

Definitions and Concepts for CAIE Biology IGCSE

Topic 20: Biotechnology and Genetic Engineering

*Definitions in **bold** are for supplement only*

Anaerobic respiration - Respiration that takes place without oxygen and forms energy from the breakdown of glucose. In muscles, lactic acid is produced. In yeast, alcohol and carbon dioxide are produced. Less energy is released than in aerobic respiration.

Antibiotic - A chemical or compound produced by a living organism that kills or prevents the growth of bacteria, e.g. penicillin.

Biofuel - A renewable energy source that is produced from biomass.

Biological washing powder - A type of detergent that contains enzymes (e.g. proteases, lipases) which remove stains by digesting large, insoluble food molecules.

Biotechnology - The field of biology involving the use of living systems to produce or transform materials. It has applications in agriculture, medicine and food science. Bacteria are useful in biotechnology.

DNA ligase - **An enzyme used to insert a specific gene into a plasmid (by joining their complementary sticky ends) to form a recombinant plasmid.**

Fermentation - The chemical breakdown of a substance (normally under anaerobic conditions) by microorganisms or enzymes.

Fermenter - A large tank in which fermentation takes place. It is filled with a nutrient solution and maintained at an optimum pH (using mineral salts) and temperature.

Genetically modified (GM) organism - An organism that has had its genome altered.

Genetic engineering - The modification of the genome of an organism by the insertion of a desired gene from another organism, enabling the formation of organisms with beneficial characteristics.

Lactase - **An enzyme that breaks down lactose into glucose and galactose. It is used in the production of lactose-free milk.**

Pectin - A polysaccharide found in plant cell walls that holds the walls of adjacent cells together.

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Pectinase - An enzyme used in the production of fruit juice. Pectinase breaks down pectin, releasing the contents of cells and increasing the yield of fruit juice. It is also used to clarify fruit juice and wine.

Penicillin - The first conventional, effective and safe antibiotic derived from the mould *Penicillium*.

Penicillium - A species of fungus responsible for the production of the antibiotic penicillin.

Plasmids - Pieces of circular DNA found in bacteria that are used to transfer genetic material between cells.

Recombinant DNA - A combination of DNA from two different organisms.

Restriction enzymes - Enzymes that cut DNA molecules at specific sequences, creating sticky ends.

Sticky ends - The staggered cut formed by restriction enzymes in double-stranded DNA.

Yeast - A microorganism which can respire anaerobically to release carbon dioxide and ethanol. Yeast is used in bread-making to make dough rise as bubbles of carbon dioxide form. It is also used to make ethanol for biofuels.

