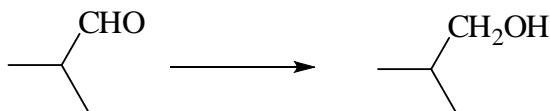


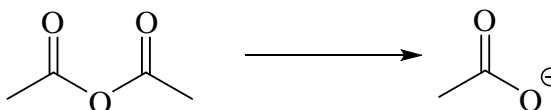
1. Which one of the following reagents would best effect the conversion shown?

- a)  $\text{H}_2$  / Pd catalyst  
 b)  $\text{NaBH}_4$  followed by  $\text{H}^+/\text{H}_2\text{O}$   
 c)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$   
 d) hot conc.  $\text{H}_2\text{SO}_4$   
 e) hot dilute  $\text{OH}^-$



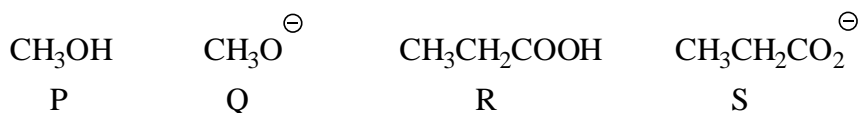
2. Which one of the following reagents would best effect the conversion shown?

- a) conc. HCl  
 b) excess  $\text{NH}_3$   
 c)  $\text{SOCl}_2$   
 d)  $\text{H}^+/\text{H}_2\text{O}/\text{heat}$   
 e)  $\text{OH}^-/\text{H}_2\text{O}/\text{heat}$



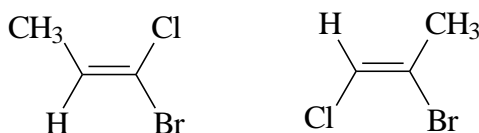
3. What are the major products from the hydrolysis of  $\text{CH}_3\text{CH}_2\text{COOCH}_3$  with hot 6 M HCl?

- a) P and R  
 b) P and S  
 c) Q and R  
 d) Q and S  
 e) none of the above



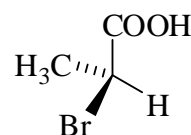
4. Which definition best describes the following pair of compounds?

- a) Enantiomers  
 b) Diastereomers  
 c) Constitutional isomers  
 d) Conformers  
 e) Same compound



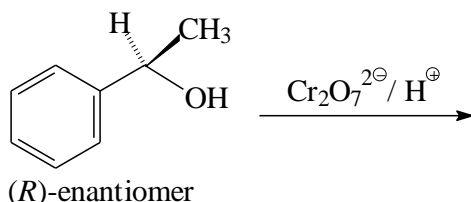
5. What is the order of priority (1<sup>st</sup> = highest) and the absolute configuration of the following compound?

- |    | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> | 4 <sup>th</sup> | Abs. Config. |
|----|-----------------|-----------------|-----------------|-----------------|--------------|
| a) | Br              | $\text{CH}_3$   | COOH            | H               | (S)          |
| b) | Br              | COOH            | $\text{CH}_3$   | H               | (R)          |
| c) | COOH            | Br              | $\text{CH}_3$   | H               | (R)          |
| d) | Br              | COOH            | $\text{CH}_3$   | H               | (S)          |
| e) | COOH            | Br              | $\text{CH}_3$   | H               | (S)          |

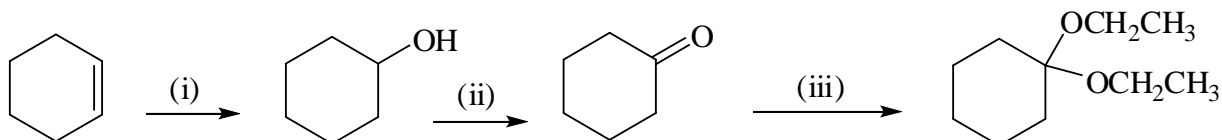


6. Which of the following terms best describes the product from the following reaction?

- a) (*R*)-enantiomer
- b) (*S*)-enantiomer
- c) racemic mixture
- d) achiral compound
- e) *meso*-compound

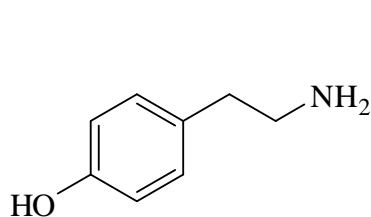


7. The reagents and reaction conditions to carry out the transformations below are:

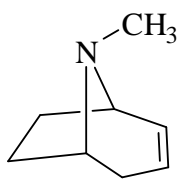


- a) (i) hot dilute  $\text{H}_2\text{SO}_4$  (ii)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$  (iii) excess ethanol/ $\text{H}^+$
- b) (i) hot dilute  $\text{OH}^-/\text{H}_2\text{O}$  (ii)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$  (iii)  $\text{NaOCH}_2\text{CH}_3$  in ethanol
- c) (i) hot dilute  $\text{H}_2\text{SO}_4$  (ii)  $\text{OH}^-/\text{H}_2\text{O}$  (iii) excess ethanol
- d) (i) hot conc.  $\text{H}_2\text{SO}_4$  (ii)  $\text{LiAlH}_4$  followed by dilute acid (iii)  $\text{NaOCH}_2\text{CH}_3$  in ethanol
- e) (i) hot dilute  $\text{OH}^-/\text{H}_2\text{O}$  (ii)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$  (iii) excess ethanol/ $\text{H}^+$

