

21 Fermenters and GM – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
fermenter	发酵罐	_____
insulin	胰岛素	_____
penicillin	青霉素	_____
temperature	温度	_____
oxygen	氧气	_____
Genetic modification	基因改造	_____
crops	农作物	_____
resistance	抗性	_____

Recall

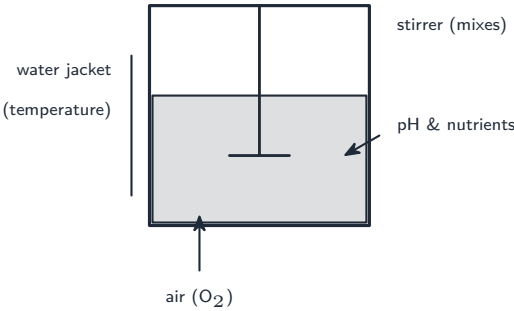
Bacteria and fungi can be grown in large tanks, and their genes can even be changed to make human proteins.

New ideas

Read these first, then do the Practice.

■ 1 Fermenters

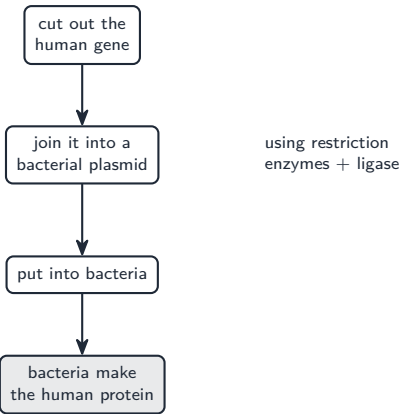
A **fermenter** 发酵罐 is a large tank used to grow microbes to make products such as **insulin** 胰岛素 and **penicillin** 青霉素. The conditions are carefully controlled:



The **temperature** 温度, **pH**, **oxygen** 氧气 and nutrients must all be kept right.

■ 2 Genetic modification

Genetic modification 基因改造 means changing an organism's genes. To make a human protein (e.g. insulin) in bacteria:



GM **crops** 农作物 can be given **resistance** 抗性 to herbicides or insect pests.

Watch out: a **fermenter** keeps temperature, pH, oxygen and nutrients controlled so the microbes make the most product. **Genetic modification** moves a gene (e.g.

the human insulin gene) into bacteria, using a **plasmid** as the carrier.

Practice

Try these in order.

21.6 What is a *fermenter* used for? [1]

21.7 Name two products made in fermenters. [2]

21.8 Name two conditions that must be controlled in a fermenter. [2]

21.9 What is *genetic modification*? [1]

21.10 Give one example of how genetic modification is used. [1]

21.11 Challenge. Outline the main steps used to make human insulin in bacteria by genetic modification. [3]