

## Chemguide – questions

### CARBOXYLIC ACIDS: PREPARATION

1. Carboxylic acids are commonly made from primary alcohols. The alcohol is heated under reflux with an excess of sodium or potassium dichromate(VI) solution acidified with sulphuric acid. When the reaction is complete, the carboxylic acid can be distilled off.

- a) Describe what you would see during the reaction.
- b) Explain the reason for heating the alcohol under reflux with an excess of the oxidising agent.
- c) Write a simple equation (using [O] for the oxidising agent) for the oxidation of propan-1-ol to propanoic acid.
- d) The electron-half-equation for the dichromate(VI) ion acting as an oxidising agent in the presence of an acid is



- (i) Work out the electron-half-equation for the conversion of propan-1-ol to propanoic acid.
- (ii) Combine that with the electron-half-equation given above to work out the ionic equation for the overall reaction.
- e) Although it would be less commonly done, you could also use the same oxidising mixture to oxidise an aldehyde such as propanal to propanoic acid. Work out the ionic equation for this reaction in the same way.

2. If you wanted to convert ethanol into propanoic acid, you could do it using this flow scheme:



For stage A, you could treat the ethanol with a mixture of red phosphorus and bromine.

- a) What reagent would you use to carry out stage B?
- b) Write an equation for the reaction you have just given.
- c) Briefly, how would you carry out stage C?
- d) Write an equation for the reaction you have just given.
- e) Name the compound  $\text{CH}_3\text{CH}_2\text{CN}$ .