

21 Fermenters and GM – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
fermenter	_____	_____	_____
insulin	_____	_____	_____
penicillin	_____	_____	_____
temperature	_____	_____	_____
oxygen	_____	_____	_____
Genetic modifica- tion	_____	_____	_____
crops	_____	_____	_____
resistance	_____	_____	_____

Recall

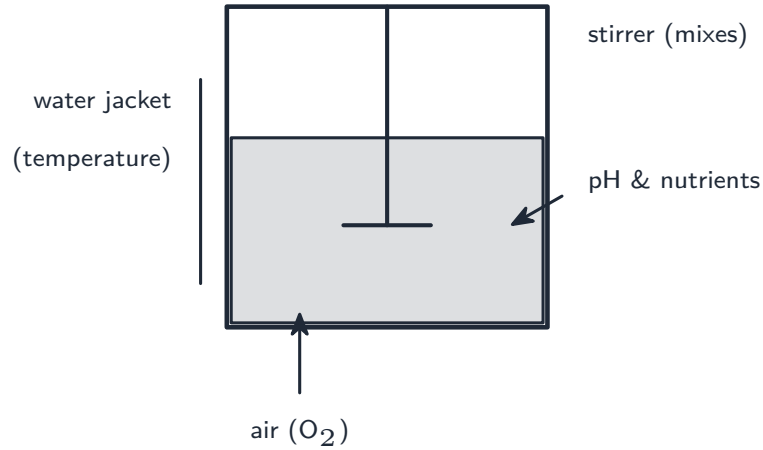
Bacteria and fungi can be grown in large tanks, and their genes can even be changed to make human proteins.

New ideas

Read these first, then do the Practice.

■ 1 Fermenters

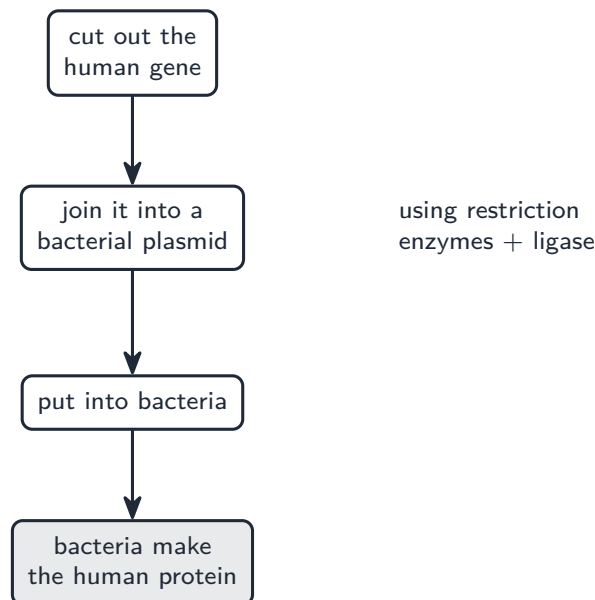
A **fermenter** is a large tank used to grow microbes to make products such as **insulin** and **penicillin**. The conditions are carefully controlled:



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

■ 2 Genetic modification

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



GM crops can be given **resistance** 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]