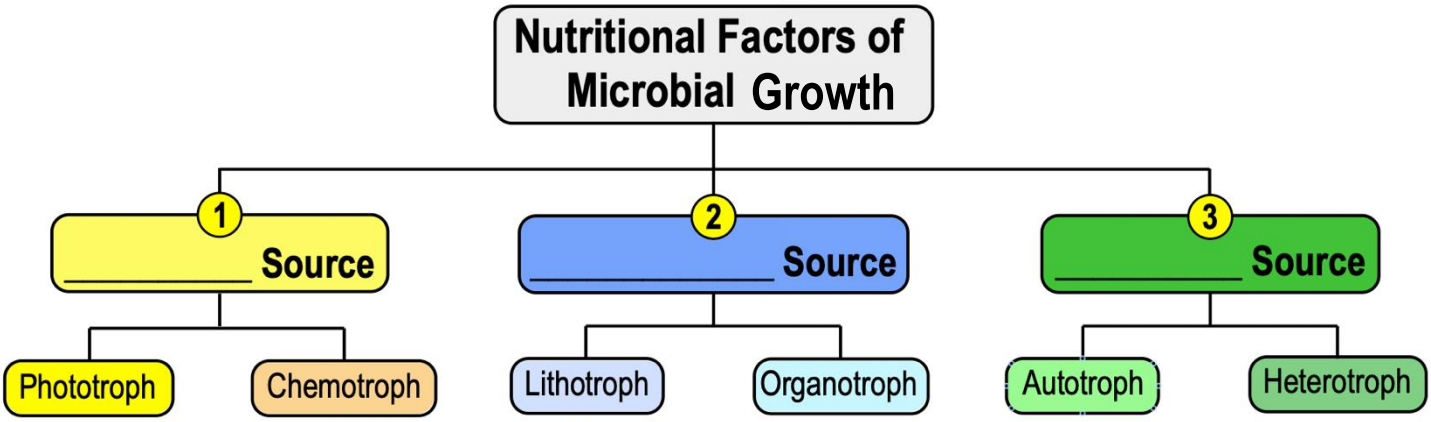
TOPIC: PROKARYOTIC METABOLISM

Nutritional factors of Microbial Growth

●Scientists typically classify organisms into different groups based on _____ nutritional factors:

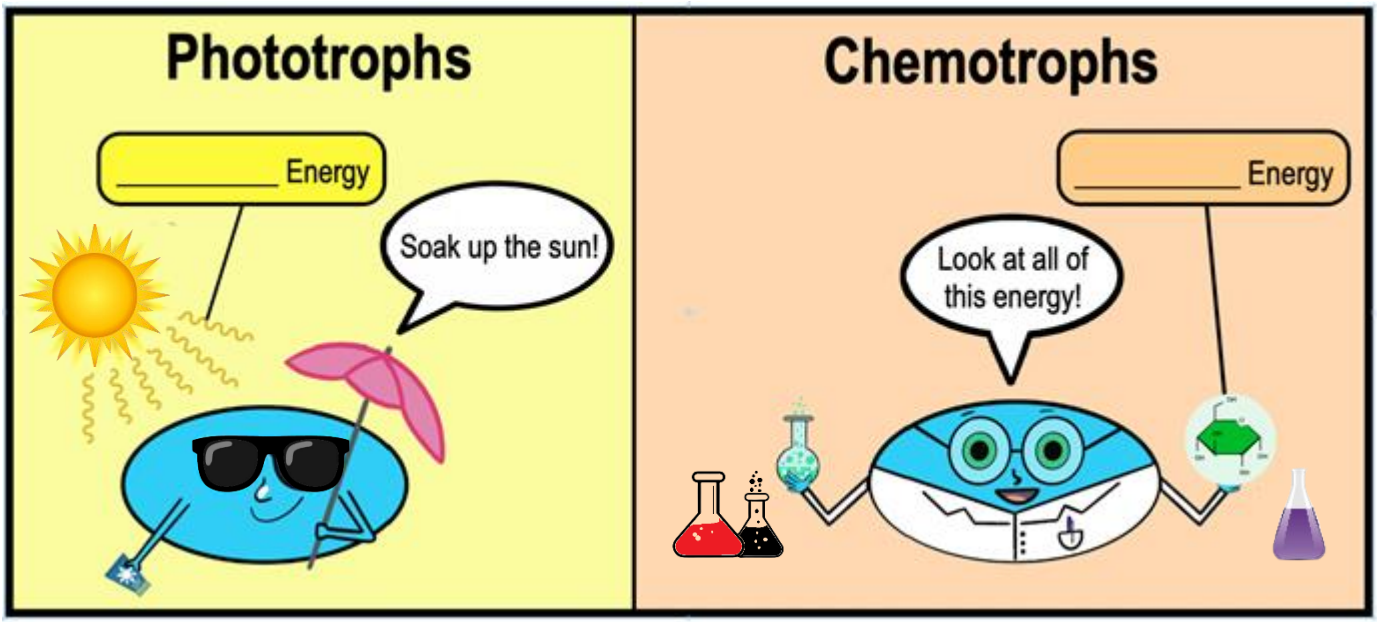
1. **Energy Source:** consumed *energy* source for powering _____ pathways.
2. **Electron Source:** original molecule supplying electrons to the Electron Transport Chain (_____).
3. **Carbon Source:** original *carbon-based* molecule supplying _____ for creating other cell components.



