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Reaction Lab: Does Burning Destroy Matter?

Grades 6-8 · 45 minutes

Physical science · Chemistry



Slides, rubric and answer key **Print and go** **No student accounts**

Chromebook friendly

What's included

- A one-page overview: objectives, essential question, vocabulary, standards and assessment
- A 45-minute lesson sequence: warm-up, direct instruction, guided practice, independent practice, closure
- Slides for the board: a PowerPoint file that also opens in Google Slides
- A student worksheet with a QR code and a before-and-after table
- A 3-question exit ticket, two to a page, with an answer key
- A rubric: 3 criteria, 4 levels, scored out of 12
- Differentiation for English learners, students with IEPs or 504 plans, and students who need more support or more challenge
- Cross-curricular extensions, and notes for teaching it in grades 4 and 5 and in high school chemistry
- Standards: NGSS

Reaction Lab: Does Burning Destroy Matter?

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Steel wool on a scale gets heavier when it burns, and a candle gets lighter. Students run both on the app's lab bench with a magnifier over them, find where the oxygen comes from and where the carbon dioxide and water go, then write back to a classmate whose lab notes say the scale must be broken.

At a glance

ESSENTIAL QUESTION

When something burns, is matter destroyed?

OBJECTIVES

Students will be able to:

- explain why burning steel wool gains mass: oxygen from the air joins the iron
- explain why a burning candle loses mass: its products leave as gases
- use a particle model to show the same atoms before and after burning
- write a claim with evidence and reasoning about a burning experiment

VOCABULARY

Combustion, Oxygen, Iron oxide, Water vapor, Evidence

STANDARDS

MS-PS1-5, MS-PS1-2

TIME AND MATERIALS

45 minutes, grades 6-8.

- One computer or Chromebook per student
- A projector
- The worksheet and exit ticket, one copy each per student
- The rubric, one copy per student if you grade the work

PREP

Make copies of the worksheet and exit ticket. Before class, open mytekdev.com/try/reactionlab?lesson=does-burning-destroy-matter&ref=tpt-reactionlab-4 once on a student computer: it opens on the steel wool lab bench. Light it once, then open Puzzles and read Fix the claim, about five minutes. Do not burn steel wool in class without your school's safety rules for it.

ASSESSMENT

- Formative: the questions under What to look for, asked while students work, and the exit ticket (answer key included).
- Summative: the worksheet, scored with the rubric.

TECHNOLOGY AND PRIVACY

Runs in any browser, Chromebooks included, with nothing to install. Students need no account and no email: the link works signed out, and nothing they do is stored on our server unless they choose to save.

Lesson sequence

MINUTES	STAGE	WHAT YOU DO	WHAT STUDENTS DO
0 to 5	**Warm-up** Hook	Show the title, essential question and Today I can slides (about 1 minute). Then the candle warm-up. Take a vote.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app with the starter open on steel wool. Ask the class to predict: heavier, lighter or the same? Light it. Show Steel wool gets heavier, then Two fires, one rule. > **It's working when:** Most students predict lighter. That prediction is the misconception the lesson is built against; write the vote on the board.	Predict, watch, and fill in the vocabulary on the worksheet.
12 to 22	**Guided practice (We do)** Steel wool together	Students open the link or scan the QR code. A short guide walks them through: Light it, the magnifier, then Puzzles. Check that every table has 85.0 and 85.6. > **Watch for:** Students who say the scale is broken or the fire added weight. Ask them to look at the magnifier: what joins the iron?	Run steel wool, use the magnifier, and fill in the first row of the table.
22 to 38	**Independent practice (You do)** The candle and the claim	Students open Burning methane, press Lab bench, and light the candle; then they write back to the classmate in Fix the claim. Walk the room with the What to look for questions. > **If they ask:** "The candle got lighter. Where did that mass go?" The candle	Fill in the candle row, then write the reply to Fix the claim as a claim, evidence and reasoning.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide and go back to the warm-up vote. Two students read their reply to the classmate. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/reactionlab?lesson=does-burning-destroy-matter&ref=tpt-reactionlab-4. A short guide opens over the app on the steel wool lab bench: a pad of steel wool on a dish on a kitchen scale reading 85.0 g, with a magnifier beside it.

1. **Steel wool.** `Light it`. The strands glow and turn from gray to black, and the reading rises to 85.6 g. In the magnifier, oxygen molecules come apart and their atoms join the iron.
2. **The candle.** Burning methane on the shelf, then `Lab bench`. The candle burns and the reading falls from 120.0 g to 119.4 g. The magnifier shows methane, the small cousin of wax, burning in the open: carbon dioxide

and water vapor leave.

3. **Fix the claim.** `Puzzles`, then `Fix the claim`. A classmate wrote that the scale must be broken. The answer box saves with the project.

> The steel wool goes against what nearly every student expects. Ask for predictions first, and keep them on the board.

Background for the teacher

Burning is a reaction with oxygen from the air. When iron burns, the oxygen joins it to make iron oxide, a solid, so the solid on the scale weighs more: mostly black Fe_3O_4, with some red Fe_2O_3. In a classroom only the outside of a pad burns, so the real gain is small, a few tenths of a gram for a pad of a few grams.

When a candle burns, the wax joins oxygen and leaves as carbon dioxide and water vapor, both gases that go into the room, so the candle gets lighter. In a real class that takes several minutes; the app speeds it up. In both cases no atom is made or destroyed: what changes is what stays on the scale. Light and heat are given off, and they have no mass any scale could weigh.

