Activity Preparation for Chapter 2

Activity/Investigation	Advance Preparation	Time Required	Other Considerations
Find Out: Changing a Powder (page 41) (TR page 46)	• 2 days before – Collect materials. – Photocopy **Assessment Master 9 Using Tools and Equipment Checklist** and **Assessment Master 10 Using Tools and Equipment Rubric**. • Day of – Distribute materials and apparatus.	• 15 min	• Review with students how to use the graduated cylinder. • Reinforce the importance of using equipment correctly by distributing and reading together **Assessment Master 9 Using Tools and Equipment Checklist**.
Find Out: Making and Diluting a Solution (page 46) (TR page 51)	• 2 days before – Buy orange drink crystals. – Collect materials and apparatus. • Day of – Set up the apparatus on your desk as a model for students. – Distribute materials and apparatus.	• 40 min	• As a class, identify each piece of equipment before beginning. • Demonstrate how to find mass using the scales or balances provided in your school. • Demonstrate how to find the volume of a liquid, paying attention to the meniscus curve.
Find Out: What Type of Change Is It? (page 51) (TR page 57)	• 2 days before – Collect materials and equipment. • Day of – Set out materials and equipment.	• 50–75 min	• Exact amounts are not required for desired results. • You may wish to provide students with a copy of the changes flowchart to work through as they answer the questions. • You may wish to distribute **Assessment Master 1 Co-operative Group Work Checklist**.

Materials Needed for Chapter 2

Activity/Investigation	Apparatus	Materials	Blackline Masters
Find Out: Changing a Powder (page 41) (TR page 46)	• 2 watch glasses • 10 mL graduated cylinder • spoon • scale or balance	• 6 g sodium bicarbonate • 5 mL vinegar • 5 mL water	
Find Out: Making and Diluting a Solution (page 46) (TR page 51)	• 3 –100 mL beakers • 200 mL beaker • 100 mL graduated cylinder • balance • stirring rod • scoopula or spoon	• 20 g orange drink crystals • 200 mL water • masking tape	**Recommended** OHT 5 PMI Chart OHT A–7 Making and Diluting a Solution
Find Out: What Type of Change Is It? (page 51) (TR page 57)	• mortar and pestle • scale or balance • 10 mL graduated cylinder • 2 evaporating dishes • hot plate • 2 – 50 mL beakers • scoopula or spoon	• 1 g copper sulfate • 20 mL water • 1 g sodium carbonate	**Recommended** OHT A–8 Identifying Physical Changes and Chemical Changes

CHAPTER 2 Physical and Chemical Changes Every Day (page 40)

SUGGESTED TIMING	MATERIALS	BLACKLINE MASTERS
30 min	• cue cards of tasks from cooks' list on page 40 • two bags labelled Group 1 and Group 2	Assessment Master 1 Co-operative Group Work Checklist Assessment Master 2 Co-operative Group Work Rubric

Overall Expectations

CIMV.01 – understand how chemicals in common household and workplace materials interact
CIMV.02 – investigate the types and rates of interactions between commonly used materials through laboratory activities
CIMV.03 – analyse how material interactions affect our daily lives

Activity Planning Notes

Introduce the idea of classifying things with a brainstorm of categories we use regularly. For example, types of music, food groups, or vehicles.

Prepare a set of cue cards containing each of the tasks listed for the cooks. Allow students to work in small groups to categorize the tasks, then redirect them toward grouping the tasks into changes of shape and creating a new substance.

To wrap up, have student groups explain the reasoning behind their grouping of the cooks' tasks. Then review each cue card, identifying those in which something new is made and those in which only the look changes. Have students complete the Making Connections questions.

Making Connections Answers (page 40)

1. a) and **b)** Various groupings are possible. Sample answer,

Group 1: prep/physical changes

- grate carrots
- slice radishes
- tear lettuce
- chop boiled eggs
- mix oil and vinegar
- add salt and spices
- melt some butter
- stir in milk
- separate the eggs
- whip the egg whites
- fold the whipped whites into the hot yolk mixture

Group 2: heating/chemical changes

- cook beef roast
- boil eggs
- brown the sugar
- cook egg yolks with milk, sugar, and vanilla flavouring until the mixture thickens

2. Answers will vary. Look for evidence that students have recognized the difference between physical and chemical changes, using their own language.

