

- 1 When a solid is purified by recrystallization, the procedure involves the removal of impurities by filtration of the hot mixture followed by filtration of the cold mixture. Which impurities are removed by these two filtrations?

	Hot filtration	Cold filtration
<input type="checkbox"/> A	insoluble impurities	insoluble impurities
<input type="checkbox"/> B	insoluble impurities	soluble impurities
<input type="checkbox"/> C	soluble impurities	insoluble impurities
<input type="checkbox"/> D	soluble impurities	soluble impurities

(Total for Question = 1 mark)

- 2 The hydride ion, H^- , is a strong reducing agent, a good nucleophile and a strong base.

Which of the following changes could **not** be brought about by the hydride ion?

- A CH_3CHO to $\text{CH}_3\text{CH}_2\text{OH}$
- B $\text{C}_2\text{H}_5\text{Br}$ to C_2H_6
- C $\text{CH}_2=\text{CH}_2$ to C_2H_6
- D CH_3COOH to CH_3COO^-

(Total for Question = 1 mark)

3 The compounds below were heated with aqueous sodium hydroxide solution. Which one of them did **not** give sodium ethanoate, CH_3COONa , as one of the products?

A $\text{CH}_3\text{COOCH}_3$

B CH_3COCH_3

C CH_3COOH

D CH_3COCl

(Total for Question 1 mark)

4 Which of the following statements about ethanoyl chloride is **not** correct?

A It reacts with ammonia to make an amine.

B It reacts with an amine to make an amide.

C It reacts with an alcohol to make an ester.

D It reacts with water to make an organic acid.

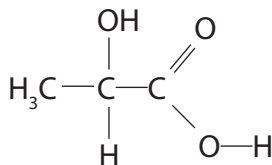
(Total for Question 1 mark)

5 Organic solids are often purified by recrystallization. This technique works on the basis that

- A the impurities must be insoluble in the solvent used.
- B the impurities must react with the solvent used.
- C the impurities crystallize first when the hot solution is cooled.
- D the cooled solution is saturated with the desired material but not with the impurities.

(Total for Question = 1 mark)

6 Ethanal, CH_3CHO , can be converted by a two-step synthesis into 2-hydroxypropanoic acid.



2-hydroxypropanoic acid

The reagents and conditions are

- | 1st step | 2nd step |
|--|--|
| <input type="checkbox"/> A $\text{Na}_2\text{Cr}_2\text{O}_7$ and dilute H_2SO_4 , heat under reflux | $\text{NaOH}(\text{aq})$, heat under reflux |
| <input type="checkbox"/> B Cl_2 , UV light | $\text{NaOH}(\text{aq})$, heat under reflux |
| <input type="checkbox"/> C LiAlH_4 in dry ether | CO_2 , room temperature |
| <input type="checkbox"/> D HCN , in presence of $\text{KCN}(\text{aq})$ | dilute $\text{HCl}(\text{aq})$, heat under reflux |

(Total for Question = 1 mark)

7 The **distinguishing** characteristic of combinatorial chemistry is that it involves the

- A simultaneous synthesis of many products.
- B interaction of starting materials to form a unique product.
- C use of catalysts.
- D use of polymer supports.

(Total for Question 12 = 1 mark)

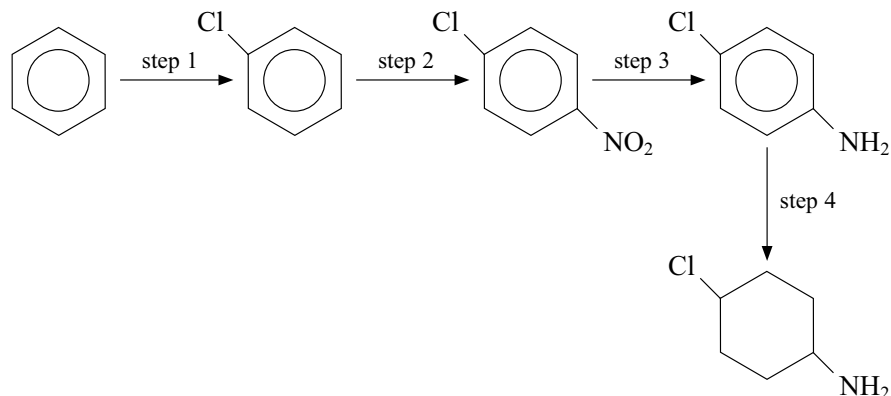
8 Bromoethane can be made by heating ethanol under reflux with 50% sulfuric acid and sodium bromide. When the mixture is distilled, the products include sulfur dioxide, bromine, hydrogen bromide and water as well as bromoethane.

The product mixture is shaken with sodium carbonate solution and later with anhydrous sodium sulfate before being re-distilled. Which of the following shows the correct list of impurities removed at each step?

		Aqueous sodium carbonate wash	Addition of sodium sulfate
<input type="checkbox"/>	A	HBr	SO ₂ , Br ₂ , water
<input type="checkbox"/>	B	SO ₂ , Br ₂	HBr, water
<input type="checkbox"/>	C	SO ₂ , HBr	Br ₂ , water
<input type="checkbox"/>	D	SO ₂ , Br ₂ , HBr	water

(Total for Question 13 = 1 mark)

9 This question is about the reaction scheme below.



Which step is most likely to need

(a) tin and concentrated hydrochloric acid?

(1)

- A Step 1
- B Step 2
- C Step 3
- D Step 4

(b) a catalyst of iron(III) chloride?

(1)

- A Step 1
- B Step 2
- C Step 3
- D Step 4

(c) a nickel catalyst?

(1)

- A Step 1
- B Step 2
- C Step 3
- D Step 4

(Total for Question 3 marks)