

1. Which of the following is isopropyl benzoate?

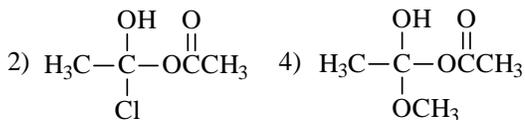
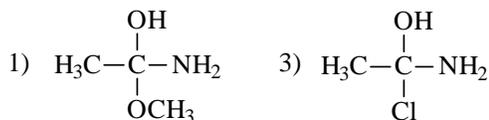
- 1) $\text{C}_6\text{H}_5\text{CO}_2\text{CH}(\text{CH}_3)_2$ 2) $\text{C}_6\text{H}_5\text{CH}_2\text{CO}_2\text{CH}(\text{CH}_3)_2$
3) $(\text{CH}_3)_2\text{CHCO}_2\text{C}_6\text{H}_5$ 4) $(\text{CH}_3)_2\text{CHCO}_2\text{CH}_2\text{C}_6\text{H}_5$

2. The compounds shown below have similar molecular weights but significantly different boiling points. Match the compound with its boiling point.

Boiling points ($^\circ\text{C}$): 28, 57, 100, 141

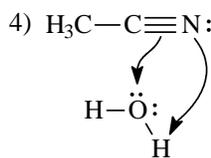
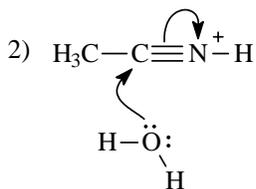
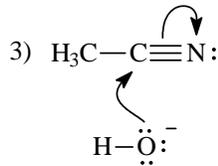
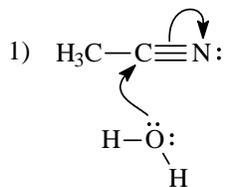
	<u>methyl acetate</u>	<u>2-butanol</u>	<u>2-methylbutane</u>	<u>propanoic acid</u>
1)	100	141	28	57
2)	57	100	28	141
3)	28	100	57	141
4)	141	57	28	100

3. Which one of the following tetrahedral intermediates dissociate to an ester?



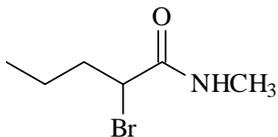
- 1) 1 2) 2 3) 3 4) 4

4. Which of the following best represents a mechanistic step in the acid-catalyzed hydrolysis of acetonitrile?



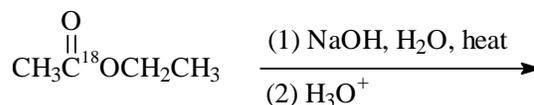
- 1) 1 2) 2 3) 3 4) 4

5. What is the name of the compound shown below?



- 1) 2-bromo-*N*-methylpentamide
 2) 2-bromo(methylamino)pentamide
 3) methylamino 2-bromopentamide
 4) methyl 2-bromopentamide

6. Saponification and neutralization of ^{18}O labeled ethyl acetate, as shown below, yields which of the following isotopically labeled products.

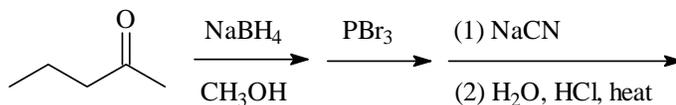


- 1) $\text{CH}_3\overset{^{18}\text{O}}{\parallel}\text{COH} + \text{CH}_3\text{CH}_2\text{OH}$ 3) $\text{CH}_3\overset{\text{O}}{\parallel}\text{COH} + \text{CH}_3\text{CH}_2^{18}\text{OH}$

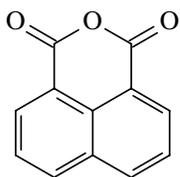
- 2) $\text{CH}_3\overset{\text{O}}{\parallel}\text{C}^{18}\text{OH} + \text{CH}_3\text{CH}_2\text{OH}$ 4) approximately equal amounts of 1 and 2

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

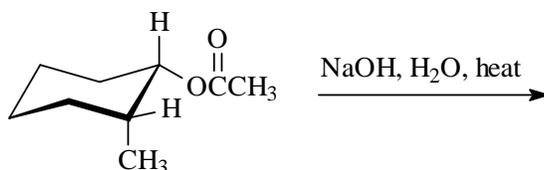
7. What is the product of the following reaction sequence?