2.1 Two Kinds of Change (page 41)

SUGGESTED TIMING

15 min
15 min for Find Out: Changing a Powder

BLACKLINE MASTERS

Assessment Master 9 Using Tools and Equipment Checklist
Assessment Master 10 Using Tools and Equipment Rubric

Specific Expectations

SIM2.04 – organize and communicate information collected from lab investigations and information research using graphic organizers
CIM1.03 – distinguish between chemical reactions and physical processes, using appropriate scientific terminology
CIM2.02 – conduct experiments to investigate how materials can interact chemically
CIM2.03 – conduct experiments to investigate how materials can interact physically
CIM2.05 – communicate the results of investigations using a variety of oral, written, and graphic formats

Key Terms Teaching Strategies

- Have students write definitions for physical and chemical change in their Science Log. You may wish to have your students keep their own glossary at the back of their Science Log.
- Tape definitions of physical and chemical changes on the word wall.

Accommodations

- Include illustrations of types of change.

Activity Planning Notes

Write definitions of chemical and physical change on the blackboard or overhead. You will add specifics to these definitions as the chapter is completed. Have students complete the Find Out activity and answer all questions in the student resource.

Check Your Understanding Answer (page 41)

3. A chemical change creates something new, but a physical change only looks different.

Find Out Activity (page 41)

Changing a Powder

Purpose

- Students observe a physical and a chemical change.

Science Background

Baking soda (sodium bicarbonate) dissolves in water. There is no reaction between the chemicals and nothing new is made. This is a physical change.

However, baking soda (sodium bicarbonate) reacts with vinegar (5% acetic acid) to form sodium acetate and carbonic acid. The carbonic acid immediately falls apart (decomposes) into water and carbon dioxide, which escapes the mixture. The fizzing is a visual cue of a chemical change; a new substance (gas) is formed.

Reinforce the importance of using equipment correctly by distributing and reading together **Assessment Master 9 Using Tools and Equipment Checklist**.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
2 days before	• Collect materials. • Photocopy **Assessment Master 9 Using Tools and Equipment Checklist** and **Assessment Master 10 Using Tools and Equipment Rubric**.
Day of	• Distribute materials and apparatus.

APPARATUS	MATERIALS
• 2 watch glasses • 10 mL graduated cylinder • spoon • scale or balance	• 6 g sodium bicarbonate • 5 mL vinegar • 5 mL water

Suggested Timing

15 min

Safety Precaution

- Have students thoroughly wash their hands with soap and water at the end of this activity.

Activity Planning Notes

Review What to Do with students and demonstrate how to use the graduated cylinder to measure the amounts of reactants. Show students how much baking soda to spoon into each liquid. Exact amounts are not required in order to get results.
Have students record their observations in a chart.

Accommodations

- Set up the experiment on your desk as a model for students.
- Measure out volumes for those students who need help.
- Direct visually impaired students to listen and smell for clues of a change. Have another student describe what they see.

What Did You Observe? Answer (page 41)

3. Yes. The white powder and vinegar mixture fizzed, making a new substance: gas.

Activity Wrap-up

- As a class, discuss students' observations. How were the two changes different? What evidence of a new substance did they observe?
- Discuss how this chemical change can be useful in cleaning. The fizzing of vinegar and baking soda can be used as an environmentally friendly way to unclog drains.

Ongoing Assessment

- Use **Assessment Master 10 Using Tools and Equipment Rubric** to assess students' use of the apparatus during Find Out: Changing a Powder.
- Repeat the chapter opener activity using a new set of everyday changes as a formative assessment of students' understanding of the difference between physical and chemical changes. Cue cards may list for example, chocolate melts, fireworks explode, sandwiches turn green and smelly, balloons burst, rubber bands stretch, paper crumples, nails bend when hammered, or apple slices brown.

