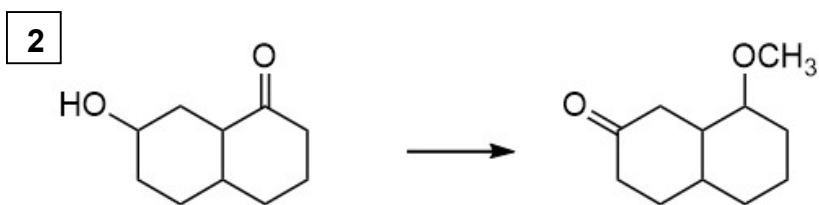
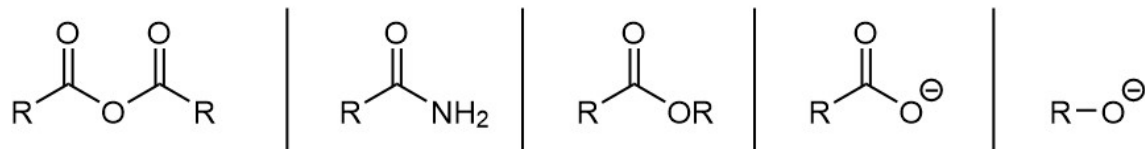




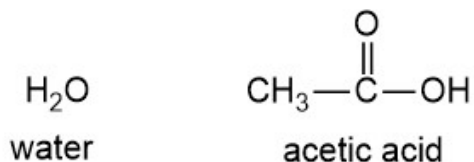
1 Provide the reagents needed to transform the given starting material into the desired product.



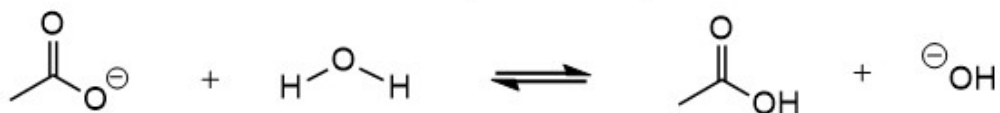
4 Match the functional groups to the correct names.



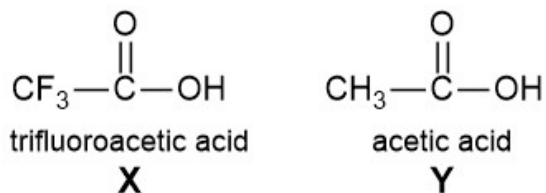
5 Which is the stronger acid? Explain briefly.



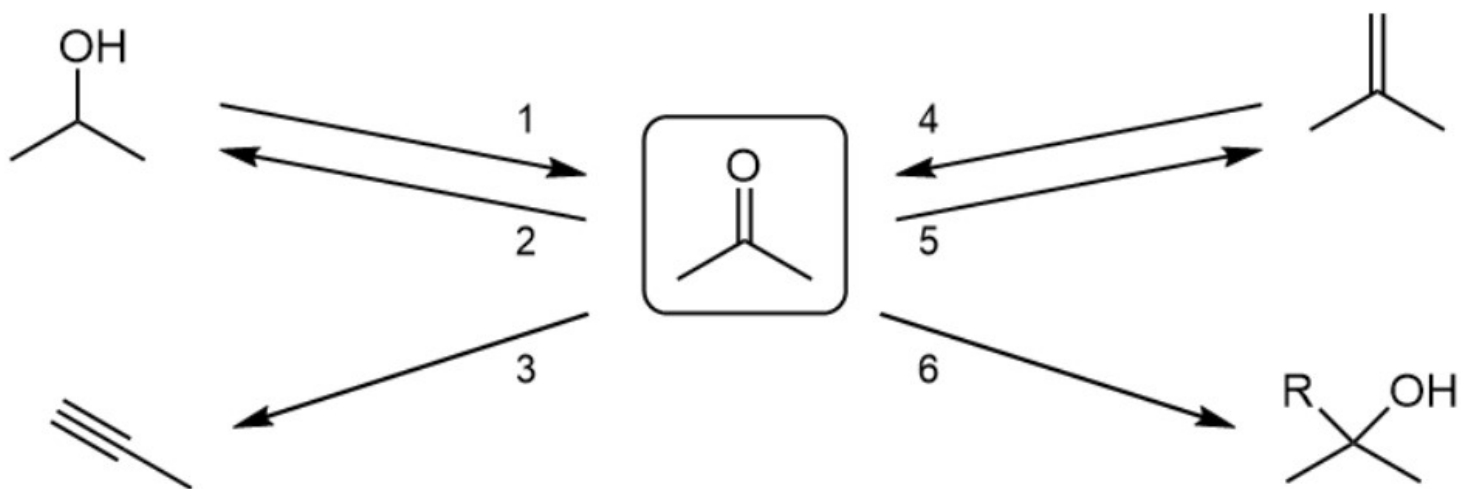
6 Provide curved arrows for the following proton-transfer reaction. Determine the direction of the equilibrium (forward or reverse favored?).



