

BACTERIAL GROWTH

I. Physical Factors

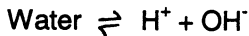
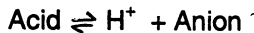
A. Temperature

Psychrophiles 0-20°C

Mesophiles 25-40°C

Thermophiles 45-near 100°C

B. pH



$$\text{pH} = -\text{Log}_{10} [\text{H}^+] \text{ (Molar Conc.)}$$

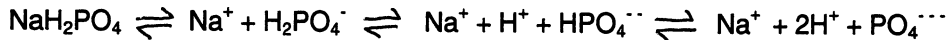
Molecular Weight

Molar Conc. = Moles/Liter

$$\text{Water pH} = -\text{Log} [10^{-7}] = -(-7) = 7$$

pH scale, water pH = 7 = neutral

Buffer:



C. Osmotic Pressure

<u>Solution</u>	<u>Water Concentration</u>		<u>Net Movement of Water</u>	
	<u>Outside the Cells</u>	<u>Inside the Cells</u>		
Isotonic	Normal	Normal	Out	In
Hypotonic	Higher	Normal	Out	In
Hypertonic	Lower	Normal	Out	In

Osmosis, Isotonic, (iso=equal), Hypotonic (hypo-under or less)
 Hypertonic (hyper=above), Halophils, Solvent (H₂O) & Solute

II. Chemical Requirements

C; N; P; S

Nitrogen Fixation

Oxygen - aerobes, anaerobes, facultative anaerobes

III. Growth Cycle - Binary Fission

Generation Time (25-30 min); Doubling of Cells

IV. Dealing with Bacterial Numbers

1 liter = 1000 ml = 10^3 ml

1 milliliter = 1000 μ l = 10^3 μ l

1 liter = 10^3 ml = 10^6 μ l

metric system

For measuring volume

V. Growth Curve - Lag; Exponential (Logarithmic); Maximum Stationary; Death

VI. Measuring Cell Numbers

A. Plate counts or colony counts

B. Filtration of Water: Coliforms, *Escherichia coli*, *Shigella*, *Salmonella*, *Campylobacter*, Hepatitis virus

C. Absorbance