Alternative Activity

- Demonstrate a more dramatic comparison of changes by dissolving sugar in water, then mixing (dehydrating) sugar in concentrated sulfuric acid. Under a fume hood, add concentrated sulfuric acid to a half-full beaker of sugar. This reaction results in products (sulfur dioxide gas (SO_2) and water vapor) that are completely different than the original substances. The water vapour dramatically forces a mass of charcoal to expand out of the beaker.
- While covering this chapter, have students add daily observations to two envelopes, one for chemical changes and one for physical changes. For example, they might add "got a haircut," "the field turned muddy," or "burned dinner" to the appropriate envelope. At the end of the chapter, review these changes as a class and discuss any that are misidentified.

2.2 Physical Changes: A Different Look (page 42)

SUGGESTED TIMING

100 min
40 min for Find Out: Making and Diluting a Solution

MATERIALS

- canned soup
- crackers
- spreadable cheese
- water
- pot
- knife
- spoon
- hot plate

BLACKLINE MASTERS

BLM 2–1 States of Matter
BLM 2–2 Calculate Amounts for Solutions
OHT 5 PMI Chart
OHT A–7 Making and Diluting a Solution

Specific Expectations

SIM1.01 – identify the ways in which scientific information is conveyed
SIM1.02 – discuss, using examples, how the method of presenting scientific information connects to the purpose
SIM2.04 – organize and communicate information collected from lab investigations and information research using graphic organizers
CIM2.03 – conduct experiments to investigate how materials can interact physically
CIM2.05 – communicate the results of investigations using a variety of oral, written, and graphic formats
CIM3.01 – research the interactions of materials that are used in daily life
CIM3.02 – analyse the costs and benefits of a specific material with reference to its interactions with other materials in the environment

Key Terms Teaching Strategies

Have students complete some or all of the following activities to help them learn and remember the key terms:

- Have students write definitions for these terms in their Science Log. You may wish to have your students keep their own glossary at the back of their Science Log.
- Have students write a paragraph that contains the key terms in this section.
- Have students draw a mind map using labelled illustrations to show the relationship between the key terms.
- Add the key terms to the word wall.

Reading Icon Answers (page 42)

1. a) Students should underline temperature, state, size, shape, and particle size.

b) The substance.

Reading Icon Answer (page 44)

1. Students should underline water.

Activity Planning Notes

Demonstrate the range of physical changes people perform daily by preparing lunch, for example. After each step, ask students "Was something new created?"

- dilute soup from a can
- reheat soup
- crush crackers
- spread cheese on crackers
- pick carrots from the soup

Review states of matter with students using **BLM 2–1 States of Matter**. Then have students complete pages 42–43 in the student resource.

Introduce the concept of dissolving by preparing a sugar-water solution. Label each part either solvent, solute, or solution. Ask students "Did the sugar disappear? Can we get it back? How?" Show them that heating a little of the solution into an evapourating dish will recover the sugar. Be careful not to burn the sugar, which would be a chemical change.

Have students complete all pages in the student resource including Find Out: Making and Diluting a Solution. Follow up this concept by having students calculate the amounts required to make solutions using **BLM 2–2 Calculate Amounts for Solutions**.

Consider using the following overhead transparencies:
- **OHT 5 PMI Chart**
- **OHT A–7 Making and Diluting a Solution**

Accommodations

- Physical changes are largely visual. Ensure that all students are able to see the demonstrations. Have a student tell the class what they see.
- Have students use a chart to organize their observations. For example,

Description of Change	Observations Before	Observations After
break chalk	one large piece of chalk	two smaller pieces of chalk
re-heat soup	cool soup	hot soup

Check Your Understanding Answers (page 43)

2. a) change in size or shape

b) change of state

c) change of size or shape

d) diluting

3. a) to **f)** Look for types of physical changes in their explanations. Sample answer:

- making ice cubes; change of state
- mashing potatoes; change of shape or size
- boiling water; change of temperature (or state if considering vapour)
- mixing juice from concentrate; diluting
- picking raisins out of a bun; separating
- shrinking clothes; change of size

Check Your Understanding Answer (page 44)

2. evaporate the water

Making Connections Answers (page 44)

3. a) to **c)** Answers will vary. Sample answer:

- soup
- soapy dish water
- liquid fertilizer
- antifreeze
- juice
- liquid soap or shampoo

Check Your Understanding Answers (page 45)

4. Students should circle water on the soft drink label and list the following solutes: sugar, carbonic acid, phosphoric acid, caramel colour, and artificial flavours.

