# Micro-organisms and their applications - Biology only

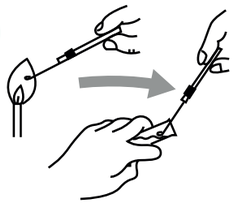
## Handling micro-organisms

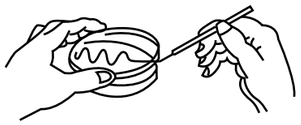
When working with micro-organisms it is important that you do not contaminate your work and your work does not contaminate the environment.

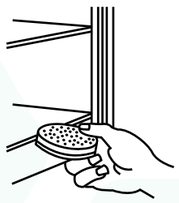
To do this, scientists use aseptic technique.

Bacteria and fungi can be grown on nutrient agar in a Petri dish, to produce an agar plate.

1. Petri dishes and nutrient agar should be sterilised before the agar is poured.
2. An inoculating loop is used to transfer bacteria and is sterilised before and after use by heating it to red heat in a Bunsen flame.
3. Only lift the Petri dish lid slightly as this prevents microorganisms from the air contaminating the culture and vice versa.
4. After inoculation the lid of the Petri dish should be secured in place by strips of adhesive tape labelled and dated.
5. Inoculated agar plates are incubated at 25°C in school laboratories for 24-48 hrs, which encourages growth of the culture without growing pathogens.
6. Sterilise plates and equipment after use.





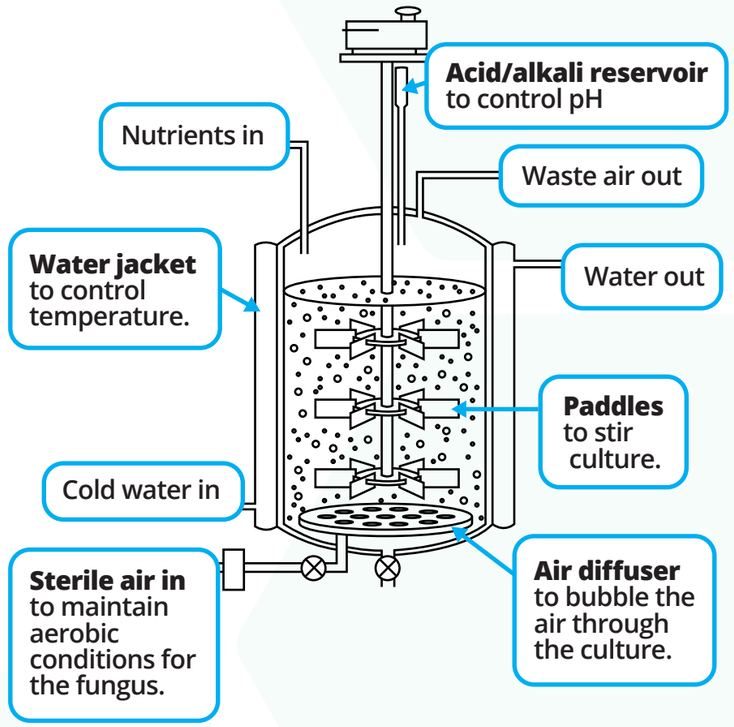


## Counting Micro-organisms

More than 200 colonies, likely to be clumping together, difficult to identify individual colonies.

**20-200 colonies** on each plate is a reliable number of colonies to count. Each colony grew from a single bacterium giving an indication of how many were in the original sample.

**Fewer than 20 colonies** is not a reliable number of colonies to count.




## Controlling Micro-organisms

The growth of micro-organisms can be controlled by temperature. This information is used for food storage.

| Food storage | Effect on bacterial growth |
|---|---|
| Room temperature | Bacterial growth is uncontrolled and rapid |
| Refrigerator | Slows bacterial growth |
| Freezer | Stops bacterial growth |

**Growing Micro-organisms -** A fungus called Penicillium that makes Penicillin can be grown in a fermenter as shown below:

This apparatus provides the microbes with the best conditions for growth.

- Optimum pH
- Optimum temperature
- Oxygen
- Nutrients

The organism grows in the fermenter and secretes the antibiotic into the surrounding medium. After incubation, the culture medium is removed filtered and the penicillin extracted.