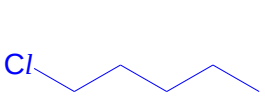
Polymers (Part 2) – Reactions of Functional Groups

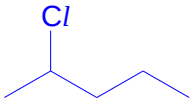
Checkpoint 1

1 Pentane reacts with Cl_2(g) in presence of UV light to give three monochlorinated products.

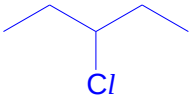
Draw the skeletal formula of the three compounds.



1-chloropentane



2-chloropentane

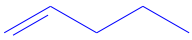


3-chloropentane

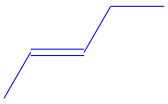
2 2-chloropentane reacts with hot ethanolic KOH to give three isomeric products with molecular formula of C_5H_{10}, containing a pair of cis-trans isomers.

Identify the type of reaction and deduce the structure of the three products.

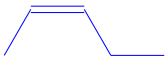
Elimination reaction



pent-1-ene



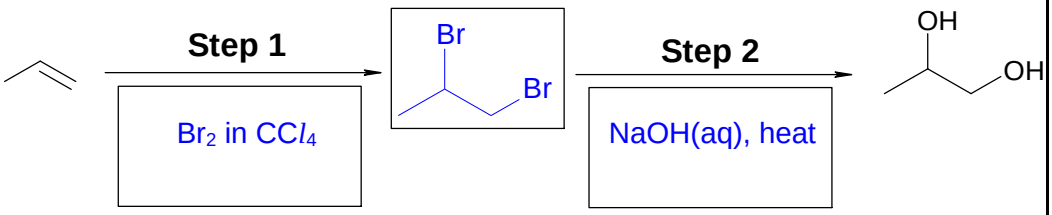
trans pent-2-ene



trans pent-2-ene

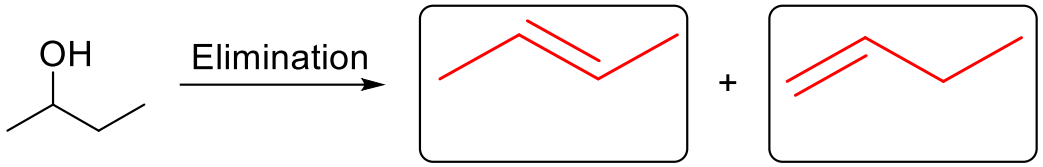
3 Propene is converted to propan-1,2-diol in a **2-step** reaction sequence.

Fill in the reagents and conditions required for each step as well as the missing structure.

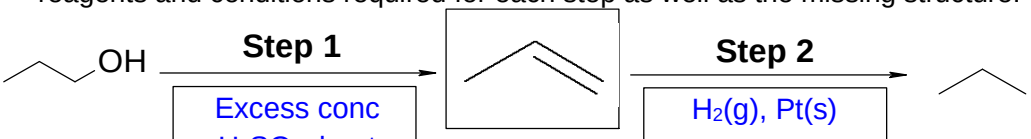


Checkpoint 2

1 Butan-2-ol undergo elimination to gives 2 different alkenes.
Draw the structures of the 2 alkenes.



2 Propan-1-ol is converted to propane in a **2-step** reaction sequence. Fill in the reagents and conditions required for each step as well as the missing structure.



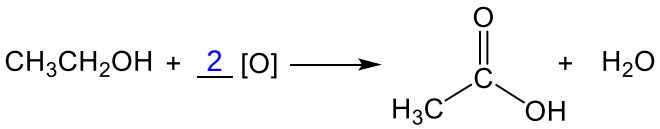
Step 1: Excess conc H_2SO_4, heat
Or Al_2O_3(s), heat

Step 2: H_2(g), Pt(s)
or
H_2(s), Ni(s), heat

Checkpoint 3

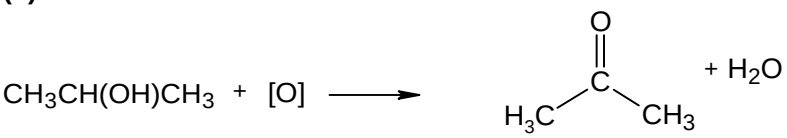
1 Fill in the blanks provided. Indicate the reagent and condition required for the reaction and the observation of the reaction.

