

### Activity: Aerobic vs. Anaerobic Respiration

#### Background:

Oxygen is very important in releasing as much energy as is possible from food (organic compounds). Most organisms are aerobic and cannot live without a constant supply of oxygen. Some organisms, however, are anaerobic and can get energy from food without oxygen being present. There are a few kinds of microorganisms that are aerobic if oxygen is available, but become anaerobic if it is not available. *Aerobacter aerogenes* is the scientific name of a bacterium, capable of causing disease.

In this investigation you will be given data from an experiment involving *Aerobacter aerogenes*. The bacteria were allowed to grow in test tubes containing distilled water to which only a few salts and various concentrations of glucose (food) were added. The series A tubes were sealed so that no air (O<sub>2</sub>) was added. The series B tubes had a continuous stream of air (O<sub>2</sub>) through them.

#### Procedure:

1. Graph Table A and Table B on the same graph.

Vertical (Y) axis = Bacteria Population (millions/100 ml glucose)

Horizontal (X) axis = Glucose (mg/100 ml)

TABLE A: BACTERIA GROWN WITHOUT OXYGEN

Series A Tubes (sealed)	mg of glucose per 100 ml of water	Millions of bacteria per 100 ml of glucose solution
1A	18 mg	50 million
2A	36 mg	90 million
3A	54 mg	170 million
4A	72 mg	220 million
5A	162 mg	450 million
6A	288 mg	650 million
7A	360 mg	675 million
8A	432 mg	675 million
9A	540 mg	670 million

TABLE B: BACTERIA GROWN WITH OXYGEN

Series B Tubes (O <sub>2</sub> added)	mg of glucose per 100 ml of water	Millions of bacteria per 100 ml of glucose solution
1B	18 mg	200 million
2B	36 mg	500 million
3B	54 mg	800 million
4B	72 mg	1100 million
5B	162 mg	2100 million
6B	288 mg	Numbers omitted because they are too large.
7B	360 mg	
8B	432 mg	
9B	540 mg	