Energy Source: Phototrophs vs. Chemotrophs

●Organisms are classified into _____ groups based on their *energy* source:

1. _____**trophs:** obtain energy from *sunlight.*
2. **Chemotrophs:** obtain energy from _____ *compounds*.



TOPIC: PROKARYOTIC METABOLISM

PRACTICE: The prefix photo- indicates that an organism will make use of _____ for energy purposes.

a) Chemicals. b) Organics. c) Light. d) Inorganics.

Electron Source: Lithotrophs vs. Organotrophs

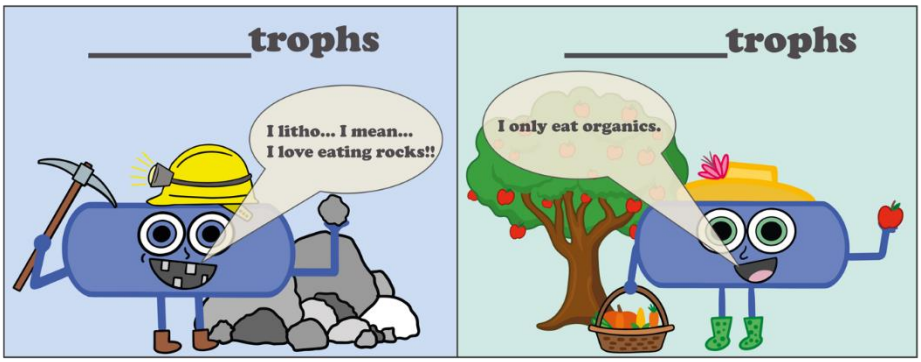
●Organisms are be categorized into _____ groups based on their *electron source.*

□ *Recall:* **electron source:** original molecule supplying electrons to the Electron Transport Chain (_____).

1 **Lithotrophs:** supply ETC with electrons from reduced _____ molecules *(Ex. H_2O, Fe^{2+})*.

□ ALL plants are *lithotrophs* because they harvest electrons from splitting water during carbon fixation.

