

Biotechnology

Why are bacteria useful in biotechnology and genetic modification?

Biotechnology **Supplement**

Apart from rapid reproduction and making complex molecules, give two reasons bacteria are useful in genetic modification.

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What is a plasmid?

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What does yeast make by anaerobic respiration?

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How is yeast used to make a biofuel?

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Why does bread dough rise?

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What happens to the ethanol when bread is baked?

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What is the use of pectinase in fruit juice production?

Few ethical concerns over their manipulation and growth; they contain plasmids.

They have a rapid reproduction rate and can make complex molecules, such as proteins.

Ethanol (alcohol) and carbon dioxide, from glucose.

A small circular loop of DNA in bacteria, which can carry an inserted gene.

Yeast respires anaerobically and makes carbon dioxide, which forms bubbles in the dough.

Yeast respires sugar anaerobically to make ethanol, which is used as fuel.

It breaks down pectin in cell walls, giving more juice and a clearer juice.

It evaporates.

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Which enzymes are in biological washing powders and what do they digest?

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Why do biological washing powders save energy?

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Why do biological washing powders work poorly in very hot water?

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How is lactose-free milk made?

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Name three products made in fermenters.

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Which five conditions are controlled in a fermenter?

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Why is temperature controlled in a fermenter?

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Why is oxygen supplied to a fermenter?

They clean well at low temperatures (30 to 40 °C), so less energy is used heating water.

Proteases (protein), lipases (fats) and amylases (starch).

Lactase breaks lactose into glucose and galactose.

The enzymes are denatured, so they no longer digest the stains.

Temperature, pH, oxygen, nutrient supply and waste products.

Insulin (bacteria), penicillin (fungus) and mycoprotein (fungus).

For aerobic respiration, releasing energy for growth and product formation.

To keep it at the optimum for enzymes; too high denatures them, too low slows reactions.

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Why are pH, nutrients and waste products controlled in a fermenter?

Genetic modification

Define genetic modification.

Genetic modification

Give an example of human genes inserted into bacteria.

Genetic modification

Name three features genes can give to GM crop plants.

Genetic modification

What is golden rice?

Genetic modification **Supplement**

What do restriction enzymes do?

Genetic modification **Supplement**

What does DNA ligase do?

Genetic modification **Supplement**

Put in order: insert plasmid into bacteria, cut gene out, join gene into plasmid, bacteria make protein.

Changing the genetic material of an organism by removing, changing or inserting individual genes.

pH is kept at the optimum for enzymes; nutrients supply energy and raw materials; waste is removed so it does not poison the microorganisms.

Herbicide resistance, insect pest resistance and improved nutritional quality.

The human insulin gene, so bacteria make human insulin.

Cut DNA, leaving sticky ends.

Rice genetically modified to improve its nutritional quality (more vitamin A precursor).

Cut gene out; join gene into plasmid; insert plasmid into bacteria (which multiply); bacteria express the gene and make protein.

Joins the sticky ends of the gene and plasmid to form a recombinant plasmid.

Genetic modification **Supplement**

What is a recombinant plasmid?

Genetic modification **Supplement**

Give two advantages of GM crops.

Genetic modification **Supplement**

Give two disadvantages of GM crops.

Higher yield; less insecticide needed;
improved nutrition.

A plasmid containing DNA (a gene) from
another organism, joined in by DNA ligase.

Genes may spread to wild plants; may harm
other organisms; seeds can be expensive.