(a)



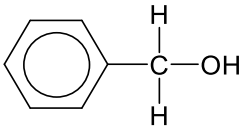
Reagent and Condition:
$K_2Cr_2O_7$, H_2SO_4(aq), heat
OR
$KMnO_4$, H_2SO_4(aq), heat

(b)

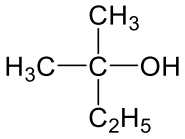


2 Which alcohol does **not** result in a colour change when warmed with acidified potassium dichromate(VI)?

A

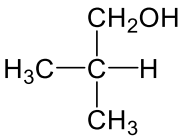


B

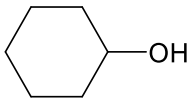


Tertiary alcohol cannot be oxidized

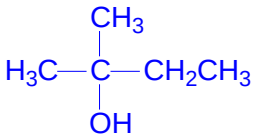
C



D



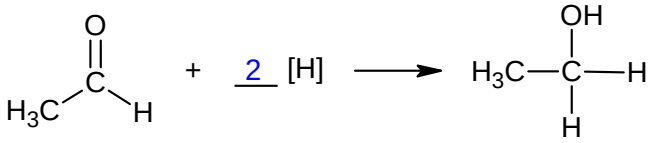
3 Draw the structure of the alcohol with the molecular formula $C_5H_{12}O$ that is resistant to oxidation. Give the name of this alcohol.



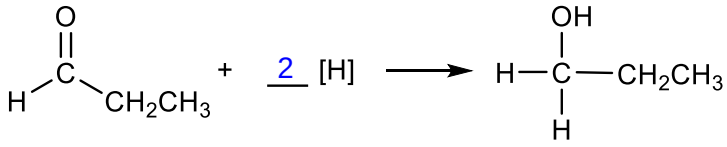
2-methylbutan-2-ol

Checkpoint 4

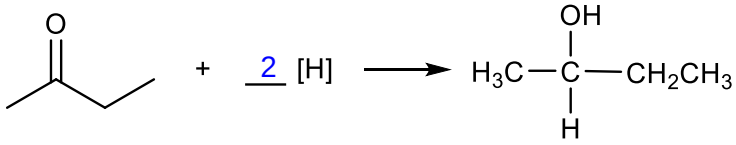
Fill in the blanks provided. Place a '✓' next to the reducing agent which allows the reduction to be carried out.



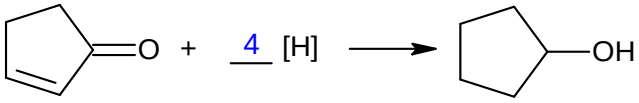
☑ $LiAlH_4$ in dry ether
☑ $NaBH_4$ in ethanol
☑ H_2/Pt



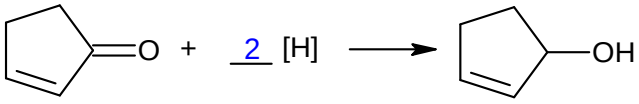
☑ $LiAlH_4$ in dry ether
☑ $NaBH_4$ in ethanol
☑ H_2/Pt



☑ $LiAlH_4$ in dry ether
☑ $NaBH_4$ in ethanol
☑ H_2/Pt



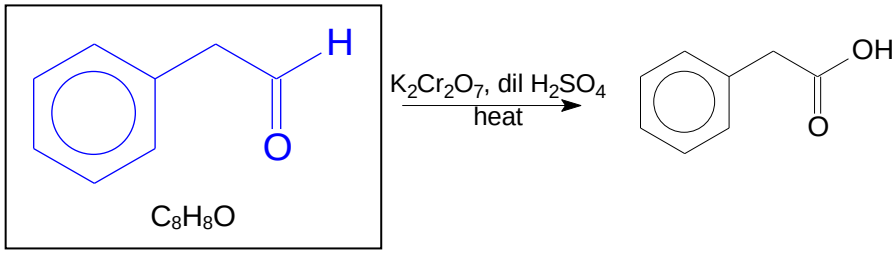
☐ $LiAlH_4$ in dry ether
☐ $NaBH_4$ in ethanol
☑ H_2/Pt



