

Solutions

Each answer shows the steps, then the **result**.

2.1

- the carboxylic acid functional group is **–COOH** (carboxyl)

2.2

- carboxylic acid + alcohol → an **ester**

3.1 C

- acid + carbonate → salt + water + **carbon dioxide**
- A is acid + metal; B and D are wrong

3.2

(a)

- acidified potassium manganate(VII)**

(b)

- the everyday product is **vinegar**

3.3

- magnesium ethanoate** and **hydrogen**

3.4

(a)

- CH₃ joined to a carbon with a double-bonded O and –OH, all bonds shown
- circled –COOH is the **carboxyl** group

(b)

- (i) **effervescence**; magnesium disappears; **hydrogen**; magnesium ethanoate
- (ii) **effervescence**; gas turns limewater milky (CO₂)
- $2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$

(c)

- esterification**
- product: **ethyl ethanoate** (sweet, fruity)
- sulfuric acid is a **catalyst**

(d)

- a weak acid only **partly ionises**
- far fewer H⁺ than a strong acid of the same concentration
- its pH is **higher** (about 3–4 vs about 1 for HCl)