CONCEPT: OXYGEN REQUIREMENTS FOR MICROBIAL GROWTH

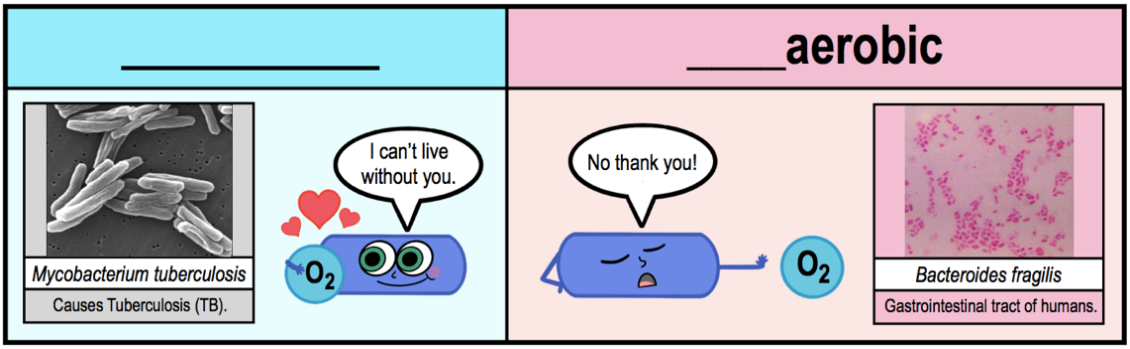
●All organisms that utilize chemical energy require a final electron _____ for the Electron Transport Chain.

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

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

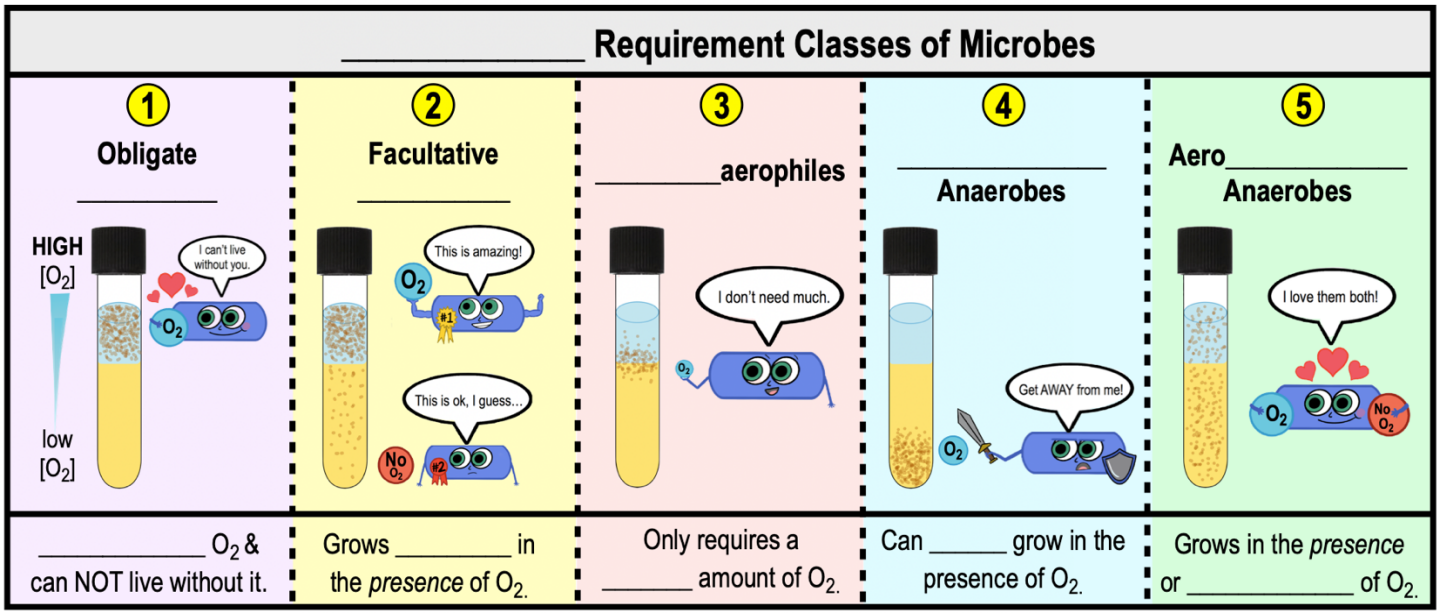
●**Anaerobes**: microbes that grow where *little to no* O_2 is present, called an _____ *environment.*

EXAMPLE: Aerobes vs. Anaerobes.



