

Oxidising alcohols and testing carbonyl compounds

Chemistry grades 11-12 (A Level · IB · Class 11-12) · Lab answers

The model answers use the sample table. Each identification must follow from at least one observation. Equations should balance and use [O] correctly, and the silver calculation uses a 1 : 2 ratio of aldehyde to silver.

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Question 1 Identify the liquids

A: propan-1-ol; B: propan-2-ol; C: 2-methylpropan-2-ol; D: propanal; E: propanone. **A, B, C, D, E = propan-1-ol, propan-2-ol, 2-methylpropan-2-ol, propanal, propanone.**

Question 2 Separating A and B

Both are oxidised, but A gives an aldehyde (DNPH precipitate and mirror) while B gives a ketone (precipitate only). **Primary gives a mirror; secondary does not.**

Question 3 Why C stays orange

C is a tertiary alcohol: the carbon bearing OH has no hydrogen, so **dichromate is not reduced and stays orange.**

Question 4 D and E with dichromate

D is an aldehyde and is easily oxidised to a carboxylic acid. E is a ketone, with no hydrogen on the carbonyl carbon, so **it resists oxidation.**

Question 5 Equation

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + [\text{O}] \rightarrow \text{CH}_3\text{CH}_2\text{CHO} + \text{H}_2\text{O}$; with excess oxidant under reflux the final product is **propanoic acid.**

Question 6 Silver from propanal

$n = 0.58 / 58.0 = 0.0100 \text{ mol}$; $n(\text{Ag}) = 0.0200 \text{ mol}$; $\text{mass} = 0.0200 \times 107.9 = \mathbf{2.16 \text{ g}}$.

Question 7 Safety and improvement

On standing, it can form explosive silver compounds, so it is made fresh and destroyed with

acid. **Improvement:** recrystallise the DNPH derivatives and compare their melting points with a data table to confirm each identity.