Lesson 2:

SNC1P

2.2 – How do we use properties to help us describe matter?

1. **P_____ properties describe how matter looks and feels.**

- Physical properties are features of matter that can be observed or measured **w**_____ changing the type of matter that something is.

	Property	Description
1)	**C**_____.	- how well a substance lets heat or electrical current move through it
2)	**D**_____.	- how compact a substance is; is calculated by dividing its mass by its volume
3)	**L**_____.	- how well the surface of a substance reflects light
4)	**S**_____.	- how much of a substance dissolves in another substance
5)	**T**_____.	- how the surface of a substance feels (roughness, softness, or smoothness)
6)	**P**_____.	- how it appears: solid, liquid, or gas
7)	**B**_____.	- how easily it can break or shatter
8)	**M**_____.	- ability of a substance to be bent or shaped by hammering without breaking
9)	**D**_____.	- ability to be stretched into a wire without snapping
10)	**V**_____.	- the resistance of a liquid is to flowing (thick, thin, runny, syrupy, etc.)

2. **C_____ properties describe how substances can change when they interact with other substances.**

- Chemical properties describe how substances can change to produce **n**_____ substances with new properties when they react with other substances. Chemical properties can only be observed when substances interact.
- The degree to which a substance can change is its **r**_____.

	Property	Description
1)	**C**_____.	- the ability of a substance to catch fire and burn in air
2)	**Reactivity with o**_____.	- describes the change that can occur when a substance is exposed to oxygen
3)	**Reactivity with a**_____.	- describes the change that can occur when a substance is exposed to acids
4)	**Reactivity with other s**_____.	- describes the change that occur when one substance reacts with other substances. When some substances are mixed together, they form a **p**_____, which is a new insoluble substance.
5)	**D**_____.	- describes the change that occur when a substance (such as water) is broken down into the parts that make it up

Homework *(Practice & Homework Book): pages* **56, 57, 59**

Source: Science Links 9. McGraw-Hill Ryerson. 2009

Name _____ Date _____

Topic 2.2 Summary

How do we use properties to help us describe matter?

Textbook pages 106–111

Before You Read

Colour is one property of matter. List two more properties of matter.

_____

_____

Reading Check

1. Which physical property makes sugar useful for sweetening beverages?

_____

How do we describe matter?

We describe matter and how it changes by describing its properties. There are two types of properties: physical properties and chemical properties.

What are physical properties?

A **physical property** is a feature of matter you can determine without changing the type of matter that something is. Physical properties include:

- **state** (solid, liquid or gas)
- **melting, freezing, and boiling point**
- **conductivity**—how well a substance lets heat or electrical current move through it
- **density**—how compact a substance is (calculated by dividing mass by volume)
- **lustre**—how well the surface of a substance reflects light
- **solubility**—how much of a substance dissolves in another substance
- **texture**—how the surface of a substance feels (rough, soft, or smooth)

The properties of a substance help to determine its usefulness. Metals have high lustre, so they are used to make mirrors. The metal tungsten is used as filaments in incandescent light bulbs because it has such a high melting point (3410°C). Rubber is often used as an *insulator*, which means that it does not conduct electricity well. This lack of conductivity helps to protect us from electric shocks.

Knowing the properties of substances can help you to tell them apart. For example, mercury is the only metal that is liquid at room temperature.

Name _____ Date _____

Topic 2.2 Summary

What are chemical properties?

A **chemical property** describes how a substance changes when it is exposed to another substance to produce something new with new properties. Chemical properties include **reactivity** with oxygen, an acid, or some other substance. **Combustibility** is the ability to catch fire and burn in air. **Decomposition** happens when a reaction breaks a substance down into the parts that make it up. When some dissolved substances are mixed, they form a solid, called a **precipitate,** which is a new substance.

You can observe chemical reactions in progress all around you. A cut apple turns brown when it is exposed to the oxygen in the air. Wood begins to burn when it is exposed to heat. Bubbles of carbon dioxide form in pancake batter when baking soda mixes with the acid in buttermilk.

Is it a physical property or a chemical property?

