Cellular Respiration

Process in our cells that converts oxygen and food into energy and waste products.

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

Glucose + Oxygen → Carbon dioxide + Water + Energy

From...



Food

+



Air

→



Exhalation

+

Into...



- Urine
- Sweat

+



- Growth
- Repair
- Movement

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Materials you need

- 9 oz. cup(s)
- Distilled water (150 mL per trial)
- Spoon
- Bromothymol blue solution (0.04%)
- Plastic wrap
- Rubber band
- Straw (2 per student)
- Straw valve (1 per student or group)
- Stopwatch



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Prepare the indicator solution – Step 1



Fill the 9 oz. cup two thirds full with deionized water

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Prepare the indicator solution - Step 2



+



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Add ½ spoon full of bromothymol blue solution (0.04%) to the water in the cup

The solution should turn blue-green

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Prepare the indicator solution – Step 3



+



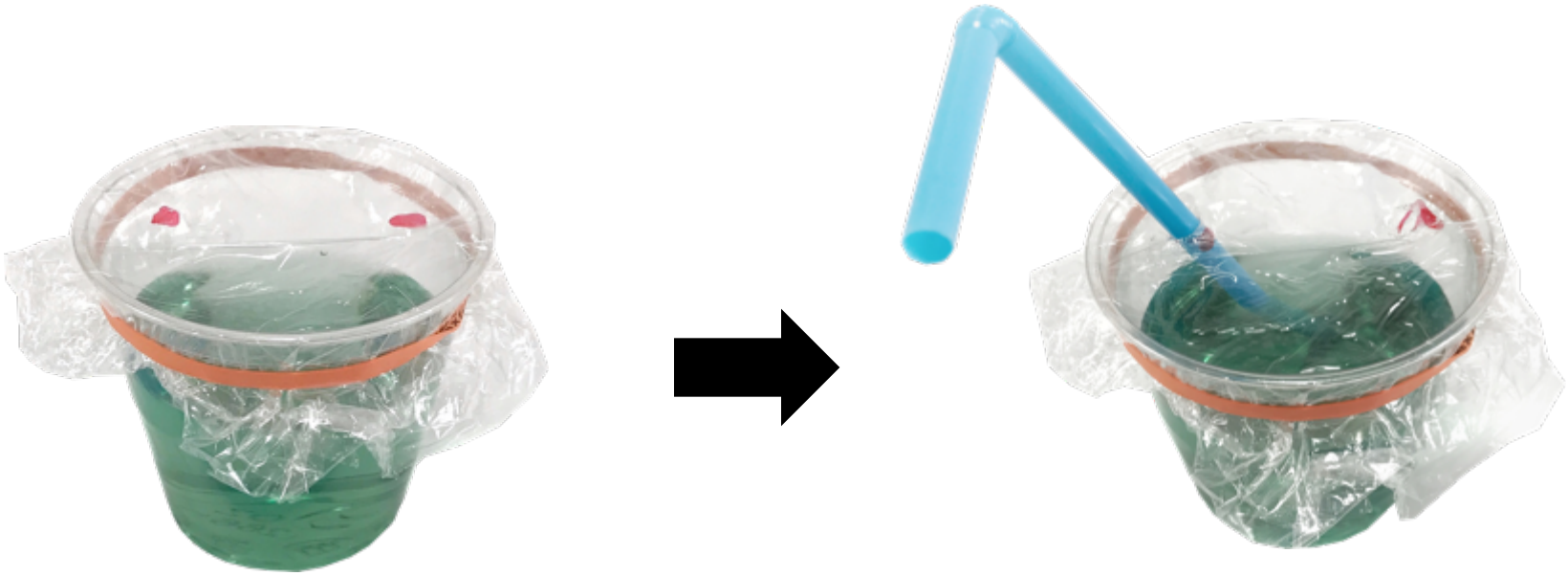
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- Cover the cup with plastic wrap
- Secure the wrap with a rubber band

