
II. Use the provided table and fill in compound structures and reagents for the following synthesis. Make sure your answer is correctly put in the designated box of the given table. **No partial point will be given for the misplaced answer.** (20 points)



I:	II:	III:
IV:	V:	VI:
VII:	A:	B:
C:		

Continue to the Next page

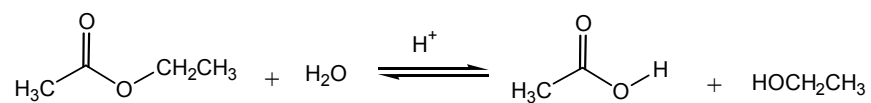
III. Show how ibuprofen can be prepared from benzene. You can use any reactants with four or less carbons. (10 points)



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IV. Propose an electron-pushing mechanism for each of the following reactions. Briefly explain why the hydrolysis of ester in acidic condition is reversible (reaction a) while in basic condition (reaction b) is irreversible. (10 points)

(a)



(b)