2 **Organotrophs:** supply ETC with electrons from _____ molecules *(Ex. glucose).*



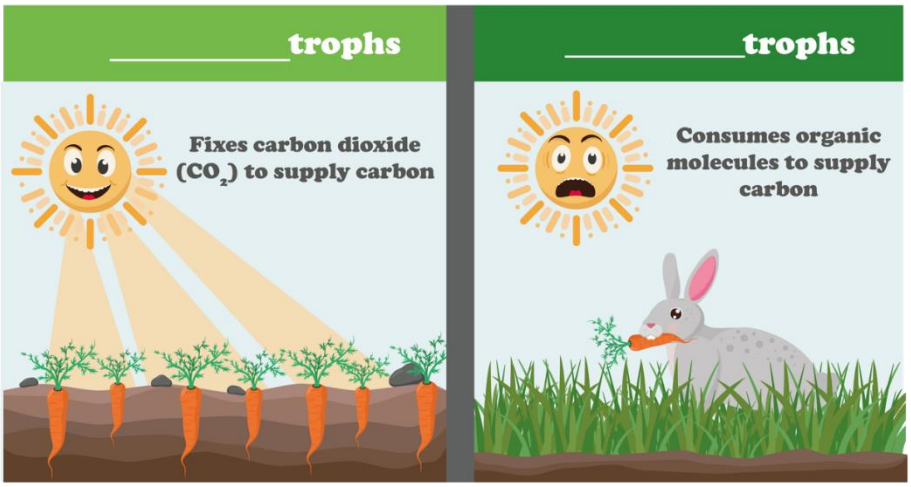
Carbon Source: Heterotrophs vs. Autotrophs

●Microorganisms are classified into _____ groups by their source of *carbon (organic or inorganic)*.

□ *Recall:* **carbon source:** original *carbon-based* molecule supplying carbon for creating other cell components.

1 **Autotrophs:** use _____ fixation to capture carbon for *making* their own food & other cell components.

2 **Heterotrophs:** *consume* & use _____ molecules to supply carbon for creating other cell components.



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PRACTICE: Biologists can divide living organisms into two groups: autotrophs and heterotrophs, which differ in _____.

a) Their method of obtaining energy.
b) The characteristics of life.
c) Their mode of inheritance.
d) The way that they generate ATP.

PRACRTICE: Organisms that use organic molecules as their source of carbon are called:

a) Archaea.
b) Chemoautotrophs.
c) Heterotrophs.
d) Autotrophs.

PRACTICE: Organisms that use CO_2 as their source of carbon are called

a) Organotrophs.
b) Heterotrophs.
c) Autotrophs.
d) Chemotrophs.

