Calorimetry CWA

The Calorimetry CWA can be used as the fire lesson assessment. The overarching question is: Was the combustion of the potato chip an endothermic or exothermic reaction? The following handouts are included:

- Prompt with no scaffolding
- Prompt with two scaffolding options
- Sample student response
- Content specific rubric

Students should be provided one of the three prompts. Three options are provided so that you can select the one with the appropriate amount of support for your students. These handouts include the prompt, data, and a response section. In addition to providing a specific CERR rubric that corresponds to this topic, a sample student response is included.

Calorimetry: Combustion of Potato Chip

Based on your data (observations and measurements), was the combustion of the potato chip an endothermic or exothermic reaction? Explain your reasoning.

Calorimetry: Combustion of Potato Chip

Question	Based on your data (observations and measurements), was the combustion of the potato chip an endothermic or exothermic reaction? Explain your reasoning.

Data Collection	***Observations***	
	Measurements	
	Mass of Empty Beaker	
	Mass of Beaker and 50 ml of Water	
	Mass of Potato Chip	

Data Analysis	***Mass of Water***	
	Show work:	Final Value:
	Change in Temperature	
	Show work:	Final Value:
	Heat Absorbed by the Water	
	Show work:	Final Value:
	Heat Released by the Potato Chip	
	Show work:	Final Value:

Scaffold Option 1

Use this chart for your outline / pre-writing (describing your claim, evidence, and reasoning) and write your essay on the back of this sheet

Claim: Write a statement that answers the question.	
Evidence: Provide scientific data that supports the claim. It needs to be appropriate and sufficient. Evidence should be from data (observation and measurements).	
Reasoning: Provide an explanation of what your evidence means, how supports the claim using scientific principles. This includes any analysis of your data. Each piece of evidence may have a different justification for why it supports the claim.	

Scaffold Option 2

Use this chart for your outline / pre-writing (describing your claim, evidence, and reasoning) and write your essay on the back of this sheet.

Claim:
Write a statement that answers the question.

Evidence 1:
Provide scientific data (observations or measurements) that supports the claim. It needs to be appropriate and sufficient.

Evidence 2:
Provide scientific data (observations or measurements) that supports the claim. It needs to be appropriate and sufficient.

Reasoning 1:
Provide an explanation of what your evidence means, how it supports the claim using scientific principles. This includes any analysis of your data.

Reasoning 2:
Provide an explanation of what your evidence means, how it supports the claim using scientific principles. This includes any analysis of your data.
.

Calorimetry: Rubric

	Exemplary	Proficient	Needs Improvement	Critical Area
Claim:	□ Correct causal claim with 2 variables: The combustion of the potato chip is exothermic because it releases energy in the form of light AND heat.	□ Correct causal claim with 1 variable: The combustion of the potato chip is exothermic because it releases energy in the form of light OR heat.	□ Correct category claim: The combustion of the potato chip is exothermic.	□ Does not construct a claim, OR □ Constructs an inaccurate claim
Evidence:	□ Provides specific and appropriate evidence that supports claim for both light AND heat.	□ Provides specific and appropriate evidence that supports claim for light OR heat.		□ Does not provide evidence, OR □ Only provides inappropriate evidence (evidence that does not support claim)
	Exemplar Evidence: □ Light: Identifies that he/she observes light being produced during the reaction □ Heat: Identifies increase in water temperature +ΔT			
Reasoning:	□ Correctly and clearly connects both the light AND heat evidence to the claim.	□ Correctly and clearly connects both the light OR heat evidence to the claim.	□ Logic unclear: Correctly connects the evidence to the claim, but leaves out important links in the logic, OR □ Inappropriate science concepts: o Applies inappropriate scientific concepts, OR o Inappropriately applies appropriate scientific concepts	□ Does not provide reasoning, OR □ Restates the evidence without connecting it to the claim
	Exemplar Reasoning: □ Light: o Identifies that energy is released in the form of light o Defines exothermic reactions as releasing light energy □ Heat o Identifies that energy is released in the form of heat o Defines exothermic reactions as releasing light energy o Identifies that heat is transferred from the potato chip to the water creating an increase in water temperature +ΔT			
Writing:	□ Writing contains no grammatical or spelling errors, AND □ Writing is clear, concise, and persuasive	□ Writing contains very few grammatical or spelling errors, OR □ Writing is clear, mostly concise, and well developed		□ Writing is difficult to follow, with many grammatical errors and no clear structure, OR □ Writing is either too wordy or too incomplete

Calorimetry: CER Sample Response

The combustion of the potato chip was an exothermic reaction in which energy was released in the form of light and heat [Claim].

First, I observed light being produced during the reaction [Evidence 1]. Since, light is a form of energy, light was released from the reaction, and exothermic reactions release energy, this is evidence that the combustion of the potato chip was exothermic [Reasoning 1].

Second, heat was released from the combustion reaction. I know this because the 150-mL of water, which rested directly above the combustion reaction, increased from 21^0C to 85^0C [Evidence 2]. Because the temperature increased, the water absorbed energy. Using the equation $Q=mC\Delta T$, where m is the mass of water, C is the specific heat of water, and ΔT is the change in temperature of the water, the heat absorbed by the water (Q) was 9,600 calories or 9.6 kilocalories. The same amount of heat Energy that was absorbed by the water was also released from the potato chip. Consequently, 9.6 kilocalories of heat were released during the combustion of the potato chip. Because heat is a form of energy, energy was released from the reaction, and exothermic reactions release energy, the combustion of the potato chip was exothermic [Reasoning 2].