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LAB 22
OBSERVATION

THE OXIDATION OF COPPER

STUDENT BOOK	Chapter 2, page 56
TOOLBOX	Pages 27, 32, 40–41

Goal

Recognize and observe oxidation.

Observation criteria

1. What is oxidation?

_____

_____

_____

2. Complete the following transformation: 2 ____ + _____ → 2 CuO.

_____

3. Complete the following table.

Substance (chemical formula)	**Characteristic properties**		
	Colour	Electrical conductivity	Solubility
Copper (Cu)			
Copper oxide (CuO)			

4. What are observation indicators of the oxidation of copper?

_____

_____

Materials

Part I

- porcelain dish
- balance (accurate to 0.01 g)
- spatula
- container of copper powder
- electrical conductivity detector
- hot plate
- crucible tongs
- 30-cm glass stirring rod
- stopwatch *or* watch (optional)
- ceramic plate

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Part II

- test tube (25 mm × 150 mm) and one-hole stopper (No. 4)
- test-tube rack
- balance (accurate to 0.01 g)
- porcelain dish and contents from Part I
- container of carbon (active)
- weighing pan
- spatula
- 30-cm glass stirring rod
- ring stand
- test-tube clamp
- Bunsen burner
- glass elbow tube
- gas collection apparatus
- 3 test tubes (18 mm × 150 mm) and stoppers (No.1)
- flexible tubing
- stopwatch *or* watch (optional)
- 50-mL beaker
- wash bottle of distilled water
- container of limewater
- matches *or* lighter
- wood splints

Procedure

Part I

1. Weigh the porcelain dish to the nearest 0.01 g. Record the mass.
2. Add exactly 10.00 g of copper powder into the porcelain dish.
3. Observe and note the colour of the copper powder.
4. Test and note the electrical conductivity of the copper powder.
5. Place the porcelain dish on the hot plate.
6. Heat at a high temperature.
7. Hold the porcelain dish in place with crucible tongs and mix the copper powder with the glass stirring rod; break up lumps.
8. Heat for 10 minutes, stirring often.
9. Turn off the hot plate.
10. Place the porcelain dish on the ceramic plate using the crucible tongs and let it cool.
11. Weigh the porcelain dish and contents. Record the mass.
12. Observe and note the colour of the substance obtained.
13. Test and note the electrical conductivity of the substance obtained.

Part II

1. Weigh the 25-mm × 150-mm test tube to the nearest 0.01 g. Record the mass.
2. Empty the contents of the porcelain dish (Part I) into the test tube.
3. Add exactly 0.60 g of active carbon into the test tube.
4. Mix carefully with the glass stirring rod.
5. Secure the test tube to the ring stand with the test tube clamp.
6. Place the Bunsen burner under the test tube.
7. Insert the glass elbow tube into the stopper hole.

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8. Close the test tube with the stopper containing the elbow tube.
9. Fill the gas collection apparatus two-thirds full with distilled water.
10. Fill the three 18-mm × 150-mm test tubes with distilled water.
11. Upend the test tubes and place them into the gas collection apparatus.
12. Connect the gas collection apparatus to the elbow tube with flexible tubing.
13. Heat the 25-mm × 150-mm test tube for 10 minutes with blue (very hot) flame.
14. Release a little gas from each of the three test tubes, then fill them with gas collected by the displacement of water.
15. Turn off the Bunsen burner and let the heated test tube cool.
16. Weigh the test tube heated and contents. Record the mass.
17. Pour the test tube contents into the 50-mL beaker.
18. Rinse the test tube with distilled water to remove carbon remaining.
19. Decant.
20. Observe and note the colour of the substance in the beaker.
21. Test and note the electrical conductivity of the substance.
22. Conduct tests to identify the gas collected in the three test tubes.
23. Clean up and put away materials.

Observations

Record your observations in the tables below. Give each table a title.

Title:

Characteristic tested	Before heating	After heating
Mass of substance (g)		
Colour		
Electrical conductivity		

Title:

Characteristic tested	Before heating	After heating and rinsing
Mass of substance (g)		
Colour		
Electrical conductivity		

Name: _____ Group: _____ Date: _____

Title:

Test	Result

Reflecting on your observations

1. Do your observations help you to better understand the reaction of oxidation? Explain your answer.

2. Is the transformation observed during Part I a physical change or a chemical change? Explain your answer.

3. Is the transformation observed during Part II a physical change or a chemical change? Explain your answer.

4. What happens to the mass of the substance in Part I?

5. What brings about the change of mass?

6. What happens to the mass of the substance in Part II?

7. What brings about the change of mass?

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8. What substance is produced in Part I?
Explain your answer.

_____

_____

9. What substances are produced in Part II?
Explain your answer.

_____

_____

_____

_____

10. Complete the following table.

	Part I	**Part II**
Type of chemical transformation		
Name of reagents		
Are reagents elements or compounds?		
Name of products		
Are products elements or compounds?		

11. How could you improve the protocol for this lab?

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_____