

Factors affecting bacterial growth

Factors affecting bacterial growth are:

1. Oxygen requirement.
2. Temperature requirement.
3. PH
4. Osmotic pressure (salt tolerance).

1) Oxygen requirement:

Bacteria are divided into four groups according to oxygen requirement:

1. Bacteria grow only in the presence of oxygen, called: **strict aerobes**.
2. Bacteria grow only in the absence of oxygen, called: **strict anaerobe**.
3. Bacteria grow in the presence or absence of oxygen, called: **facultative anaerobe**.
4. Bacteria grow in a little amount of oxygen, called: **micro aerophilic**

In our bodies:

- The aerobic places: skin, eye, mouth, throat, nose.
- The anaerobic places: deep in tissue, large intestine.
- The micro aerobic: upper part of stomach.

How to achieve anaerobic condition:

1. Anaerobic hood.
2. Anaerobic jar: use gas generating kit which contains chemicals to consume the oxygen present in the jar.
 - We add 10 ml water to the gas kit.
 - $\text{Chemical} + \text{H}_2\text{O} \rightarrow \text{H}_2 + \text{CO}_2$
 - $\text{H}_2 + \text{O}_2 \text{ (in jar)} \xrightarrow{\text{catalyst}} \text{H}_2\text{O}$ (appear as droplet in the jar)

Catalyst: use it to speed up the reaction between H_2 and O_2

To check anaerobic condition we use:

1- Chemical indicator:

Called: Redox dye.

It is a yellow strip and it turns green or blue in the presence of O₂.

2- Biological indicator:

Use:

Strict aerobic bacteria, if it didn't grow that means= anaerobic condition.

Or we use:

Strict anaerobe bacteria, if it grows that's mean = anaerobic condition

2) Temperature requirement:

Bacteria are divided into three groups according to temperature requirement:

1. Bacteria grow at cold temp. (4-10°C), called: **Psychrophilic**.
2. Bacteria grow at 15- 45°C, called: **Mesophilic (pathogenic bacteria)**.
3. Bacteria grow at 45-90°C, called: **Thermophilic**

3) PH:

- ž 1. Some bacteria grow at acidic PH (3-6), Called: **Acidophilic**.
- ž 2. Or grow at alkaline PH (8-10), Called: **Alkalophilic /basophilic**.
- ž 3. Most bacteria grow at neutral PH (7).

4) Osmotic pressure:

Bacteria vary in their tolerance to salt levels.

- ž 1. Some cannot tolerate high concentration of salt.
- ž 2. Other can tolerate medium concentration of salt.
- ž 3. Some can tolerate high concentration of salt, called: **halophilic**.