

Name: KEY

Microbiology: Chapter 6

Review Outline

Physical Requirements for Growth

1. Fill in the table below regarding the temperature requirements for microbial growth (5 Questions).

Organism Type	Optimum Growth Temperature	Grows at Temperature (Min/Max)	Miscellaneous Facts
Psychrophile	15°C	0°C	Cold Loving
Psychrotroph	25°C	0°	Refrigerator Spoilage
Mesophile	$25-40^{\circ}\text{C}$	$25-40^{\circ}\text{C}$	Most common / Human pathogens
Thermophile			Hotter than normal
Hyperthermophile/ Extreme Thermophile			Archaea Producers use <u>Sulfur</u> to make energy without light.

2. Fill in the table below regarding pH (3 Questions).

A). What pH do most bacteria grow at?	$6.5 - 7.5$
B). What is an acidophile?	Organisms that can survive at lower pH values.
C). What is a buffer?	A substance that resist changes in pH.
D). How does food preservation work?	By creating a hypertonic solution to dehydrate cells to increase shelf-life.

3. Fill in the table below regarding salt concentrations (2 Questions).

Organism Type	Salt Requirement/Preference	Miscellaneous Facts
Extreme/ Obligat Halophile	$20 - 30\%$	Archaea Found in Dead Sea <i>Great Salt Lake</i>
Facultative Halophile	can grow in above average salt concentrations but prefers NOT to.	XXXXXXXXXX

Chemical Requirements for Growth

4. Fill in the table regarding CHONPS (2 Questions).

Element	Molecules it Creates
C	All compounds in living things.
H	Satisfies all compounds in living things.
O	Cellular respiration (energy production).
N	Amino Acids (proteins) + Nitrogen Bases (RNA/DNA)
P	ATP, membrane phospholipids, DNA.

5. Amino Acids (proteins).



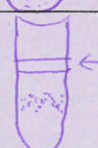


5. What are superoxide free radicals?

A toxic by-product of aerobic respiration.

6. Fill in the table below regarding methods of handling superoxide free radicals (4 Questions).

Enzyme	Reaction it performs	What Organisms contain this enzyme.
SOD	$\bullet O_2^- + \bullet O_2^- + 2H^+ \rightarrow H_2O_2 + O_2$	All groups except obligate anaerobes
Catalase	$2H_2O_2 \rightarrow 2H_2O + O_2$	<ul style="list-style-type: none"> Obligate Aerobes Facultative Anaerobes Microaerophiles
Peroxidase	$H_2O_2 + 2H^+ \rightarrow 2H_2O$	XXXXXXXXXX

7. Fill in the table below regarding oxygen consumption (8 Questions).

Organism Type	Environment(s) it can grow in. (Think O ₂ , Candle Jar, and/or Anaerobe Box).	Contains SOD (Check the box)	Contains catalase (Check the box)	Appearance in Thioglycolate Broth Explain where you would see growth in the tube.
Obligate Aerobe	O ₂	✓	✓	only at the top in the pink layer. 
Facultative Anaerobe	O ₂ , candle jar, Anaerobe Box	✓	✓	growth all but more at the top 
Microaerophile	CANDLE JAR	✓	✓	Suspended in the center 
Obligate Anaerobe	Anaerobe BOX			only at the bottom/not pink areas 
Aerotolerant Anaerobe	Anaerobe Box, candle jar, O ₂	✓		growth all the way (more at bottom) 

Lab Skills

8. Fill in the table below regarding OFG Tubes (1 Question).

Type of Organism	Appearance of Open Tube	Appearance of Oil Covered Tube	Explain the process/mechanism responsible for the appearance in the tubes.
Oxidizer	yellow	green	can digest glucose with the use of O_2 only. (only uses aerobic respiration).
Fermenter	yellow	yellow	can digest glucose with <u>AND</u> without O_2 . (uses aerobic [oxidative] and fermentation [to break down lactose]).
Non-Utilizer	green (green/blue)	green (green/blue)	The organism is an anaerobe (incapable of using these pathways → uses peptones).

9. Fill in the table below regarding Starch Plates (1 Question).

Type of Organism	Appearance of Plate (After Iodine Test)	Explain the process/mechanism responsible for the appearance in the of the iodine test.
Can Use Starch	Halo around bacteria	This bacteria contains amylase, an exoenzyme, to digest starch and break it into glucose subunits.
Can't Use Starch	No Halo/ Darker around bacteria.	This bacteria does <u>not</u> contain the exoenzyme amylase.

10. Fill in the table regarding TSI slants (4 Questions).

Type of Organism	Appearance of Slant	Appearance of Butt	Explain the process/mechanism responsible for the appearance in the of tube.
Glucose Utilizer	yellow (10hrs) then Red (24hrs)	yellow - stays yellow	Glucose is the only sugar oxidized and will be used up quickly (After glucose, peptones are used → returns to red).
Glucose and Lactose/Sucrose	yellow (stays yellow)	yellow - stays yellow	As glucose is oxidized, the tube turns yellow and will stay yellow due to high acid production during lactose/sucrose use.
Peptone Utilizer (No Sugars)	red/ darker red	red/ darker red.	No sugar is used; only peptones are oxidized

11. Fill in the table regarding media types (10 Questions).

Type of Media	How does it work?	What types of plates have we used?	Explain the mechanism of the plate(s).
Selective <i>antibiotics, salt, acidity, chemicals.</i>	Only certain groups of bacteria grow (due to antibiotics, salt, acidity, chemicals).	PVEA EMB selects for <u>GN</u>	contains alcohol that dissolves GN cells outer membrane and dehydrates the cell. Selects for <u>G+</u>
Differential	Ingredients are used to intentionally cause appearance differences between bacteria.	EMB	EMB is <u>BOTH</u> differential and selective. Differential → contains lactose and a pH indicator that changes color due to acid production if lactose is used. Selective - dyes methylene blue and eosin inhibit <u>G+</u>

12. Compare and Contrast Complex and Chemically Defined Media (2 Questions).

Exact compositions unknown
Contains extracts.

Exact composition known
- Formulas & amounts

BOTH grow microbes
eosin inhibits G+

13. Be able to analyze growth curves for organisms at varying conditions (8 Questions).

14. Know how to calculate number of cells after a given number of generations (1 Question).

15. Know how bacteria reproduce (1 Question).