5. a) The solvent is gold and the solute is silver, because there is more of the gold.

b) The solvent is silver and the solute is gold, because there is more of the silver.

6. A dilute solution has more solute than a concentrated solution does.

Find Out Activity (page 46)

Making and Diluting a Solution

Purpose

- Students make and dilute a solution, examining the properties of different concentrations.

Science Background

The concentration of a solution describes the balance of solvent and solute(s) in the mixture. The more concentrated a solution is, the more solute it contains. In this activity, one physical trait of concentration becomes apparent: more concentrated solutions are darker in colour.

Concentration can be expressed in many ways:
- mass per volume (g/mL)
- volume per volume (mL/mL)
- percent (50%)
- ratio (50:50)
- parts per million (ppm)
- molar (M or Mol/L)

The stock orange solution in this activity has a concentration of 0.1 g/mL.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
2 days before	• Buy orange drink crystals. • Collect materials and apparatus.
Day of	• Set up the apparatus on your desk as a model for students. • Distribute materials and apparatus.

APPARATUS	MATERIALS
• 3 –100 mL beakers • 200 mL beaker • 100 mL graduated cylinder • balance • stirring rod • scoopula or spoon	• 20 g orange drink crystals • 200 mL water • masking tape

Suggested Timing

40 min

Safety Precautions

- Remind students never to eat or drink in the science classroom.
- Have students clean up the work area and wash their hands thoroughly with soap and water at the end of the activity.

Activity Planning Notes

Have students work in small groups of 2 to 3. As a class, identify each piece of equipment before

beginning. Demonstrate how to find mass using the scales or balances provided in your school. Demonstrate how to find the volume of a liquid, paying attention to the meniscus curve. Have students label the 200 mL beaker "stock solution."

Accommodations

- Perform the steps in the investigation sequentially, all together like synchronized swimmers.
- Prepare an overhead that presents the procedure using pictures.
- Read the procedure to students, having them perform the steps as they are read out.

What Did You Observe? Answer (page 47)

5. Each beaker is a different shade of orange. A is darkest, B is medium, and C is lightest.

What Did You Find Out? Answers (page 47)

6. a) The beakers should be shaded as follows:

- A; completely shaded
- B; half shaded
- C; one third shaded

b)
- A; darkest
- B; medium
- C; lightest

7. a) A, because it contains nothing but stock solution and is the darkest colour.

b) C, because it contains the least amount stock solution and is the lightest colour.

Making Connections Answers (page 47)

8. a) The 3% solution is more concentrated because it contains more sodium hypochlorite.

b) Advantages include: could be diluted if necessary, uses less packaging, need less for same result.

Disadvantages include: more corrosive, may require dilution before use (not ready to use).

Activity Wrap-up

- Discuss students' observations and the answers to the questions on page 47. Display a few sets of beakers in front of the class and discuss the similarities and differences. Discuss any difficulty students had in carrying out the steps of this activity.
- Have students create a PMI chart for a concentrated product they use in daily life. For example,
- Consider using **OHT A–7 Making and Diluting a Solution** and **OHT 5 PMI Chart** to help take up the answers and observations.

Plus	Minus	Interesting
• less packaging waste • less storage space • lighter • longer shelf life • faster acting	• may not be ready to use • takes time to prepare • manufacturing requires process to remove solvent • errors in dilution possible • increased hazards	• may taste different than foods not from concentrate • can control the concentration

Alternative Activities

- Have students prepare a one-page report on fluids requiring dilution in the automotive, cleaning, or food industries. Reports should detail procedures used to prepare the dilutions and explain the consequences of using the wrong concentration.
- Have students complete **BLM 2–2 Calculate Amounts for Solutions** in order to understand the relationship between concentration of a solution and the amounts of solute(s) and solvent.

