

# **Factors Affecting Bacterial Growth**

# Factors affecting bacterial growth are:

- Oxygen requirement.
- Temperature requirement.
- PH.
- Osmotic pressure (salt tolerance).

# Oxygen Requirement

Bacteria are divided into four groups according to oxygen requirement:

- **Strict aerobes:** Bacteria grow only in the presence of oxygen.
- **Strict anaerobes:** Bacteria grow only in the absence of oxygen.
- **Facultative anaerobes:** Bacteria grow in the presence or absence of oxygen.
- **Micro aerophilic:** Bacteria grow in a little amount of oxygen.

## 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 contain chemicals to consume the oxygen present in the jar.

\*We add 10 ml water to the gas kit.

- $\text{Chemical} + \text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{CO}_2$
- $\text{H}_2 + \text{O}_2 \text{ (in jar)} \xrightarrow{\text{catalyst}} \text{H}_2\text{O}$  (appear as droplet in the jar)
- **Catalyst:** use it to speed up the reaction between  $\text{H}_2$  and  $\text{O}_2$

## Anaerobic jar



## Gas generating kit



# To Check Anaerobic Condition We Use:

## 1- Chemical indicator:

- Called: Redox dye (methylene blue indicator)
- It is a yellow strip and it turns green or blue in the presence of O<sub>2</sub>.

## 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.

# Temperature Requirement

Bacteria are divided into three groups according to temperature requirement:

- **Thermophilic:**

Bacteria grow at high temperature 45-90 °C.

- **Mesophilic:**

Bacteria grow at normal temperature 15- 45 °C.

- **Psychrophilic:**

Bacteria grow at cold temperature 4-10 °C.



# PH

Bacteria are divided into three groups according to PH requirement:

- **Acidophilic:**

Bacteria grow at acidic PH (3-6).

- **Alkalophilic/ basophilic:**

Bacteria grow at alkaline PH (8-10).

- **Neutrophilic:**

Most bacteria grow at neutral PH (7).

# Osmotic Pressure

## Bacteria vary in their tolerance to salt levels:

- Some can live at low salt con. (1% NaCl) and they dead at high concentration of salt.
- Other can tolerate medium concentration of salt (5% NaCl).
- Some can tolerate high concentration of salt (9% NaCl), called: **Halophilic**.