Reviewing the Nutritional Growth Factors of Microbes

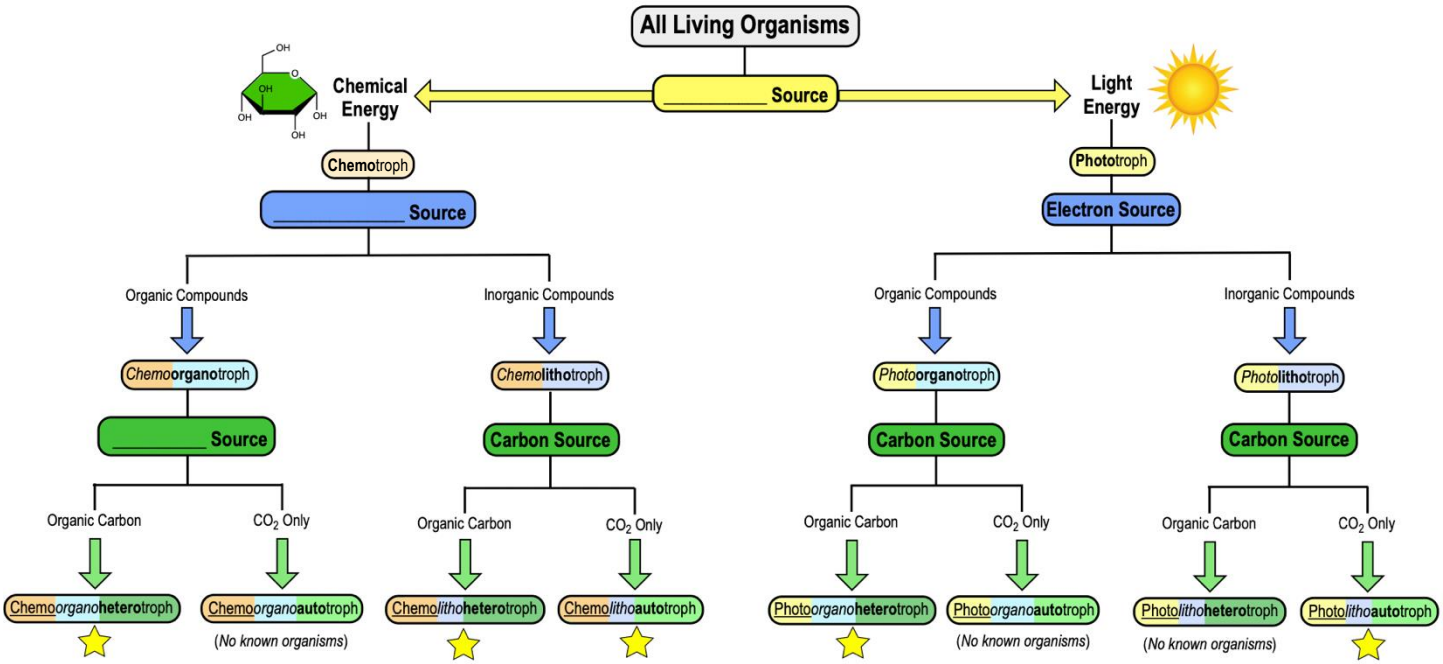
Energy Source	
Phototroph	Obtains enery from _____.
Chemotroph	Obtains enery from _____ *compounds*.
Electron Source	
Lithotroph	Supplies ETC with electrons from reduced _____ molecules.
Organotroph	Supplies ETC with electrons from _____ molecules.
Carbon Source	
Autotroph	Fixes *inorganic* CO_2 to _____ its own molecules/food & supply the cell with carbon.
Heterotroph	_____ pre-made *organic* molecules/food to supply the cell with carbon.

TOPIC: PROKARYOTIC METABOLISM

Nutritional Diversity Among Microbes

●Scientists typically categorize microbes into groups based on a _____ of the 3 key nutritional factors:

□ All combinations are *theoretically* possible even though some have no known organisms to date.



PRACTICE: Chemoheterotrophs:

a) Use sunlight as an energy source.
b) Use preformed organic molecules as a carbon source.
c) Use preformed organic molecules as an energy source.
d) Use inorganic chemicals as an energy source.
e) B and C.

