

Microbial Growth (Chapter 6)

Physical Requirements:

Temperature:

- Psychrophiles---0 C to <25 C/ optimal at 15 C
- Psychrotrophs---0 C to < 40 C/ optimal at 20 C to 30 C
- Mesophiles---25 C to 45 C/ optimal at 37 C
- Thermophiles---45 C to 70 C/ optimal 50 C to 60 C
- Extreme thermophiles---70 C to 110 C

pH:

- pH 6.5 to 7.5 (very few grow at < 4.0)
- Acidophiles--<5.5
- Alkalophiles-- >8.5

Osmotic Pressure:

- Hypotonic
- Isotonic
- Hypertonic (preservation of food with high conc. of salt or sugar)

Chemical Requirements:

1. Carbon
 2. Nitrogen, sulfur, phosphate
 3. Trace elements (Fe, Cu, Z, etc.)
 4. Oxygen:
 - a. Obligate aerobe
 - b. Facultative anaerobe
 - c. Obligate anaerobe[Toxic forms of oxygen: singlet O₂
Superoxide free radicals
Hydrogen peroxide
Hydroxyl radical]
 - d. Aerotolerant anaerobes and microaerophilic
5. Organic Growth factors

Culture Media:

- Chemically defined or Complex
- Anaerobic media/ Increased CO₂
- Selective
- Differential
- Enrichment
- Transport

Bacterial Growth:

Generation time

Growth phases:

Lag

Log

Stationary

Death

Bacterial Growth Measurement:

Plate counts

Measure # of viable cells

Count only if between 30 to 300 colonies

Org/ml = # counted in 1 ml. X dilution factor

Filtration (very small numbers)

Most Probable Number (MPN)

Direct Microscopic Count:

Breed count method

Petroff-Hausser cell counter

Indirect Methods:

Turbidity

McFarland standards

Metabolic Activity

Dry Weight