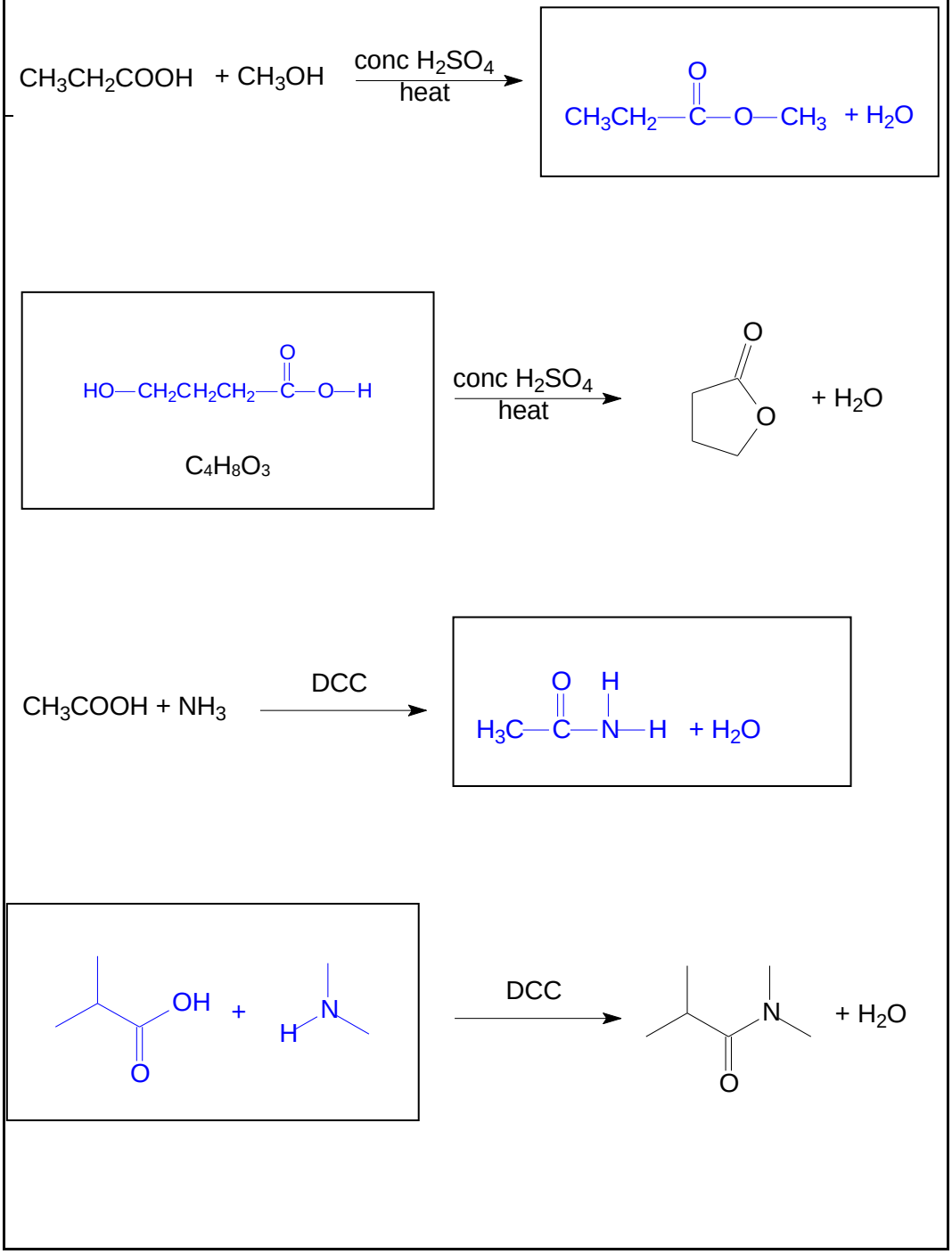
☑ $LiAlH_4$ in dry ether
☑ $NaBH_4$ in ethanol
☐ H_2/Pt

Checkpoint 5

CH_3CH_2CHO $\xrightarrow[\text{heat}]{KMnO_4, \text{ dil } H_2SO_4}$ CH_3CH_2COOH

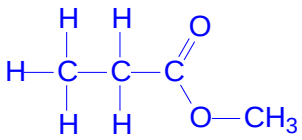
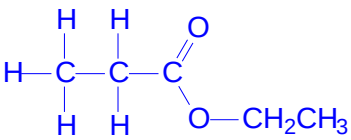


Checkpoint 6



Checkpoint 7

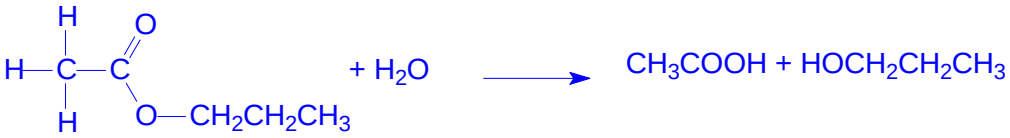
Draw the structure of the following esters.

	
Methyl propanoate	Ethyl propanoate

Checkpoint 8

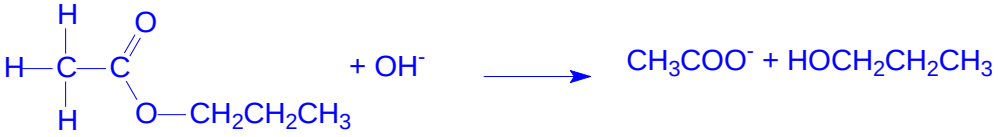
Write the balanced equation when propyl ethanoate reacts with

(i) $H_2SO_4(aq)$, heat



$$+ H_2O \longrightarrow CH_3COOH + HOCH_2CH_2CH_3$$

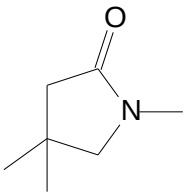
(ii) NaOH(aq), heat



$$+ OH^- \longrightarrow CH_3COO^- + HOCH_2CH_2CH_3$$

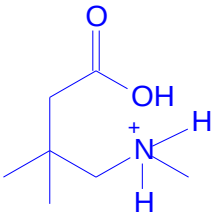
Checkpoint 9

Draw the structure of the products formed when the amide **A** reacts with



Amide **A**

(i) H_2SO_4(aq), heat



(ii) NaOH(aq), heat