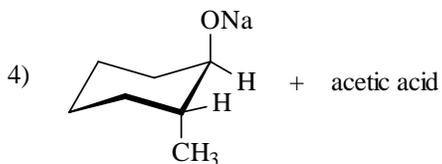
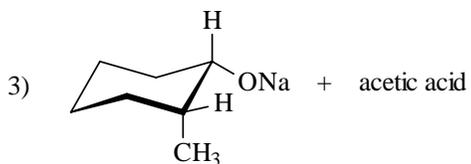
- 1) 2-methyl-1-pentanol
 2) 2-bromo-3-methylpentanoic acid
 3) 2-methylpentanoic acid
 4) 4-hydroxyhexanoic acid
8. The compound shown below is classified as a(an):



- 1) lactone
 2) β -ketoester
 3) diketone
 4) carboxylic acid anhydride
9. What are the products of the following reaction?

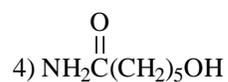
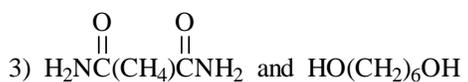
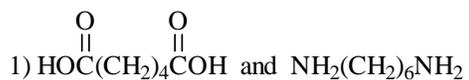
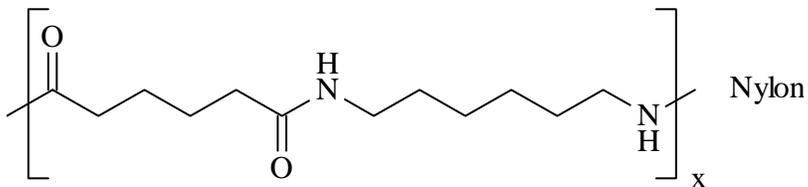


- 1) trans-2-methylcyclohexanol and sodium acetate
 2) cis-2-methylcyclohexanol and sodium acetate



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

10. Identify the monomer(s) used to make the following polymer.



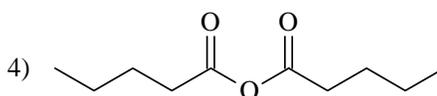
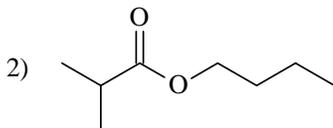
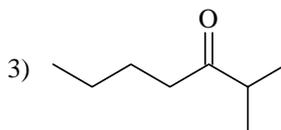
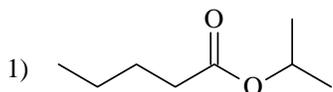
1) 1

2) 2

3) 3

4) 4

11. What is the product of the following reactions?



1) 1

2) 2

3) 3

4) 4

12. Which one of the following is not a good way to make propyl acetate?

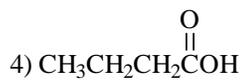
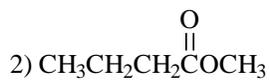
1) $\text{CH}_3\text{CO}_2\text{H}$ and $\text{CH}_3\text{CH}_2\text{OH}$ with H_2SO_4 as a catalyst

2) $\text{CH}_3\text{CO}_2\text{H}$ and $\text{CH}_3\text{CH}_2\text{OH}$ with NaOH

3) CH_3COCl and $\text{CH}_3\text{CH}_2\text{OH}$ with pyridine

4) $(\text{CH}_3\text{CO})_2\text{O}$ and $\text{CH}_3\text{CH}_2\text{OH}$ with H_2SO_4 as a catalyst

13. Which of the following compounds, on reaction with aqueous sodium hydroxide, yields sodium butanoate, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{Na}$, at the slowest rate?



1) 1

2) 2

3) 3

4) 4