

Worksheet answers

1. What is needed to make paper burn? Why?

Heat energy and oxygen. Energy is needed to break the bonds between atoms in the paper so they can react.

2. What was the mass of the candle:

a) before it was burnt?

b) after it was burnt?

c) Are the two masses the same or different? Why is this?

The mass of the candle decreases when it is burnt. This is because some of the wax has reacted to form gas.

3. Is burning a candle a physical or chemical change? How can you tell?

Both physical and chemical changes occur. Melting wax is a physical change: it is still wax but changes state of matter. Burning wax is a chemical change because wax is changed into new substances.

4. What was the mass of the whole set up (candle and jar):

a) as soon as you put the jar over the candle?

b) when the candle went out?

c) Are the two masses the same or different? Why is this?

The mass was the same before and after the reaction. This is because gases produced by burning were trapped inside the jar. The same atoms are present before and after the reaction, but they are bonded differently to make different substances.

5. Why did the candle go out?

The candle needs oxygen to burn. After a while all of the oxygen in the air in the jar was used up.

6. Did you notice any moisture on the inside surfaces of the jar? What could this liquid be?

There were droplets of water inside the jar.

7. Suggest where this liquid came from.

Water is produced by the chemical reaction when a candle burns.

8. What happened to the limewater?

It went cloudy.

9. What gas must have been produced? Where did it come from?

This shows that carbon dioxide gas was produced. It was produced from the chemical reaction when the candle burnt.

10. Why is a wick needed to burn wax?

Once wax is melted, it travels up the wick and then vapourises (turns into gas). It needs to do this before it can combust (react with oxygen).

11. When the wick is lit, does the wax burn or just the wick? How can you tell?

Both wax and wick burnt. You can see that there is less wax present after the candle has burnt, and the wick is shorter.

12. Describe appearance of the stick, after it has been burnt.

It is smaller and black. It might crumble when touched.

13. What has been produced?

The black solid is carbon.

14. What happened to the mass of the stick?

The stick decreased in mass.

15. The law of conservation of mass states that no mass should be gained or lost during a chemical reaction. How can you explain the change in stick mass when it was burnt?

The stick has lost mass but gases were produced. If the mass of the burnt stick and the gases were added together it should equal the mass of the stick at the start of the experiment.

16. If a stick is burnt in a closed container, would the whole system (container and contents) change mass? Explain why or why not.

The whole system should not change mass. The mass of the stick at the start should equal the mass of all of the products (burnt stick plus gas) added together.

17. Does burning wood require or give off energy? Or both? Explain.

Energy is needed to make the stick start to burn because energy is needed to pull atoms apart. Overall energy is given off by the reaction because it produces large amounts of heat and light. This energy is produced when atoms join back together.

18. What things are required when compounds that contain carbon burn? (These are reactants.)

Reactants are the carbon-containing material being burnt and oxygen.

19. What things are produced when compounds that contain carbon burn? (These are products.)

Products are water and carbon dioxide. Sometimes other products (such as carbon and carbon monoxide) are produced, depending how much oxygen is available.

20. Record your observations.

The steel wool glowed brightly when touched with the battery.

21. Describe what happened to steel wool in the reaction. What evidence do you have that a new substance has been formed?

The steel wool turned black. It is no longer steel, so a new substance has been formed.

22. What happened when the steel wool was lit? How did this compare with when the steel wool was lit in unlimited oxygen? Explain why.

It didn't light. Oxygen is required for this reaction to occur and the burning candle had used up all available oxygen.

23. Describe the appearance of steel wool after it has been burnt.

It is black.

24. What has been produced?

An iron oxide coating has formed on the steel wool.

25. What happened to the mass of the steel wool?

It increased in mass when burnt.

26. How can you explain this change in mass, thinking about the law of conservation of mass?

Oxygen from the air reacted with the steel wool. If masses of oxygen and unburnt steel wool were added together they would equal the mass of the steel wool after burning.

27. How do the results of this experiment compare with when you measured the change in mass of the stick? Explain why.

The stick lost mass but the steel wool gained mass. This is because the stick reacted to form gas but the steel wool reacted with a gas to form a solid.

28. Write your observations and a word equation to show what happens in each reaction:

a. burning calcium

*It burnt with a red flame and a white substance was formed.
calcium + oxygen → calcium oxide*

b. burning copper

*It burnt with a green flame and a black substance was formed.
copper + oxygen → copper oxide*

c. burning magnesium

*It burnt with a bright white flame and a white substance was formed.
magnesium + oxygen → magnesium oxide*

d. burning hydrogen

*The hydrogen balloon popped with a loud bang; a large flame was produced.
hydrogen + oxygen → water*

29. What things are used up in a combustion reaction involving compounds that don't contain carbon? (These are the reactants.)

Reactants are the non-carbon-containing compound and oxygen.

30. What things are created in a combustion reaction involving compounds that don't contain carbon? (These are the products.)

Products are an oxide form of the non-carbon-containing compounds.

31. What happened to the limewater? What does this tell you?

It went a milky colour. This shows that we breathe out carbon dioxide.

32. What happened to the mirror? What does this tell you?

It fogged up. This moisture shows that we breathe out water vapour.