7 What predictions can you make about the relative K_a and pK_a values of the two acids shown below? Justify your answers.



8 Provide the missing reagents (each transformation corresponds to one letter).



My solution:

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1 2 3 4 5 6

(enter into PollEverywhere as one word, such as **abcde**)

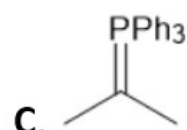
Correct answer:

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1 2 3 4 5 6

A. t-BuOK

B. 1) R₃CO⁻; 2) H₃O⁺



D. ROH, TsOH

E. 1) LiAlH₄; 2) H₃O⁺

F. 1) BH₃-THF; 2) H₂O₂, NaOH

G. MCPBA

H. H₂SO₄, H₂O, HgSO₄

I. conc. H₂SO₄, heat

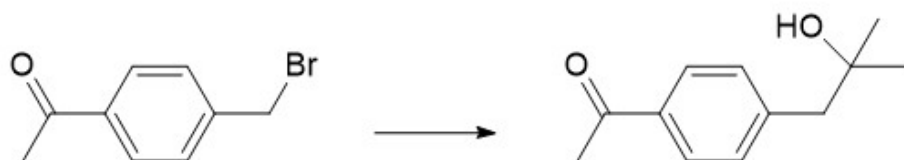
J. Ph₃P=CH₂

K. 1) RMgBr; 2) H₃O⁺

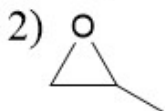
L. Na₂Cr₂O₇, H₂SO₄, H₂O

Which reagents would be best to achieve the following synthesis?

1

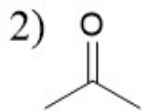


A) 1) Mg



3) H_3O^+

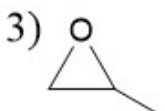
C) 1) Mg



3) H_3O^+

B) 1) , TsOH

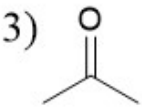
2) Mg



4) H_3O^+ , heat

D) 1) , TsOH

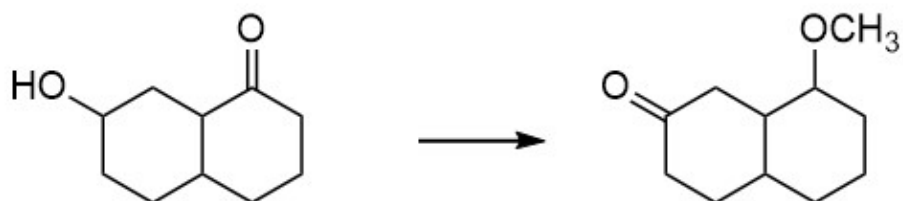
2) Mg



4) H_3O^+ , heat

Which reagents would be best to achieve the following synthesis?

2



A) 1) TMSCl , base

2) CH_3ONa

3) H_2/Pd

4) TBAF

5) PCC

B) 1) PCC

2) NaBH_4 , MeOH

3) NaH

4) CH_3I

C) 1) TMSCl , base

2) LiAlH_4 ; wkup

3) NaH

4) CH_3I

5) TBAF

6) PCC

D) 1) CH_3OH , TsOH

2) PCC

3) H_3O^+

4) CH_3ONa

5) H_2/Pd

E) 1) NaBH_4 , MeOH

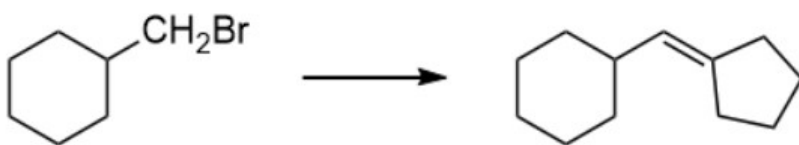
2) NaH

3) CH_3I

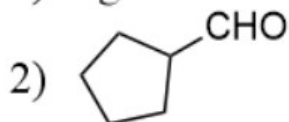
4) PCC

Which reagents would be best to achieve the following synthesis?

