Exercise and CO_2 Production

Purpose: The test was to discover and gather data about how carbon dioxide content in breath is affected by exercise.

Hypothesis: Exercise increases the amount of CO_2 in human breath and, with exercise; the Bromothymal Blue will turn yellow quicker.

Background Information:

Prior to the experiment, a few key things are already known that played an important role in the experiment. One of these facts was that Bromothymal Blue is a known indicator for carbon dioxide content. It is also known that around 10 to15 drops of Bromothymal Blue is best for carbon dioxide indication in 10 ml of water, as well as the fact that it should be accompanied by a quick shake of the container in order to best 'see' the indication of carbon. In addition, respiration in humans has carbon dioxide as a waste product during the exhale part of the respiration process. Furthermore, exercise increases inhale and exhale rates during the respiration. The most hands on 'material' involved was distilled water, which is water that has been purified into the pure water element.

Materials:

-Test tube

-Bromothymal Blue

-Straws (a different straw per person)

-Distilled water

-Goggles

-Dropper

-Stop watch

Procedure: 1) Fetch materials. 2) Fill test tube with 10 milliliters of distilled water. 3) Grab stop watch in hand and place it in dominant hand in such a way that the display in which the numbers are facing you right side up with it cleared to where it only shows 0:00:00:00. 4) Get dropper and squeeze top pump while the bottom end is located in the container of Bromothymal blue and release pressure. KEEP DROPPER IN HAND SECURELY AND SAFELY IN SUCH A WAY THAT CONTAMINATION WILL NOT COME TO IT. 5) While dropper is still in hand, move it in a horizontal motion towards the test tube, place the open end inside the test tube and drop 10-15 drops inside test tube in such a way that the water will be mingled thoroughly. 6) Have assistant 1 stand still for thirty seconds. Then place straw in assistant's mouth securely in about half of an inch. 7) Fetch a cork with the dimensions of a diameter 2 millimeters wide and 3

millimeters high. It must have two holes in it half a millimeter wide all the way around. 8) Place straw end free of assistant's mouth through one hole until the straw end dips into the water. 9) Have assistant breathe gently into straw until water and Bromothymal blue mixture turn yellow. 10) Time it and put the data into data table. 11) Repeat entire procedure again, with the exception of having the assistant who stood still previously run until short of breath prior to breathing in to straw.

Data:

Test Number	Time Taken (seconds)	Time Difference	Observations	
1	15.93	None	Mixture is clearly yellow	
2	7	8.93	Transformed faster	
3	14	1.93	Mixture is green/yellow color	
4	50	34.7	Test subject two had a large time difference	
5	21	5.7	Middle time between Test subjects one and two	
6	20.69	4.93	Not large time difference between exercise and standing still	

Conclusion: The hypothesis is correct. The exercise increased carbon dioxide in our breath. There are a few improvements that could have been made. The plan was to test only twice, but our stopwatches didn't function when needed. It was also planned to only test one person before realization came that to conduct the test on several people would have better results, as to the wider range of data. Although it could be estimated that our hypothesis was correct, our results were not clear and produced many questions. For example, when test subject one mixture transformed color in 15.93 seconds, test subject's two transformed in 50 seconds.