

Pre-Experiment Discussion Assessment

Points	Criteria
4	<ul style="list-style-type: none">• Student is able to clearly brainstorm a need for biofuels.• Student is able to hypothesize roughly how biofuels are created and identify examples of different sources of biofuels.• Student can identify all the major inputs and outputs of a fermentation reaction.
3	<ul style="list-style-type: none">• Student brainstorms a need for biofuels.• Student can identify some sources of biofuels.• Student can identify all the major inputs and outputs of a fermentation reaction.
2	<ul style="list-style-type: none">• Student begins to brainstorm the need for biofuels.• Student can identify few sources of biofuels.• Student can identify few inputs or outputs of a fermentation reaction.
1	<ul style="list-style-type: none">• Student does not participate in pre-activity discussion.• Student can identify few or no sources of biofuels.• Student can identify 1 or no inputs or outputs of a fermentation reaction.

During the Experiment

Points	Criteria
4	<ul style="list-style-type: none">• Students clearly label their bottles.• Students have a control.• Measurements are precise.• Students follow the lab protocol.• Observations are clearly recorded and labeled.• Students can correctly explain why they are observing the amount of CO₂ collected in the balloon and use a chemical equation as part of

	their explanation.
3	<ul style="list-style-type: none"> • Students clearly label their bottles. • Students have a control. • In general, measurements are precise. • Students follow the lab protocol. • Most observations are clearly recorded and labeled. • Students can correctly explain why they are observing the amount of CO₂ collected in the balloon.
2	<ul style="list-style-type: none"> • Students label their bottles. • There is no control. • Measurements are not precise. • Students follow the lab protocol. • Observations are recorded and but not labeled. • Students have difficulty explaining why they are observing the amount of CO₂ collected in the balloon.
1	<ul style="list-style-type: none"> • Students do not clearly label their bottles. • There is no control. • Measurements are sporadic and are not precise. • Students rarely follow the lab protocol. • Observations are recorded and but not labeled. • Students cannot explain why they are observing the amount of CO₂ collected in the balloon.

Post-Experiment Assessment

Points	Criteria
4	<ul style="list-style-type: none"> • Students clearly present their design for a biofuels plant. • Presentation includes multiple types of communication (graphics, audio, etc.) • Design demonstrates outside research. • Design references data from the experiment.

	<ul style="list-style-type: none"> • Students have taken 4-5 factors into account (i.e. efficiency of ethanol production, impact on the environment, use as food source)
3	<ul style="list-style-type: none"> • Students present their design for a biofuels plant. • Presentation includes at least two types of communication (graphics, audio, etc.) • Design demonstrates some outside research. • Design references data from the experiment. • Students have taken 2-3 factors into account (i.e. efficiency of ethanol production, impact on the environment, use as food source)
2	<ul style="list-style-type: none"> • Students present their design for a biofuels plant. • Presentation is only verbal and includes no audio, graphics, etc. • Design demonstrates little outside research. • Design references some data from the experiment. • Students have taken 1-2 factors into account (i.e. efficiency of ethanol production, impact on the environment, use as food source)
1	<ul style="list-style-type: none"> • Students present their design for a biofuels plant. • Presentation is only verbal and includes no audio, graphics, etc. • Design demonstrates no outside research. • Design references little or no data from the experiment. • Students have taken only 1 factor into account (i.e. efficiency of ethanol production, impact on the environment, use as food source)