

1. Which of the following have an enol form?

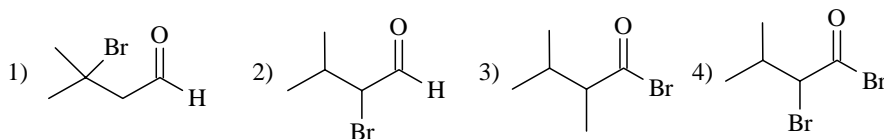
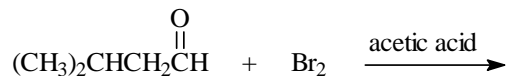
- A. benzaldehyde, $\text{C}_6\text{H}_5\text{CHO}$
- B. 2,2-dimethylpropanal, $(\text{CH}_3)_3\text{CCHO}$
- C. 2,2-dichloropropanal, $\text{CH}_3\text{CCl}_2\text{CHO}$

- 1) none have enol forms
- 2) only A
- 3) only B
- 4) A and C

2. How many alpha hydrogens are there on 2,4-dimethyl-3-pentanone?

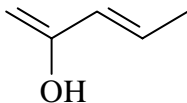
- 1) only one
- 2) two
- 3) three
- 4) four

3. What is the product of the reaction below?



- 1) 1
- 2) 2
- 3) 3
- 4) 4

4. Identify the keto form of the following enol.

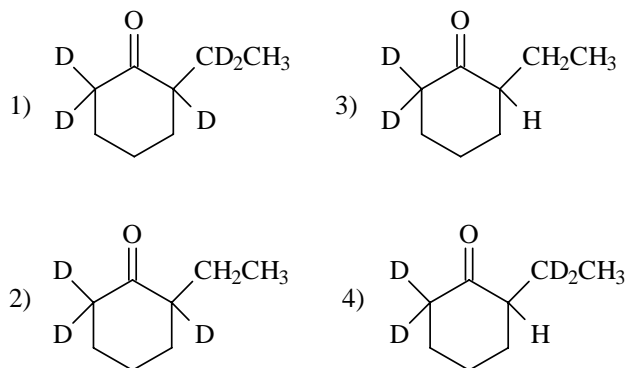
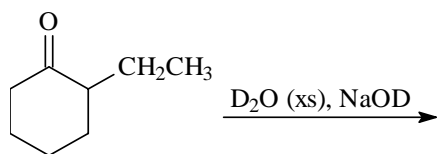


- 1) 1-penten-3-one
- 2) (E)-3-penten-2-one
- 3) 2-pentanone
- 4) (E)-3-pentenal

5. Which of the following has the highest percentage of enol in a keto-enol equilibrium?

- 1) hexanal
- 2) 2-hexanone
- 3) 2,4-hexanedione
- 4) 2,5-hexanedione

6. Identify the deuterated compound resulting from the following reaction.

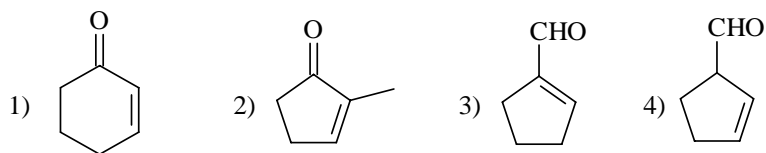
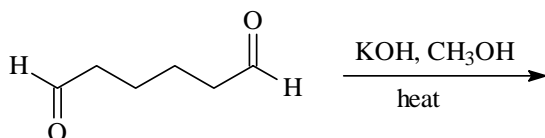


1) 1 2) 2 3) 3 4) 4

7. How many different aldol addition products can be formed in the reaction of equal amounts of propanal and butanal with aqueous sodium hydroxide at 0°C ? (consider only constitutional isomer - not stereoisomers)

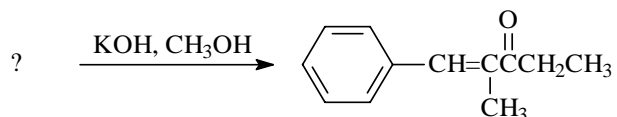
1) only one 2) two 3) three 4) four

8. What is the product of the following intramolecular aldol condensation reaction?

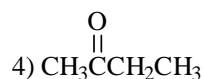
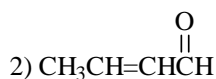
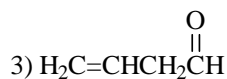
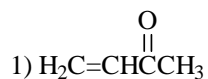
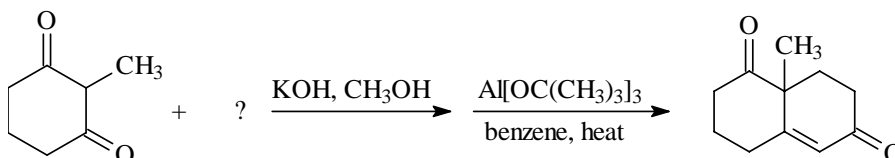


1) 1 2) 2 3) 3 4) 4

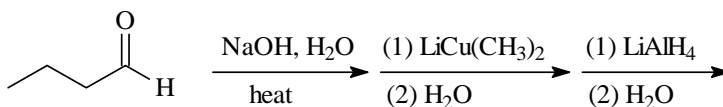
9. Identify the starting reagents needed to make the following compound by a mixed aldol condensation.



- 1) benzaldehyde ($\text{C}_6\text{H}_5\text{CH}=\text{O}$) and 3-pentanone
 - 2) benzaldehyde ($\text{C}_6\text{H}_5\text{CH}=\text{O}$) and 2-pentanone
 - 3) acetophenone (methyl phenyl ketone) and 2-butanone
 - 4) acetophenone (methyl phenyl ketone) and butanal
10. The Robinson annulation reaction is shown below. Identify the missing reagent in the first step.

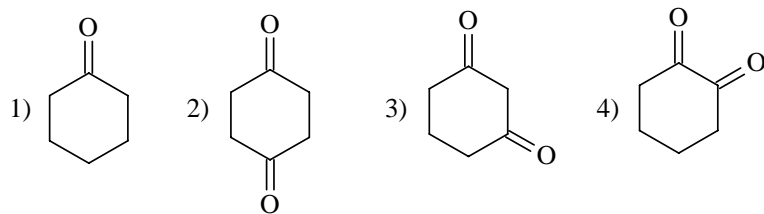


- 1) 1 2) 2 3) 3 4) 4
11. Which one of the following reagents adds a methyl group by conjugate (1,4-addition) addition to an α,β -unsaturated ketone or aldehyde?
- 1) $\text{LiCu}(\text{CH}_3)_2$ 2) CH_3MgBr 3) $\text{Hg}(\text{O}_2\text{CCH}_3)_2$ 4) CH_3Li
12. What is the product of the following reaction sequence?



- 1) 3-ethyl-2-methyl-1-hexanol
- 2) 2-ethyl-3-methyl-1-hexanol
- 3) 2,3-dimethyl-1-pentanol
- 4) 3,3-dimethyl-1-pentanol

13. Which of the following has the largest acid dissociation constant, K_a ?



1) 1

2) 2

3) 3

4) 4

14. Propose a mechanism for the following reaction.

