

# POTENTIAL USE OF MICROORGANISMS IN BIOTECHNOLOGY AND SUSTAINABILITY OF THE ENVIRONMENT

- **Biotechnology** - Uses living organisms or biological processes to produce beneficial products.
- **Genetic engineering** - Used to alter the genetic structure of bacteria to produce bacteria that benefits us.

## ENZYME PRODUCTION

Fruit peel and vegetable scraps are fermented with sugar to produce **eco enzymes** which

- can break down fat and proteins in stains
- have **cleaning properties** due to the alcohol or acetic acid produced by the metabolic processes of bacteria
- is used as an **eco-friendly** cleaning agent



## OIL SPILL CLEAN-UP

- Oil spills are cleaned up by **genetically modified bacteria**.
- The oil spill is treated with bacteria and a nutrition solution.
- The bacteria will break down the complex oil components into simpler and safer components.



## PRODUCTION OF BIOPLASTIC

Some bioplastics can be made from **polyester** produced by bacteria through fermentation of sugars. The bioplastics produced

- are **biodegradable** and thus, friendly to the environment
- can be used to make device casings and packaging material for goods



## TREATING SEWAGE

- In the sewage treatment system, microorganisms break down harmful organic material into safer byproducts.
- Bacteria will break down sewage water into water, carbon dioxide, mineral salts and methane gas.
  - (a) Methane gas as a fuel
  - (b) Dried sewage sludge as fertiliser

