

Controls and Variables

READ EACH OF THE FOLLOWING DESCRIPTIONS OF EXPERIMENTS. IDENTIFY THE INDEPENDENT VARIABLE(S), DEPENDENT VARIABLE(S), CONTROL AND CONSTANTS. BRIEFLY DIAGRAM THE EXPERIMENT. TRY TO THINK OF WAYS THESE EXPERIMENTS COULD BE IMPROVED.

1. Anne read that there had been a sewage spill in one of the local creeks that runs into the local river that is used for recreation, electric power and drinking water. She also read that the factor which causes fish kills in the water seems to be a lowering of the dissolved oxygen. She also learned that the microorganisms in the sewage were using up the oxygen and if the weather remained cool the DO level would probably remain acceptable. She collected samples of water from the creek, took them back to the lab and put them into several containers of the same size into which she put the same amount of water. She varied the temperatures of each container from below room temperature to above room temperature but kept each at a constant temperature. Each day she performed a dissolved oxygen test on the samples and recorded her data. At the end of 5 days she was able to draw conclusions from her experiment.

2. John and his lab group were studying how abiotic influences affect organisms. They were told that they were to work with brine shrimp and to determine the pH at which they survived best. They worked with plastic tubing that could be closed off at each end. They began by putting 10 brine shrimp in the tubing in a solution of water. In one end they injected a small amount of a 1% solution of HCl. In the other end a 1% solution of KOH was injected. They observed the shrimp for 30 minutes, recorded their preferences at one-minute intervals and repeated the experiment three times.

3. Amy's lab assignment was to determine how members of a species are affected by intraspecific competition. (Competition by members within the same species). She used radish seeds and planted them in small pots. She put the same amount of dirt in each pot. In the first five pots she planted one seed. In the second five pots she planted 10 seeds and in the third five pots she planted 20 seeds. She placed them in a well lighted area and watered her plants whenever the soil surface was dry. At the end of three weeks she removed the plants from each pot including the roots and determined the biomass from each pot. From this she was able to determine the average biomass.

4. Bob's lab in AP Environmental was to measure the effect of toxic materials on brine shrimp and determine the LD 50 (Lethal dose 50%). His group was assigned to determine the LD 50 of copper sulfate (CuSO_4). They used two petri dishes per concentration. In two petri dishes they put a 10% solution of CuSO_4 . In the next a 1% solution, in the next 0.1%, in the next 0.01 % and in the last they used 0% copper sulfate. They put 10 brine shrimp in each petri dish and they examined them at the end of twenty-four and forty-eight hours. From this they were able to determine the approximate concentration at which 50% of the brine shrimp died within forty-eight hours.

5. Katherine wanted to determine which of several popular herbicides was most effective on weeds. She grew five flats of 100 grass seeds each for 5 days. She then took each of five herbicides and sprayed the same amount on each flat. Each flat received the same amount of water and sunlight. She observed the flats and the end of 12, 24, 36 and 48 hours and counted how many plants in each flat died within the various time periods.