

Module 1: Respiration

Grade 4



In this module, students investigate the question, “What variables affect the color of the solution?” in order to learn about when respiration and photosynthesis occur in both animals and aquatic plants. For their initial observation, students are shown an experiment in which they are given three bottles with bromothymol blue solution: one bottle with only the solution, one with an aquatic plant, and one with an aquatic snail. After 24 hours the solution with the snail turns yellow, the solution with the aquatic plant turns light blue, and the one with no additional contents stays blue. The students further learn

about what is causing the change in the color of the solution by planning and carrying out experiments in groups of ~5. The variables that students can explore include plant type, bottle size, and light amount. In addition, the class performs an experiment to explore changing animal type. At the end of the investigation groups give a poster presentation to the rest of the class, which allows the group to teach the class about the variable they investigated. On the final day of the module students learn that the presence of carbon dioxide is what is changing the solution from blue to yellow. Student learn that animals produce carbon dioxide regardless of the light amount due to respiration. While aquatic plants do undergo respiration regardless of the light amount they will only change the color of the solution if the aquatic plants are in the dark. This is because in the light aquatic plants also undergo photosynthesis which converts carbon dioxide into oxygen, therefore, more carbon dioxide is consumed than produced. In addition, students analyze data showing what is happening to the carbon dioxide levels in the atmosphere. The scientific practice this module focuses on is procedures, including identifying appropriate procedure steps from a given question and experimental set-up as well as identifying an experimenter’s question from a given procedure. In this module the Next Generation Science Standard performance expectation 4-LS1-1 is covered.