Research on middle school students finds that about half think burning iron loses mass, and some say a candle's light itself has mass. Both are what this lesson is aimed at.

What to look for

Ask these while students work. A student who has understood the lesson can answer them without help:

- Where did the extra 0.6 g on the steel wool come from?
- Where did the candle's lost mass go?
- Does the light from the flame weigh anything?
- Is the scale broken? How do you know?
- Would the candle lose mass if it burned in a sealed jar on the scale?

> The last question is the real test: in a sealed jar the gases stay, so the mass would hold.

Cross-curricular extensions

- Math: the steel wool gained 0.6 g. If a pad of 3 g gains 20 percent, what would it weigh after?
- Earth science: rust is slow burning. Find out why a rusty nail weighs more than a new one.
- English: turn the reply to the classmate into a short lab report: claim, evidence, reasoning.
- History: read about phlogiston, the old idea that burning things lose a substance, and why weighing metals as they burned overturned it.

Vocabulary

Combustion	Burning: a reaction with oxygen that gives off heat and light.
Oxygen	O_2, the gas from the air that joins in when something burns.
Iron oxide	What iron becomes when oxygen joins it: rust, or the black crust on burned steel wool.
Water vapor	Water as a gas. A flame makes it, and it leaves into the air.
Evidence	Something you observed or measured that supports a claim.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the atoms on the board as you say each word: the letters on the balls carry the meaning.
- Pair each learner with a partner for steel wool; the table is numbers and arrows.
- Accept the reply to the classmate as a labeled drawing.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students, one reading the scale and one moving the magnifier.
- Zoom the browser to 150%.
- Allow steel wool alone where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter for the reply: "The scale is not broken. The steel wool got heavier because ___."
- A check-in after steel wool: every table has both readings before the candle.
- Write the reply together on the board, then students copy and finish it.

STUDENTS READY FOR MORE

- Run Burning magnesium in the particle view and say whether it gains or loses mass in the open, and why.
- In the particle view, burn methane with the lid on and with it off, and explain the difference with the candle.
- Find out why real rust weighs more than the iron it came from.

Adapting for other grades

Younger students: In grades 4 and 5, do steel wool together and stop at the magnifier; drop the third rubric row; total 8, and 6 meets the objectives.

Older students: In high school chemistry, pick high school, balance $3\ Fe + 2\ O_2 \rightarrow Fe_3O_4$, and work out how much oxygen 5 g of iron could take up if it all burned.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/reactionlab?lesson=does-burning-destroy-matter

Essential question: When something burns, is matter destroyed?

Warm-up: A candle burns for an hour and gets shorter. Was some of the candle destroyed?

_____

1. **Vocabulary.** Combustion, oxygen, iron oxide, water vapor, evidence: write each in your own words.

2. **The before-and-after table.** Steel wool: before _____ g, after _____ g, heavier or lighter _____, why _____. Candle: before _____ g, after _____ g, heavier or lighter _____, why _____.

3. **Fix the claim.** My reply to the classmate, with a claim, the readings as evidence, and my reasoning:

1. Steel wool got heavier and the candle got lighter. Explain both with atoms.

2. Would a candle burning in a sealed jar on a scale get lighter? Why?

Reaction Lab: Does Burning Destroy Matter?

Exit ticket

Name: _____

1. Steel wool burns on a scale, open to the air. The reading after is: (A) lower (B) the same (C) higher

2. A candle burns and gets lighter because: (A) its atoms were destroyed (B) its products left as gases (C) the light took the mass

3. A classmate says burning destroys matter. Write one sentence back, with evidence from today.

Reaction Lab: Does Burning Destroy Matter?

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Answer key: exit ticket

QUESTION	ANSWER	WHY
1	C	Oxygen from the air joins the iron to make iron oxide, which stays on the scale.
2	B	Carbon dioxide and water vapor leave into the room. Light has no mass any scale could weigh.
3	Open answer	A full answer names one reading and the atoms: for example, the steel wool got heavier because oxygen joined it, so nothing was destroyed.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
The data	Both readings for steel wool and the candle recorded, with the change and its direction.	Both readings recorded for both.	One reaction recorded.	No data recorded.
The particles	Explains the gain as oxygen joining the iron and the loss as gases leaving, with the magnifier as evidence.	Explains one of the two with particles.	Describes what was seen without particles.	Says matter was made or destroyed.
The reply	A claim, the readings as evidence, and reasoning with atoms, written to the classmate.	A claim with evidence.	A claim with no evidence.	No reply.

Total: ____ / 12. A score of 9 or more meets the objectives.

Standards

The lesson is built for MS-PS1-5, with the change in the steel wool as evidence of a new substance for MS-PS1-2.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
NGSS	**MS-PS1-5**	6-8	Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	Students use the model to show the atoms stay the same in burning and explain each change of mass by what joined or left.
NGSS	**MS-PS1-2**	6-8	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	The steel wool changes color and mass, data that iron oxide has formed.

Checked November 2026 against: NGSS MS-PS1-5, Matter and its Interactions, NGSS MS-PS1-2, Matter and its Interactions.

Optional: save student work in a free class

The whole lesson runs at the link on the worksheet, with no accounts and no sign-up.

To keep students' work, and see it all in one place, make a free class. It takes about ten minutes, once, and covers every lesson in this series: mytekdev.com/tools/class-setup

Students in a class open mytekdev.com/tools/reaction-lab/lessons/does-burning-destroy-matter/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time.

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