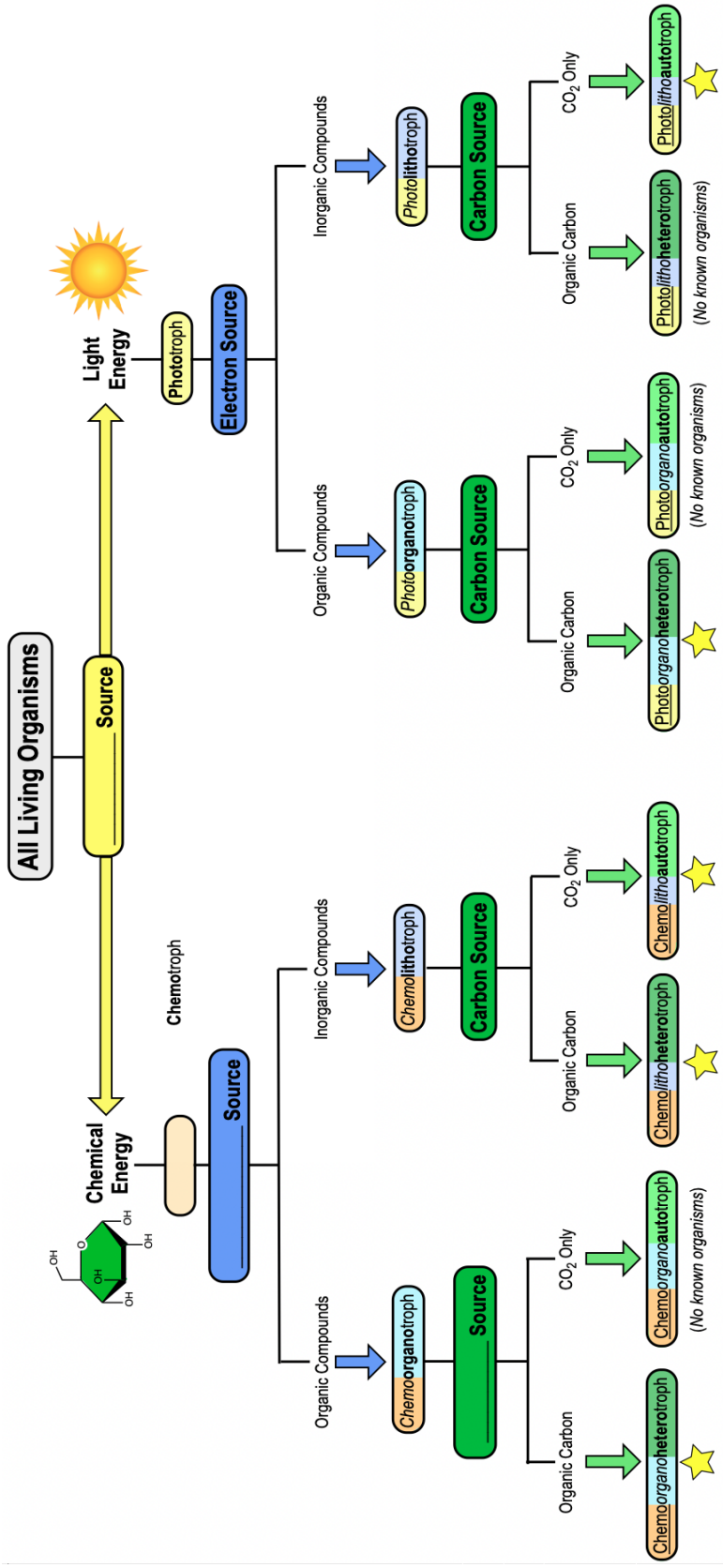
PRACTICE: Cyanobacteria are a group of photosynthetic bacteria. These bacteria use sunlight as their energy source and carbon dioxide as their carbon source. Cyanobacteria are _____.

a) Chemoautotrophs.
b) Photoautotrophs.
c) Chemoheterotrophs.
d) Photoheterotrophs.

PRACTICE: Humans are:

a) Chemolithoautotrophs.
b) Photooganoautotrophs.
c) Chemoorganoheterotrophs.
d) Chemolithoheterotrophs.

TOPIC: PROKARYOTIC METABOLISM



TOPIC: PROKARYOTIC METABOLISM

Oxygen Requirements for Microbial Growth

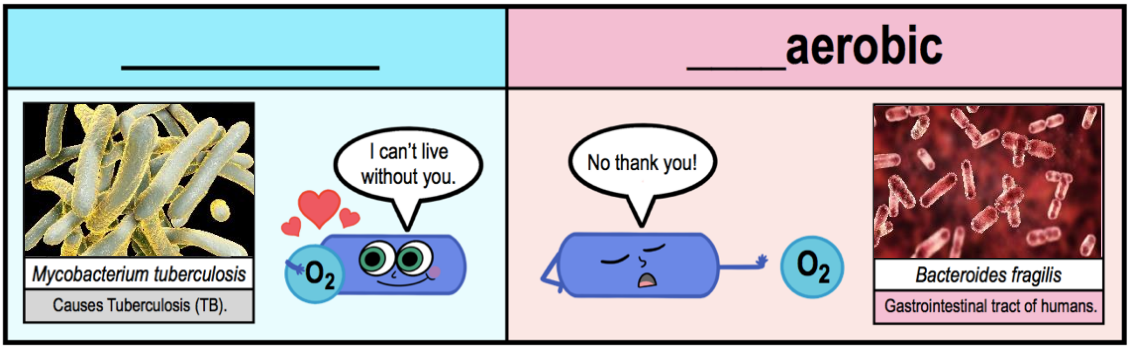
●All organisms that utilize chemical energy require a final electron _____ for the Electron Transport Chain.