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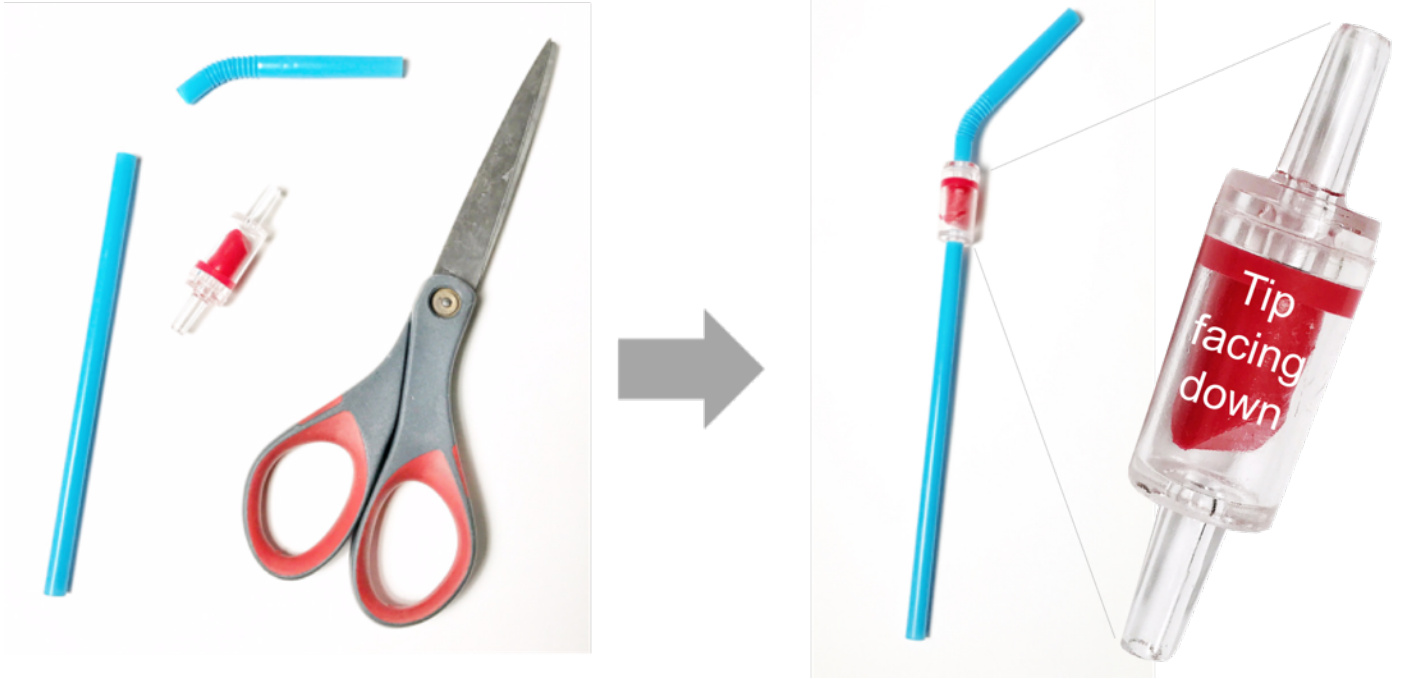
Prepare the indicator solution – Step 4



- Mark two spots on the plastic wrap closer to the rim of the cup
- Use the straw to poke a hole through each of the marks

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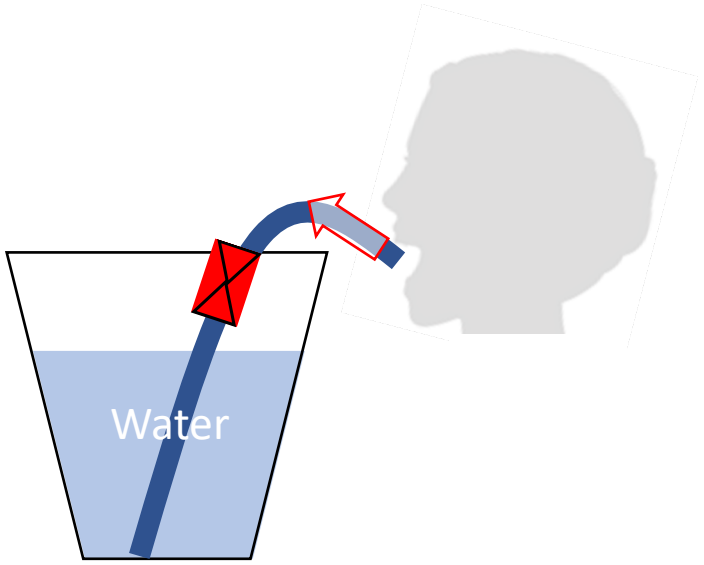
Prepare your straw



- Cut your plastic straw just below the bending part
- Insert the safety valve in between both parts of the straw (the red tip inside the valve should face down). The valve can be reused and shared
- The valve is a safety measure to prevent accidental suction of solution. You can only blow through it in one direction.

