Name: _____ Class: _____ Date: _____

3.5 Grading the Explanations Tool: What Happens to Soda Water When It Fizzes?

*This tool has "grading" in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below.*

Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers.

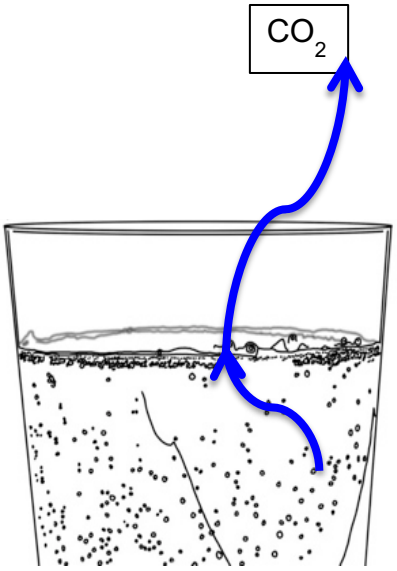
Carbon TIME Discourse Routine around the Explanations Tool:

1. *Introduction: Students review their Evidence-Based Arguments Tools. Establish the purpose for completing the tool as developing a complete explanation for the unit phenomenon.*
2. *Private thinking and writing: Students complete the Explanations Tool individually.*
3. *Partner or small group work: Students share and compare ideas in pairs/small groups, with the goal of improving their explanations.*
4. *Sharing ideas in whole-class discussion: Class discussions serve to elicit, clarify, and compare explanations from individual students and/or student groups.*
5. *Consensus-seeking discussion accompanied by public writing: Class discussions focus on coming to consensus around a correct, coherent explanation that answers (here, just two of) the Three Questions while addressing the 4 steps. We recommend that students revise their explanations in a different colored pen/pencil.*

These are difficult questions, so even the most successful students will miss a few of them. You should decide how to translate the number of points that students earn into grades for report cards. Here are some ideas about levels of points that represent excellent, good, and adequate performance.

Total possible: 11 points	***For higher demand high school courses***	***For middle school or lower demand high school courses***
Excellent	*9 points*	*8 points*
Good	*8 points*	*6 points*
Acceptable	*6 points*	*5 points*

The Matter Movement Question

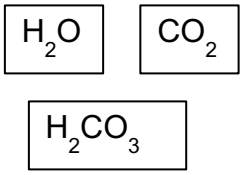


Draw and label arrows that show molecules moving through and out the soda water when it fizzes.

- Show and label molecules with carbon atoms
  - In the soda water before it starts to fizz.
  - Moving through the soda water in the bubbles
  - Leaving the soda water
- Label other, relevant molecules.

Grading arrows

- *1 point for arrow labeled "H_2CO_3" or "carbonic acid" in the soda water*
- *1 point for arrow labeled "CO_2" or "carbon dioxide" moving through the soda water in bubbles*



- *1 point for arrow labeled "H_2O" or "water" in the soda water*
- *1 point for arrow labeled "CO_2" or "carbon dioxide" leaving the soda water*

4 points total

The Matter Change Question

Write the chemical equation for the change that happens when soda water fizzes:

$H_2CO_3 \rightarrow CO_2 + H_20$

1 point for correct answer

Chemical Change

What molecules are carbon atoms in before the chemical change?

Carbonic Acid or H_2CO_3

1 point for correct answer

What molecules are carbon atoms in after the chemical change?

Carbon dioxide or CO_2

1 point for correct answer

What other molecules are produced?

Water or H_2O

1 point for correct answer

Explain in words: What happens to soda water when it fizzes? (Answer on the back).

Level 4 responses should include answers to three of the four numbered questions (not the Energy Change Question) on the Three Questions poster and handout:

1. ***Matter movement: Carbonic acid is in the soda water before it starts to fizz.***
2. ***Matter change: Carbonic acid separates into carbon dioxide and water.***
3. ***Matter movement: The carbon dioxide in bubbles moves through and leaves the soda water. The water molecules remain in the soda water.***

1 point for each correct answer

3 points total

Use this Explanations Tool to help guide your written explanation, being sure to answer the Three Questions.

Remember: **Atoms last forever** (so you can arrange atoms into new molecules but can't add or subtract atoms).