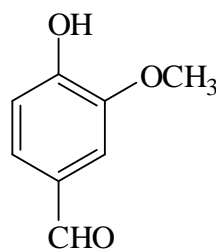
Q 8-10 refer to the following four molecules.



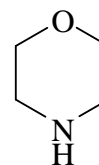
tyramine



tropidene



vanillin



morpholine

8. Which of the compounds will undergo an acid-base reaction with dilute  $\text{HCl}$ ?

- a) tyramine and tropidene only
- b) tyramine, tropidene and morpholine only
- c) tyramine only
- d) tropidene only
- e) all of them

9. Which of the compounds will undergo an acid-base reaction with dilute  $\text{NaOH}$ ?

- a) tyramine and vanillin only
- b) tyramine, vanillin and morpholine only
- c) tyramine only
- d) vanillin only
- e) none of them

10. Which of the compounds will react (effervesce or bubble) when treated with dilute  $\text{NaHCO}_3$  solution?

- a) morpholine only
- b) tyramine and vanillin only
- c) tropidene only
- d) all of them
- e) none of them

Correct answers: 1B, 2E, 3A, 4C, 5D, 6D, 7A, 8B, 9A, 10E

1. Which one of the following reagents would best effect the conversion shown?

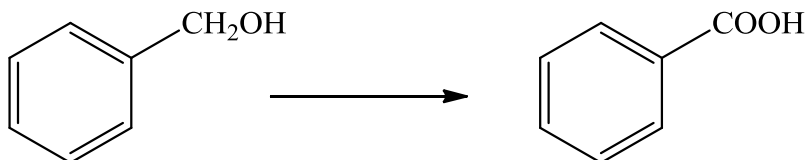
a)  $\text{H}_2$  / Pd catalyst

b)  $\text{NaBH}_4$  followed by  $\text{H}^+/\text{H}_2\text{O}$

c)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$

d) hot conc.  $\text{H}_2\text{SO}_4$

e) hot dilute  $\text{OH}^-$



2. Which one of the following reagents would best effect the conversion shown?

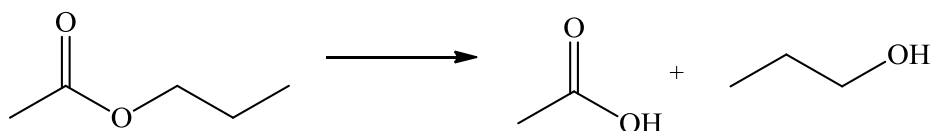
a)  $\text{HCl}(\text{g})$

b) excess  $\text{NH}_3$

c)  $\text{SOCl}_2$

d)  $\text{H}^+/\text{H}_2\text{O}/\text{heat}$

e)  $\text{OH}^-/\text{H}_2\text{O}/\text{heat}$



3. What are the major products from the hydrolysis of  $\text{CH}_3\text{CH}_2\text{COOCH}_3$  with hot 4 M  $\text{NaOH}$ ?

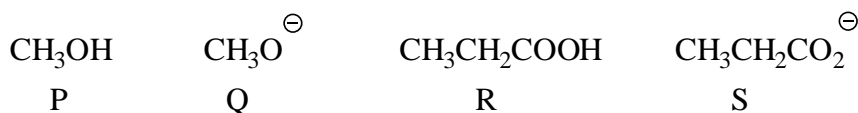
a) P and R

b) P and S

c) Q and R

d) Q and S

e) none of the above



4. Which definition best describes the following pair of compounds?

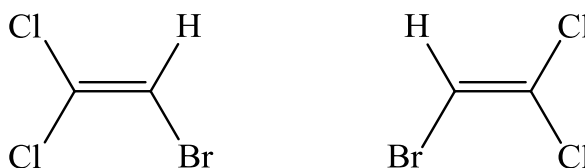
a) Enantiomers

b) Diastereomers

c) Constitutional isomers

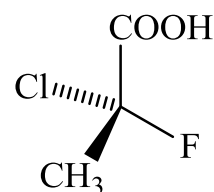
d) Conformers

e) Same compound



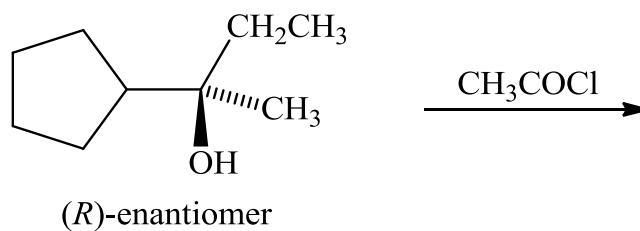
5. What is the order of priority (1<sup>st</sup> = highest) and the absolute configuration of the following compound?

- | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> | 4 <sup>th</sup> | Abs. Config. |
|-----------------|-----------------|-----------------|-----------------|--------------|
| a) Cl           | $\text{CH}_3$   | COOH            | F               | (S)          |
| b) Cl           | F               | COOH            | $\text{CH}_3$   | (R)          |
| c) COOH         | Cl              | F               | $\text{CH}_3$   | (R)          |
| d) Cl           | F               | COOH            | $\text{CH}_3$   | (S)          |
| e) COOH         | Cl              | $\text{CH}_3$   | F               | (S)          |

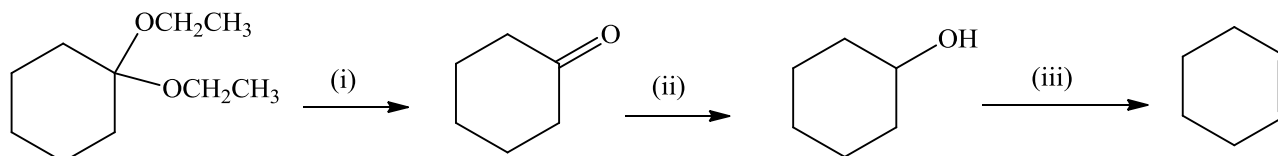


6. Which of the following terms best describes the product from the following reaction?

- a) (*R*)-enantiomer
- b) (*S*)-enantiomer
- c) racemic mixture
- d) achiral compound
- e) *meso*-compound

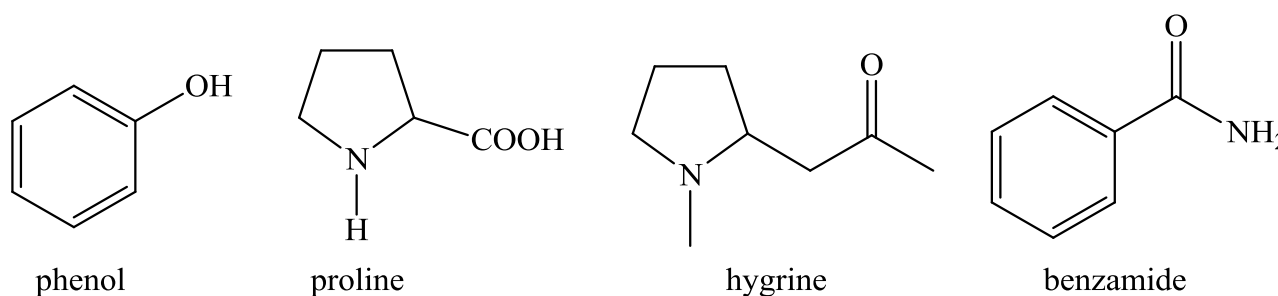


7. The reagents and reaction conditions to carry out the transformations below are:



- a) (i) dilute  $\text{H}_2\text{SO}_4$  (ii)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$  (iii) conc.  $\text{KOH}$  in ethanol
- b) (i) dilute  $\text{OH}^-/\text{H}_2\text{O}$  (ii)  $\text{LiAlH}_4$  followed by dilute acid (iii) hot conc.  $\text{H}_2\text{SO}_4$
- c) (i) dilute  $\text{H}_2\text{SO}_4$  (ii)  $\text{LiAlH}_4$  followed by dilute acid (iii) conc.  $\text{KOH}$  in ethanol
- d) (i) dilute  $\text{H}_2\text{SO}_4$  (ii)  $\text{LiAlH}_4$  followed by dilute acid (iii) hot conc.  $\text{H}_2\text{SO}_4$
- e) (i) dilute  $\text{OH}^-/\text{H}_2\text{O}$  (ii)  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$  (iii) conc.  $\text{KOH}$  in ethanol

Q 8-10 refer to the following four molecules.



8. Which of the compounds will undergo an acid-base reaction with dilute  $\text{HCl}$ ?

- a) proline and benzamide only
- b) proline, hygrine and benzamide only
- c) proline and hygrine only
- d) hygrine only
- e) all of them

9. Which of the compounds will undergo an acid-base reaction with dilute  $\text{NaOH}$ ?

- a) proline and benzamide only
- b) phenol, proline and benzamide only
- c) phenol and proline only
- d) phenol only
- e) all of them

10. Which of the compounds will react (effervesce or bubble) when treated with dilute  $\text{NaHCO}_3$  solution?

- a) proline and benzamide only
- b) phenol, proline and benzamide only
- c) phenol only
- d) proline only
- e) none of them

Correct answers: 1C, 2D, 3B, 4E, 5B, 6A, 7D, 8C, 9C, 10D