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Practice with just water

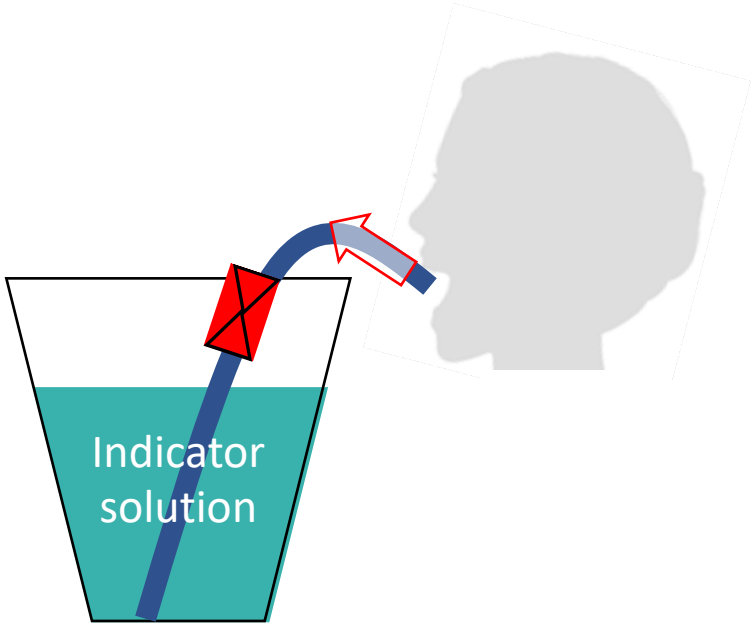




- Fill the cup with just water
- Take a deep breath and start exhaling into the solution
- Inhale through your nose when necessary

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Start the experiment

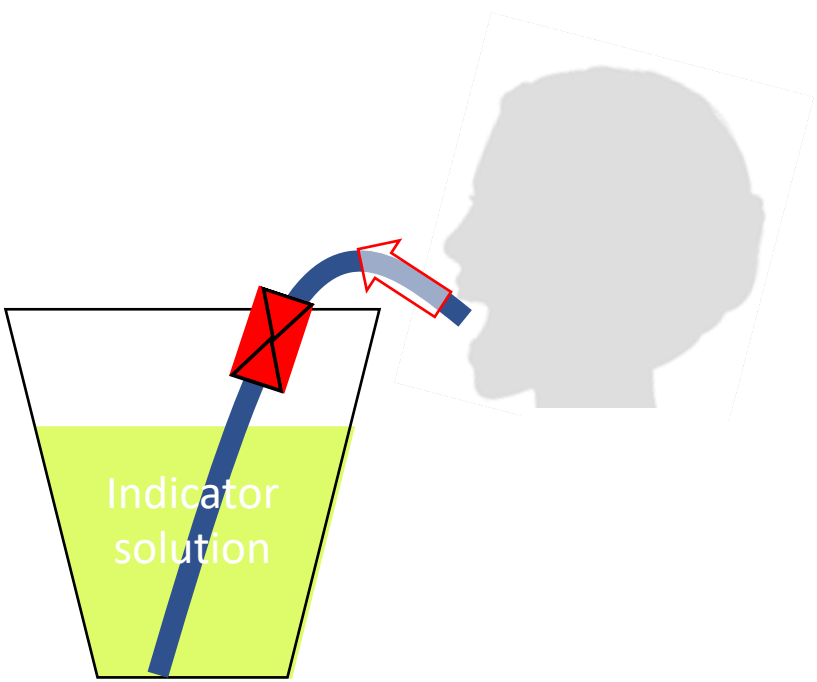




- Use the prepared indicator solution
- Start the stopwatch
- Take a deep breath and start exhaling into the solution
- Inhale through your nose when necessary

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Stop the experiment when color is done changing





- Continue exhaling into the solution until the color changes from blue-green to green-yellow
- Stop the stopwatch once the color has changed and does not change anymore

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Repeat experiment after exercising



- Prepare a fresh indicator solution and new straw
- Set up your experiment again
- Do jumping jacks for one minute
- Start the stopwatch
- Exhale into the indicator solution until it turns green-yellow
- Stop the stopwatch once the color has changed

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Record all times in your data table

Experimental condition	Time of color change [s]				
	Student 1	Student 2	Student 3	Student 4	Average
Before exercising					
After exercising					

Calculate the average time of color change for each experiment from all your trials

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Interpret your results

Experimental condition	Average time of color change [s]
Before exercising	
After exercising	

- Was your data reproducible?
- Did the experiment confirm your hypothesis?
- Can you explain your results?

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