

Solutions

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

2.1

- yeast anaerobic products: **ethanol** and **carbon dioxide**

2.2

- pectinase **breaks down cell walls** to release more (and clearer) fruit juice

3.1 B

- the enzymes **digest stains at lower temperatures**
- A, C and D are not what the enzymes do

3.2

(a)

- any **two** of: temperature / pH / oxygen / nutrient supply / waste removal

(b)

- any **one** of: insulin / penicillin / mycoprotein

3.3

(a)

- bread: anaerobic respiration produces **carbon dioxide**, which makes dough rise
- biofuel: the same process produces **ethanol**, distilled and burned as fuel

(b)

- they break down stains water cannot remove: **protease** (protein) and **lipase** (fat)
- at very high temperature the enzymes are **denatured**

(c)

- **lactase** is added, or milk is passed over immobilised lactase
- lactose is broken into **glucose and galactose**

(d)

- **temperature**: water jacket at the optimum; too high denatures enzymes
- **pH**: enzymes work only in a narrow range
- **oxygen**: sterile air and stirring so organisms respire and stay mixed