Ongoing Assessment

- Use **Assessment Master 10 Using Tools and Equipment Rubric** to assess students' use of the apparatus during Find Out: Making and Diluting a Solution.

2.3 Chemical Changes: Making Something New (page 48)

SUGGESTED TIMING

30–60 min including demonstrations

MATERIALS

- 50 mL water
- small piece of calcium metal
- 100 mL beaker
- splint
- lighter
- 1/3 test tube of lead nitrate solution
- 1/3 test tube of potassium iodide solution
- tungsten or fluorescent light bulb
- spoonful of powdered zinc sulfide
- 50 mL dilute hydrochloric acid (1–3 Mol/L)

BLACKLINE MASTERS

BLM 2–3 Parts of a Chemical Change

Specific Expectations

CIM1.03 – distinguish between chemical reactions and physical processes, using appropriate scientific terminology

Key Terms Teaching Strategies

- Ensure definitions are written in the students' Science Log. You may wish to have your students keep their own glossary at the back of their Science Log.
- Continue adding terms to the word wall.
- Have students circle "solid" in the examples of changes on page 48 and draw an arrow to "precipitate" in the key terms box to help them remember that a precipitate is a solid produced during a chemical reaction.
- Use **BLM 2–3 Parts of a Chemical Change** to help students understand the terms reactant and product.

Activity Planning Notes

Conduct a series of demonstrations to illustrate each sign of a chemical change. Have a student closely observe each reaction and tell the class what they observe:

- produce heat (and fizzing hydrogen gas) by adding water to a small piece of calcium in a beaker
- produce sound by introducing a glowing splint into the hydrogen gas the water and calcium produced
- produce a precipitate (and colour change) by mixing colourless solutions of lead nitrate and potassium iodide. Note: this takes several hours so you may wish to have "before and after" samples
- produce light by lighting a light bulb, draw attention to the filament or gas
- produce the smell of rotten eggs by putting a spoonful of powdered zinc sulfide into dilute hydrochloric acid

Note: Follow appropriate safety precautions and disposal procedures.

Explain that some signs can be misleading. For example, colour appears to change when a solution is diluted and when a metal turns red-hot. Colour change alone is not enough evidence to identify a chemical change. Similarly, bubbles can represent the creation of a new substance (a gas) or a change of state (e.g., boiling).

Explain the scientific terms reactant and product for starting and resulting substances. Use **BLM 2–3 Parts of a Chemical Change** to help students understand the role of reactants and products in chemical reactions.

Accommodations

- Have students create their own illustrated guide to the signs of a chemical change. For each sign, they should draw an example or paste a picture from a magazine or catalogue. Captions can be used to briefly describe each illustration.

Check Your Understanding Answers (page 48)

1. a) to **c)** Accept any of: heat, light, sound, colour, odour, solid, or gas. Examples will vary but may include,

- food rots
- cake rises
- light bulb heats up
- milk curdles
- matches sizzle

2. a) iron, oxygen; rust

b) zinc, sulfur; zinc sulfide

c) carbonic acid; water, carbon dioxide

3. a) physical

b) chemical

c) chemical

d) chemical

e) chemical

Alternative Activities

- Demonstrate a dramatic reaction by combining Mentos mints and Diet Coke. The cola spouts forcefully from the bottle, so use a single mint, a small bottle, and large overflow tray to limit the mess. You may choose to show a video of the reaction instead.
- Activate a chemical hot pack made of sodium acetate (the re-usable kind in which a metal disk is flexed to activate it). Pass the hot pack around before and after activating it so that students can see the crystals form and experience the heat that is given off by the chemical reaction.
- Demonstrate the difference between dissolving and a chemical change. First put a piece of magnesium into water and watch nothing happen. Then put the piece of magnesium into 3 Mol/L hydrochloric acid and watch it react! It disappears, but you know it is a chemical change because of other signs. This is *not* dissolving.
- Use some or all of the activities in the following Chemistry *ActiveFolders*: Chemical Reactions.

