

Requirements for Growth			
Physical Requirements			
From where	1. Temperature	2. pH	3. Osmotic Pressure
Def	Microbes classified into several groups <b>based on</b> their preferred temperature ranges.		Cells are 80 to 90% water.
Name of bacteria	A. Psychrophiles B. Mesophiles C. Thermophiles D. Extreme Thermophiles (Hyperthermophiles)	Organisms can be classified as: A. Acidophiles B. Neutrophiles C. Alkaliphiles	A. Halophiles B. Extreme or Obligate Halophiles C. Facultative Halophiles

Requirements for Growth				
Physical Requirements:		1. Temperature		
From where	Psychrophiles	Mesophiles	Thermophiles	Extreme Thermophiles (Hyperthermophiles)
Char	1- "Cold-loving". 2- Can grow at 0 C.	1- "Middle loving". 2- Most bacteria. 3- Best growth between 25 to 40 C. o 4- Optimum temperature commonly 37 C. o 5- Many have adapted to live in the bodies of animals.	1- "Heat loving". 2- Optimum growth between 50 to 60 C. o o 3- Adapted to live in sunlit soil, compost piles, and hot springs.	1- Optimum growth at 80 C or higher. 2- EX: Archaeobacteria. 3- Most live in volcanic and ocean vents.
Name group that classified	Two groups: ◆ <u>True Psychrophiles</u> char: 1- Optimum growth at 15 C or below. 2- Found in very cold environments (North pole, ocean depths). 3- Seldom cause disease or food spoilage. ◆ <u>Psychrotrophs</u> : char : 1- Optimum growth at 20 to 30 C. 2- Responsible for most low temperature food spoilage.			

Requirements for Growth			
Physical Requirements:		2. pH	
From where	Acidophiles	Neutrophiles	Alkaliphiles
Char	1- "Acid loving". 2- Grow at very low pH (0.1 to 5.4)	1- Grow at pH 5.4 to 8.5.	1- "Alkali loving". 2- Grow at alkaline or high pH (7 to 12 or higher)
EX	1- Lactobacillus produces lactic acid 2- tolerates mild acidity.	- Includes most human pathogens.	- Vibrio cholerae optimal pH 9.

Requirements for Growth			
Physical Requirements:		3. Osmotic Pressure	
From where	Halophiles	Extreme or Obligate Halophiles	Facultative Halophiles
Char	1- Require moderate to large salt concentrations. 2- Ocean water contains 3.5% salt.	1- Require very high salt concentrations (20 to 30%).	1- Do not require high salt concentrations for growth, but tolerate 2% salt or more.
EX	- Most bacteria in oceans.	- Bacteria in Dead Sea.	

Requirements for Growth		
Chemical Requirements		
From where	1. Carbon	2. Oxygen
Char	1- Makes up 50% of dry weight of cell. 2- Structural backbone of all organic compounds	
Name of bacteria	A. Chemoheterotrophs B. Chemoautotrophs and Photoautotrophs	bacteria are classified into: A. Aerobes B. Anaerobes

Requirements for Growth		
Chemical Requirements		
From where	1. Carbon	
	Chemoheterotrophs	Chemoautotrophs and Photoautotrophs
Char	Obtain carbon from their energy source: lipids, proteins, and carbohydrates	Obtain carbon from carbon dioxide

Requirements for Growth		
Chemical Requirements		2. Oxygen
From where	Aerobes	Anaerobes
Char	utilizes oxygen and can detoxify it	do not utilize oxygen
Name of bacteria	<ul style="list-style-type: none"> <li>• <u>obligate aerobes</u>: cannot grow without oxygen</li> <li>• <u>facultative anaerobes</u>: utilize oxygen but can also grow in its absence</li> <li>• <u>microaerophilic</u> : requires only a small amount of oxygen</li> </ul>	<ul style="list-style-type: none"> <li>• <u>obligate anaerobes</u>: lack the enzymes to detoxify oxygen so cannot survive in an oxygen environment</li> <li>• <u>aerotolerance anaerobes</u>: do not utilize oxygen but can survive and grow in its presence</li> </ul>