□ In many microbes, the final electron acceptor is _____(O_2).

●_____: microbes that *require* O_2 & grow where it is abundant, called an *aerobic environment.*

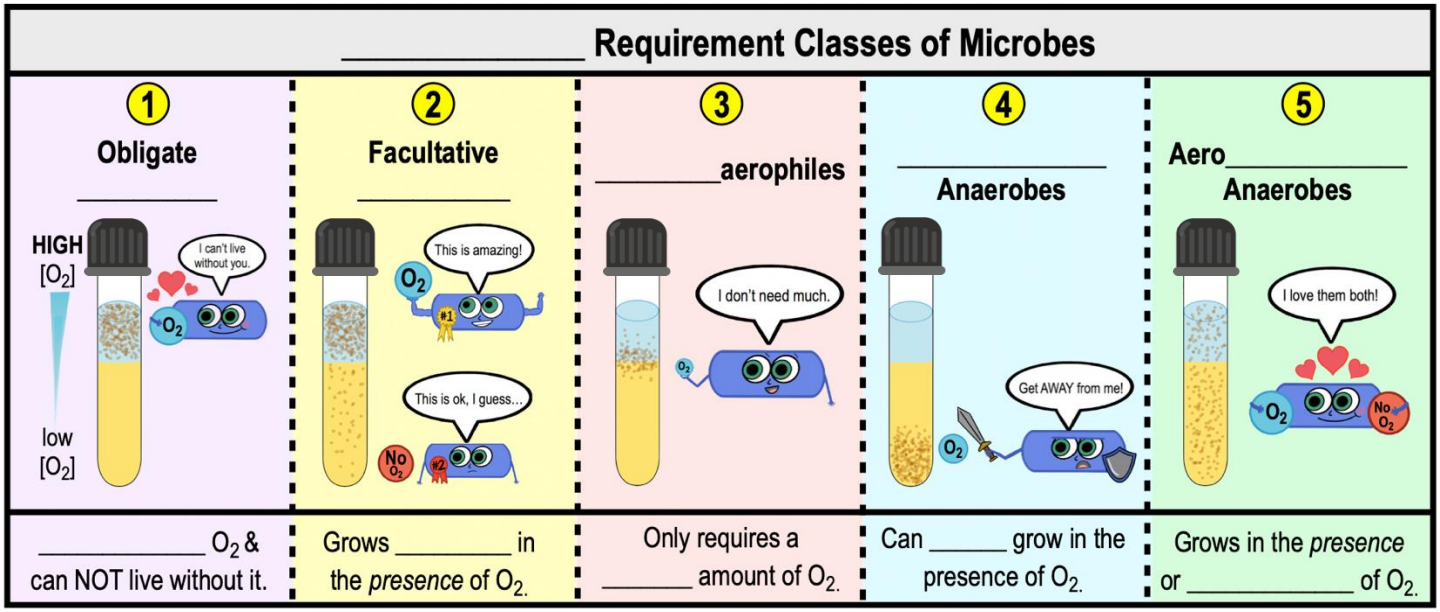
●**Anaerobes**: microbes that grow where *little to no* O_2 is present, called an _____ *environment.*

EXAMPLE: Aerobes vs. Anaerobes.