Oxygen Requirement Classes of Microbes

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



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

a) Facultative aerobes.

b) Obligate aerobes.

c) Facultative anaerobes.

d) Microaerophiles.

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

a) Aerotolerant anaerobes.
b) Facultative anaerobes.
c) Obligate aerobes.
d) Microaerophiles.

Reactive Oxygen Species

●Aerobes that require O_2 generate *toxic* derivatives of oxygen called _____ *oxygen species.*

□ **Reactive oxygen species (_____):** highly reactive *oxygen* molecules that cause damage to the cell.

□ Examples of **ROS** include *super*_____ (O_2^-) & *hydrogen* _____*oxide* (H_2O_2).

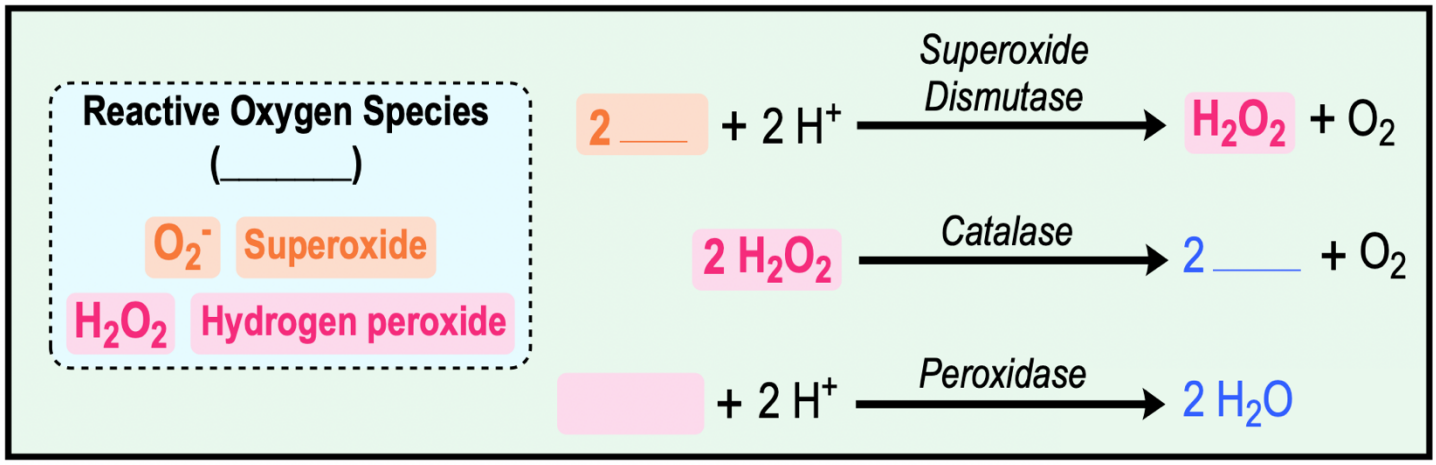
●All *aerobes* produce enzymes that *protect* the cell from *ROS*:

□ **Superoxide** _____ **(SOD):** converts 2 *superoxide* molecules into O_2 & *Hydrogen peroxide.*

□ _____**:** converts 2 *hydrogen peroxide* molecules into O_2 & 2 molecules of water.

□ **Peroxidase:** converts *hydrogen peroxide* into _____.

EXAMPLE: Enzymes of aerobic organisms protect the cell by converting reactive oxygen species to O_2 and water.



PRACTICE: The enzyme(s) that deal with toxic oxygen-containing molecules is/are

a) Glycolase.
b) Catalase.
c) Superoxide dismutase.
d) Cytochrome oxidase.
e) B & C.
f) B & D.