Catalase is an enzyme expressed in all aerobes. In aerobic respiration, oxygen is the final electron acceptor. Sometimes during respiration, reactive oxygen species are generated that can be toxic to the cell. Catalase is an antioxidant protein that neutralizes one type of reactive oxygen species, hydrogen peroxide, H2O­2. The reaction this enzyme catalyzes is as follows:

2H2O2 🡪 2H2O + O2 (gas)

Obligate aerobic bacteria and some facultative anaerobic bacteria produce catalase. To determine if a bacteria produces catalase, place a small amount of bacteria onto a slide and mix with hydrogen peroxide. Observe for the rapid production of oxygen bubbles.

*Staphylococcus* species are obligate aerobes that produces catalase (catalase positive). These bacteria have the ability to respire using oxygen as the terminal electron acceptor. Streptococcus species are facultative anaerobes that only ferment, and do not respire using oxygen as a terminal electron acceptor. These organisms are catalase negative.

In this exercise your instructor will demonstrate the catalase test using *Staphylococcus aureus* and *Streptococcus pyogenes*. Notice the difference between the production of oxygen bubbles in the two tests. On your own, you will perform the catalase test with *Staphylococcus aureus* following the procedure below. Please be sure to master this experiment as you will have to perform it on an unknown bacterial specimen in a few weeks.

Procedure:

1.    Transfer a small amount of bacterial colony to a surface of clean, dry glass slide using a loop or sterile wooden stick

2.    Place a drop of 3% H2O2 on to the slide and mix.

3.    A positive result is the rapid production of oxygen (within 5-10 sec.) as evidenced by bubbling.

4.    A negative result is no bubbles or only a few scattered bubbles.

5.    Dispose of your slide in the bleach water.