

21.2 Biotechnology

Name: _____ Class: _____ Date: _____ **Total: 22 marks**

KEY WORDS fermenter 发酵罐 • penicillin 青霉素 • biofuel 生物燃料 • biotechnology 生物技术
• yeast 酵母

Objective

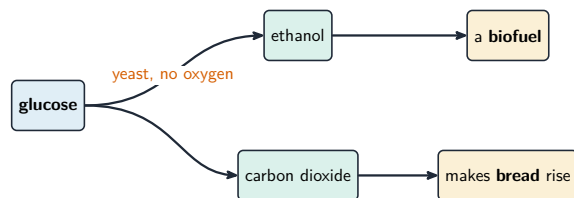
Build the skills to answer exam questions on **biotechnology** 生物技术 — **yeast** 酵母 (biofuel/bread), industrial **enzymes** 酶, and **fermenters** 发酵罐.

You must be able to:

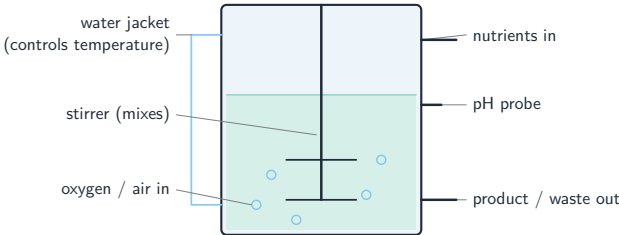
- describe how yeast makes ethanol and carbon dioxide
- give the uses of pectinase, washing-powder enzymes and lactase
- state the conditions controlled in a fermenter

1 Worked examples

■ Yeast and fermenters



Yeast respire anaerobically → ethanol (biofuel) and carbon dioxide (makes bread rise)



A fermenter grows microbes with the conditions controlled — e.g. to make insulin, penicillin, mycoprotein

- **pectinase**: more/clearer fruit juice; **lactase**: lactose-free milk.

2 Practice

2.1 Name the two products yeast makes by anaerobic respiration. [2]

2.2 State the use of pectinase. [1]

3 Exam-style questions

3.1 Biological washing powders contain enzymes that: [1]

A	B
C	D

- A make stains
- B digest stains at lower temperatures
- C colour clothes
- D kill bacteria

3.2 A fermenter is used to grow microbes.

(a) State two conditions that must be controlled in a fermenter. [2]

(b) Name one useful product made in a fermenter. [1]

3.3 Yeast is used to make bread and to make biofuel. Industrial enzymes are used in washing powders and in producing lactose-free milk.

(a) Explain the role of yeast in making bread, and in making biofuel, naming the product that matters in each case. [4]

(b) State **two** reasons why enzymes in washing powder are useful, and explain why such a powder should not be used at very high temperature. [3]

(c) Describe how lactose-free milk is produced using an enzyme. [2]

(d) Name **three** conditions that must be controlled inside a fermenter, and explain why each matters. [6]
