

Biotechnology *Checklist*

Problems and Profit with waste (= Credit outcomes)*

1. **Untreated sewage** causes **pollution** if it is released into rivers. It can also carry harmful **diseases**.
2. Some diseases from water contaminated with raw sewage are - typhoid, cholera, dysentery, diarrhoea.
3. Raw sewage in rivers results in an **increase in bacteria** which **use up all the oxygen** in the water so that most life cannot survive.
4. Sewage is **treated** by allowing naturally occurring bacteria to break down the organic waste into harmless substances. This process requires lots of **oxygen** so air is pumped into the tanks containing the sewage.
5. Since sewage contains many substances many different microorganisms are needed to break it down completely.
6. Two products of fermentation are **alcohol** and **methane gas (biogas)**.
7. Fuel from fermentation is **cleaner** and burns releasing **more energy** than fossil fuels.
8. Microbes can turn waste materials into useful products eg manure can be used to produce biogas and left over fruit pulp can be changed into **animal feed**.
9. **Fungi** can be used to make **mycoprotein** which can be used in place of meat when cooking.
- 10*. Microbes are involved in both the **nitrogen cycle** and the **carbon cycle** (during the process of **decomposition**). This is important for **recycling** substances in nature.
11. **Precautions** must be taken when handling or growing microbes to ensure that **unwanted microbes** do not grow and cause **disease**.
12. Microorganisms reproduce very rapidly by **asexual reproduction** if the conditions are **ideal**.
13. Precautions include
 - (a) washing hands and bench surface with **disinfectant**
 - (b) **sterilising** equipment in an **autoclave**
 - (c) keeping plates closed
 - (d) using high temperatures when disposing of plates (in an autoclave)

14. **Aseptic techniques** are used to avoid **contamination**. These include
- (a) using sterilised growth media
 - (b) flaming inoculating loops and necks of culture bottles
 - (c) keeping dishes and bottles covered as much as possible.
15. Manufacturing processes must take precautions to deal with **resistant** fungal and bacterial **spores**. Autoclaves at 15lb. per sq. in. pressure and at 121°C destroy most harmful spores.
- These are used in hospitals to sterilise operating equipment.