Ongoing Assessment

- Use the Check Your Understanding questions on pages 48 to 49 to assess students' understanding of chemical changes.

Technology Links

- For video examples of dramatic chemical reactions, go to **www.mcgrawhill.ca/books/Se10** and follow the links to Chemical Reactions.

2.4 Identifying Physical Changes and Chemical Changes (page 50)

SUGGESTED TIMING

30 min
50–75 min for Find Out: What Type of Change Is It?

BLACKLINE MASTERS

BLM 2–4 Find Out: Prepare a Foam
OHT A–8 Identifying Physical Changes and Chemical Changes
Assessment Master 1 Co-operative Group Work Checklist

Specific Expectations

SIM2.04 – organize and communicate information collected from lab investigations and information research using graphic organizers
CIM1.03 – distinguish between chemical reactions and physical processes, using appropriate scientific terminology
CIM2.01 – select and use appropriate lab equipment and apply WHMIS safety procedures for the handling, storage, disposal, and recycling of laboratory materials
CIM2.02 – conduct experiments to investigate how materials can interact chemically
CIM2.03 – conduct experiments to investigate how materials can interact physically
CIM2.05 – communicate the results of investigations using a variety of oral, written, and graphic formats

Activity Planning Notes

As a class, trace several changes through the flowchart to figure out whether they are chemical or physical changes. Begin by demonstrating the change. For example, crumpling or burning paper. Check off any signs that apply.

Have students complete the Find Out activity. Have students make a foam by completing **BLM 2–4 Find Out: Prepare a Foam** in which they make marshmallow. The Alternative Activities describe other ways to prepare gels and foams, and a demonstration of evapourating alcohol.

Consider using the following overhead transparency:
- **OHT A–8 Identifying Physical Changes and Chemical Changes**

Accommodations

- Have students trace a change through the flowchart. Some students will need a new copy for each change, so have extras on hand.

Check Your Understanding Answer (page 50)

1. Answers will vary. Look for evidence that students can systematically work through the flowchart to classify the change.

Find Out Activity (page 51)

What Type of Change Is It?

Purpose

- Students carry out changes and practice identifying them as chemical or physical.

Science Background

Matter can undergo two types of changes: physical and chemical. A physical change results from a physical process and does not change the chemical composition or properties of the reactants. The original reactants can be retrieved by physical methods.

The most difficult of the physical changes for students to identify is dissolving, because it looks like the solute disappears.

In a chemical change, the reactants react with each other to produce an entirely new product. The product(s) have different physical and chemical properties than the original reactants. A chemical change is often indicated by a change in energy such as heat, sound, or light. In other instances a solid (precipitate) will form where once there was none. Permanent colour change and the production of a gas (detected as smell or fizzing) are also common indicators of a chemical reaction.

A physical change will not exhibit any clues of a chemical change. However, a chemical reaction often involves physical changes as well. Students will need to distinguish that when only a physical change has occurred, nothing new has been created. Otherwise the change is chemical.

Note: if the copper sulfate solution is heated too much, it will appear brown or burnt around the edges. This may confuse students about what type of change evapourating is.

Advance Preparation

WHEN TO BEGIN	WHAT TO DO
2 days before	• Collect materials and equipment. • Photocopy Assessment **Master 1 Co-operative Group Work Checklist** (optional).
Day of	• Set out materials and equipment.

APPARATUS	MATERIALS
• mortar and pestle • scale or balance • 10 mL graduated cylinder • 2 evaporating dishes • hot plate • 2 – 50 mL beakers • scoopula or spoon	• 1 g copper sulfate • 20 mL water • 1 g sodium carbonate

Suggested Timing

50–75 min

Safety Precautions

- Do not allow students to eat or drink anything in the laboratory.
- Remind students never to touch the element of a hot plate.
- Direct students to unplug appliances by pulling on the plug, not the cord.
- Explain proper disposal and cleanup procedures to students.
- Have students clean up their work areas and thoroughly wash their hands with soap and water at the end of this activity.

