Respiration and Photosynthesis Lab

1) The over all reaction for photosynthesis:

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

carbon dioxide + water -> photosynthate** + oxygen

2) The overall reaction for cellular respiration is

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Glucose + Oxygen -> Carbon dioxide + Water

Your own respiration will provide CO_2 for photosynthesis in the lab experiment.

One way to measure photosynthesis is to look at the decrease in CO_2. In lab you will look at this decrease in CO_2 using an aquatic plant and a pH indicator dye (Bromothymol blue). CO_2 dissolves in water, and this leads to acidification of the water. The system works like this:

$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$

More CO_2 leads to production of more H^+, and the H^+ can be measured with a pH indicator dye, **bromothymol blue**. In the presence of **H^+**, bromothymol blue turns from **blue** (basic) to **green (acidic)**.

Figure A shows 3 tubes from the CO_2 uptake experiment. CO_2 was added to each tube at the start of the experiment (by blowing bubbles into the tube), causing the solution to become acidic and turn green. The tubes were then exposed to light for one hour. If the solution remain green after the treatment, this indicates that CO_2 is present. If the tubes turn blue, CO_2 has disappeared, indicating that photosynthesis has occurred.

1. Control : Bromothymol blue alone (no Elodea)

2. Bromothymol blue + 1 Elodea sprig

3. Bromothymol blue + 2 Elodea sprigs + aluminum foil