3

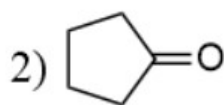


A) 1) Mg



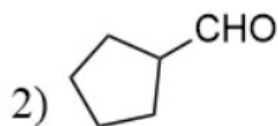
3) conc. H_2SO_4 , heat

C) 1) Mg



3) conc. H_2SO_4 , heat

B) 1) $\text{Ph}_3\text{P}=\text{CH}_2$



3) conc. H_2SO_4 , heat

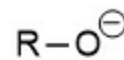
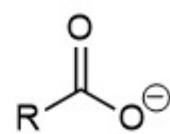
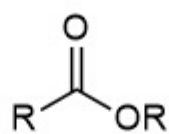
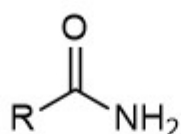
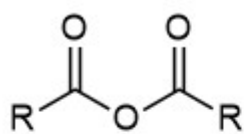
D) 1) Ph_3P

2) BuLi



4

Match the functional groups to the correct names.



A) ether

amide

ether

carboxylic acid

alcohol

B) anhydride

amide

ester

carboxylate

alkoxide

C) anhydride

amine

ester

carboxylate

alkoxide

D) ether

amine

ether

carboxylate

alcohol

E) anhydride

amide

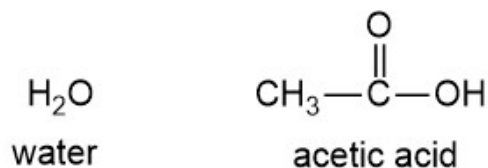
ester

carboxylic acid

alkoxide

5

Which is the stronger acid? Explain briefly.



A) Because this is more stable: $\text{H}-\text{O}^{\ominus}$
water is the **stronger** acid.

B) Because this is more stable: $\text{H}-\text{O}-\text{H}$
water is the **weaker** acid.

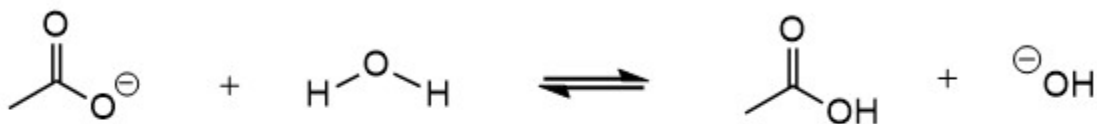
C) Because this is more stable: $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}^{\ominus}$
acetic acid is the **stronger** acid.

D) Because this is more stable: $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$
acetic acid is the **weaker** acid.

E) It's impossible to predict acid strength without $\text{p}K_{\text{a}}$ data.

6

Provide curved arrows for the following proton-transfer reaction. Determine the direction of the equilibrium (forward or reverse favored?).



A) Forward, because acetate is the weaker base.

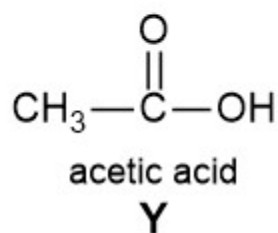
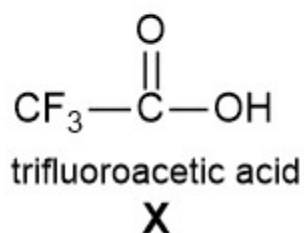
B) Forward, because hydroxide is the weaker base.

C) Reverse, because acetate is the stronger base.

D) Reverse, because hydroxide is the stronger base.

7

What predictions can you make about the relative K_a and pK_a values of the two acids shown below? Justify your answers.



- A) **X** has the larger K_a and the larger pK_a .
- B) **X** has the larger K_a and the smaller pK_a .
- C) **Y** has the larger K_a and the larger pK_a .
- D) **Y** has the larger K_a and the smaller pK_a .

8