Oxygen Requirement Classes of Microbes

●Microbes are classified into _____ groups based on their requirement for O_2.



TOPIC: PROKARYOTIC METABOLISM

PRACTICE: Organisms that require oxygen for metabolism are referred to as:

a) Facultative aerobes.

b) Obligate aerobes.

c) Facultative anaerobes.

d) Microaerophiles.

PRACTICE: Organisms that are indifferent to the presence of oxygen are:

a) Aerotolerant anaerobes.

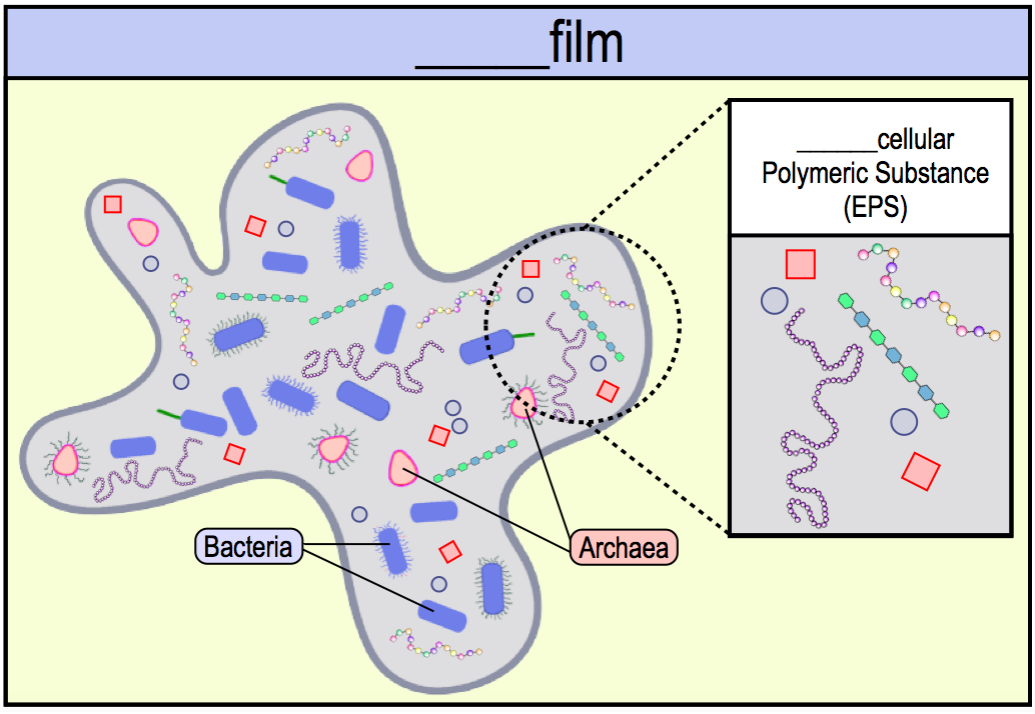
b) Facultative anaerobes.

c) Obligate aerobes.

d) Microaerophiles.

Introduction to Biofilms

- _____: group of cells encased in a *slime-like* polysaccharide layer _____ to a surface.
  - □ Can be found on virtually _____ surface & can cause serious illness.
  - □ Encased by a polysaccharide matrix of *Extracellular Polymeric Substances (_____).*
- **Extracellular Polymeric Substances (EPS):** sticky matrix of _____ secreted by cells supporting biofilm structure.
  - □ Polymer types include *polysaccharides, proteins, glycoproteins, glycolipids, & lipids.*



TOPIC: PROKARYOTIC METABOLISM

PRACTICE: _____ are complex communities of various types of microbes that adhere to surfaces.

a) Biofilms.
b) Aggregates.
c) Colonies.
d) Cell morphologies.

PRACTICE: Biofilms can contain which of the following:

a) Bacterial cells.
b) Proteins.
c) Archaeal cells.
d) Polysaccharides.
e) All of the choices are correct.