Activity Planning Notes

Read the directions for each part of the activity as a class before letting students proceed with that part. Hand out only the chemicals needed immediately to complete that part. Set up a model of the equipment and materials used for each part of the activity. Circulate among students to identify those in need of additional coaching.

Accommodations

- Demonstrate the proper use of a balance or scale.
- Display a 1 g sample of sodium carbonate and copper sulfate as a model for students. Exact amounts are not required for desired results. Alternatively, supply the materials in pre-measured amounts.
- Provide a plastic bag and rolling pin for students who lack the motor skills to use a mortar and pestle. Alternatively, provide the materials in both crystal and powder form for comparison.
- Provide students with a copy of the changes flowchart to work through as they answer the questions.
- Prepare an overhead that explains each What to Do section using pictures.

What Did You Observe? Answer (page 51)

3. Sample observations for grinding copper sulfate:

Property	Before Grinding	After Grinding
colour	vibrant blue	blue
state	solid	solid
shape and size	small crystals	powder

What Did You Discover? Answers (page 51)

4. Physical change. Clues such as, nothing new, and a change in size and shape.

5. a) No

b) Physical. No new substance was created.

What Did You Observe? Answers (page 52)

8. Sample observations for copper sulfate solution:

Property	Before Heating	After Heating
colour	transparent blue	blue solid film
state	liquid	solid

9. Physical change. Clues such as, nothing new and a change in state.

What Did You Discover? Answers (page 52)

10. a) No

b) Physical change. No new substance was created.

What Did You Observe? Answers (page 53)

13. Sample observations for mixing copper sulfate and sodium carbonate solutions:

Property	Before Mixing	After Mixing
colour of copper sulfate solution	transparent blue	cloudy blue
colour of sodium carbonate solution	clear colourless	as above

14. Chemical change. Clues such as, a new solid was formed.

What Did You Discover? Answers (page 53)

15. a) Yes

b) Chemical change, because a new solid was created.

Activity Wrap-up

- Have students share their observations with the class. Take up the answers and address any discrepancies or misunderstandings. Have students create a flowchart of the changes they performed in this experiment.
- Have students complete **Assessment Master 1 Co-operative Group Work Checklist** to assess how well they worked in a group. Have students discuss how to improve group work.

Alternative Activities

- Have students make their own hair gel by preparing gelatin from a commercial powder. Follow directions on the package. Students can design an investigation to compare the properties of a gel and a solution or to compare this gel to commercial hair gels.
- Invite a guest speaker who can explain or demonstrate the process of making a gel such as butter or cheese. Alternatively, have students present a video of the process.
- Research foams used in firefighting, highlighting the properties that make them useful.
- Instant hand sanitizers are usually made up of alcohol in a gel. Have students time how long it takes for alcohol hand sanitizer to evapourate.
- Have students prepare a commercial shaving gel that foams because of body heat. A nickel-sized sample will foam on a gloved hand. Rubbing will speed up the foaming. Have students compare the properties of the foam to the properties of the gel. They may find a flashlight useful.
- Have students make ice cream (foam) by placing a small resealable bag containing a mixture of 250 mL of milk, 80 mL of sugar, and 2.5 mL of vanilla extract inside a larger bag that is one-third full of ice and a scoop of salt. Periodically massage the ice cream bag to work air into the mixture as it solidifies.
- Conduct a demonstration that both evapourates alcohol and reinforces the idea of flammability. Swirl 5 mL of ethanol inside a large *dry plastic* bottle, then drain the excess. Place the bottle on the desktop pointing up, behind a shield to protect students. You may duct tape the bottle to the desk or opt for a dramatic fly-away. Stand clear as you light the alcohol vapours with a match or glowing splint. This shows how flammable alcohol vapours can be since they cause the big noise and shoot the bottle up in the air.
- Use some or all of the activities in the following Chemistry *ActiveFolders*: Chemical and Physical Changes.

Ongoing Assessment

- Use the Check Your Understanding question on page 50 as a summative assessment of students' ability to systematically work through the flowchart to classify changes.
- Use **Assessment Master 10 Using Tools and Equipment Rubric** to assess students' use of the apparatus during Find Out: What Type of Change Is It?
- Use **Assessment Master 6 Scientific Communication Rubric** to assess the quality of student work during Find Out: What Type of Change Is It?
- Use **Assessment Master 8 Safety Rubric** to assess students' safety practices during Find Out: What Type of Change Is It?
- Students' answers to the questions in Find Out: What Type of Change Is It? can be used as a summative assessment of their understanding of how to determine whether a change is physical or chemical.

Chapter 2 Review (pages 54–55)

SUGGESTED TIMING

75 min to complete and take-up the review, and then assign the Practice Test

BLACKLINE MASTERS

Master 5 Certificate
Master 6 List of Skills
BLM 2–5 Chapter 2 Practice Test
BLM 2–6 Chapter 2 Test
BLM 2–7 BLM Answers

Accommodations

- Allow students to make a chapter summary page of the key ideas/skills from the chapter. The back of the student resource provides space to do this. Alternatively, you might develop a chapter summary as an entire class.
- If students have difficulty with a particular review question, use the Review Guide to identify the section they need to review.
- **BLM 2–5 Chapter 2 Practice Test** can be customized to produce extra reinforcement questions.

Summative Assessment

- Have students use the changes flowchart to identify any remaining misunderstandings about identifying changes as either chemical or physical.
- Have students complete **BLM 2–6 Chapter 2 Test** to assess individual skills.
- You may wish to develop **Master 5 Certificate** to show students what they have learned during this chapter. Cut and paste the related skills from **Master 6 List of Skills**.

Using the Chapter Review

Depending on your class, students should be able to work through the review at their own pace. In order to have success with the Chapter Review, some students may need to do it in chunks, by completing several questions and then taking them up before continuing. This process will prevent students from completing many questions incorrectly.

To provide additional reinforcement of key terms, have students create flash cards using illustrations for each term. Once the review is completed and taken up, assign **BLM 2–5 Chapter 2 Practice Test** for students to answer individually. They may wish to use their completed review to help them.

Review Guide

Question	Section(s)	Refer to
1	2.1	Two Kinds of Change (page 41)
2	2.2	Vanishing Substances: Solutions (page 44)
3	2.2	Vanishing Substances: Solutions (page 44)
4	2.2	How Are Solutions Made? (page 45)
5	2.3	Check Your Understanding (page 49)
6	2.2	How Can You Tell If It Is a Physical Change? (page 42)
7	2.3	What Is a Chemical Change? (page 48)
8	2.4	Identifying Physical Changes and Chemical Changes (page 50)
9	2.2	Vanishing Substances: Solutions (page 44)
10	2.2	Vanishing Substances: Solutions (page 44)
11	Chapter Opener	Physical and Chemical Changes Every Day (page 40)

Chapter 2 Review Answers (pages 54–55)

1. **c)** physical change

2. **a)** solution

3. **d)** solute; **f)** solvent

4. **g)** state

5. **e)** precipitate

6. **a)** to **c)** Look for any three physical changes. Sample answer:

- electric stove element glows red-hot
- molding clay
- tearing paper
- ice melts
- separating a mixture
- hair is cut
- butter melts
- wood is sanded
- sugar dissolves

7. **a)** to **e)** Look for five signs including producing,

- heat
- light
- sound
- colour
- odour
- solid or precipitate
- gas

8. **a)** physical; change of state

b) chemical; odour and solid (precipitate) produced

c) chemical; odour and colour produced

d) physical; change of size

e) physical; change of shape

f) chemical; heat, light, and gas produced

9. B

10. **a)** solute; dust particles

solvent; air

b) solutes; protein, fat, sugar

solvent; water

11. Physical: Accept any two, such as:

- chopping
- melting
- dissolving

Chemical: Accept any two, such as:

- baking
- cooking
- browning
- vinegar and baking soda