A chemical property involves the formation of something new. These clues tell you that a new substance has been formed.

- The substance changes colour.
- Bubbles form, telling you a new gas has been produced.
- A new odour forms, telling you a new gas has been formed.
- A new solid (a precipitate) forms
- Energy in the form of heat, light, and/or sound is released when the substances are mixed.

Why is solubility a physical property?

When salt is placed into water, the salt particles get so small that you cannot see them any more. But the taste of plain salt and of salt water is the same. This tells you that the salt has not changed into a new substance. If you put the salt water on a stove and boiled away all the water, the original salt would remain in the pot. Solubility may appear to be a chemical property, but it is a physical property.

Is it a chemical property or a physical property?

Answer the following questions

1. Do you see a permanent new colour?
2. Do you see bubbles or smell a new smell?
3. Did you see light or feel heat or hear sound ?
4. Is there a new solid formed when two solutions are mixed?

If you have answered **YES** to any of these questions, then a new substance has been formed. The property is a **chemical** property.

If you have answered **NO** to **ALL** of these questions, then there is no new substance. The property is a **physical** property.

Reading Check

2. What chemical property makes wood not a very safe material to build a house with?

_____

Reading Check

3. What happens to salt particles when they are placed in water?

_____

_____

_____

Name _____ Date _____

Comprehension
Topic 2.2

Use with textbook pages 106–111.

Physical or chemical property?

In the second column of the table, indicate whether the property described is a physical or chemical property. In the next column, explain your choice.

Description	Physical or chemical property?	How do you know?
1. Nitrogen is a gas.		
2. Methanol burns easily in air.		
3. Baking soda reacts with vinegar, producing the gas carbon dioxide.		
4. Sulfur is yellow.		
5. An iron railing rusts.		
6. Wooden spoons are used to stir hot food.		
7. Juice crystals dissolve in water.		
8. A metal anchor sinks in water.		
9. Sandpaper is scratchy.		
10. Fishing lures use shiny metal to attract fish.		

11. **(a)** List a physical property of sugar and salt that is the same. _____

(b) List a physical property of sugar and salt that is different. _____

(c) Explain how you can tell the difference between these two substances in your kitchen.

12. One physical property of gasoline is _____. A chemical property of gasoline is _____.

Name _____ Date _____

Key Term Review
Topic 2.2

Use with textbook pages 106–111.

Chemical and physical properties

Vocabulary			
boiling point chemical combustibility combustible conductivity	decomposition less lustre melting point	more physical precipitate property	reacts with acid solubility state texture

Use the terms in the vocabulary box to fill in the blanks. You can use each term more than once. You will not need to use every term.

1. A _____ describes the characteristics of a substance.
2. If you can determine the property of a substance without changing the type of matter, it is a _____ property. When the substance interacts with a different substance and something new is made, you are observing a _____ property.
3. _____ describes how easily electricity or heat can move through a material.
4. Iron melts at 1535°C. This is the _____ of iron, which is a _____ property of iron.
5. When a solid floats on water, it is _____ dense than water.
6. _____ describes how the surface of a substance feels.
7. Whether a substance is a solid, liquid or gas describes a _____ property of the substance.
8. Rubber does not dissolve in water, so _____ is not a property of rubber.
9. A substance that catches fire and burns in air is said to be _____.
10. Magnesium is mixed with acid and bubbles form. This is a _____ property of magnesium.
11. _____ describes how well the surface of a substance reflects light.

Name _____ Date _____

Applying Knowledge
Topic 2.2

Use with textbook pages 106–111.

Useful properties

In the second column of the chart, describe one way in which the property makes the substance useful in daily life. An example is done for you.

Substance and property	How the property is useful
Glass is transparent.	Used in windows so that sunlight can come in
Plastic is flexible.	
Steel can be made into thin sheets.	
Copper can be pulled into thin wires.	
Wood floats.	
Sugar dissolves.	
Titanium is a strong metal.	
Windshield washer fluid has a freezing point of –40°C.	
Silk reflects light at many angles, making it shiny.	
Aluminum is a light metal.	
Vinegar slows the growth of bacteria.	
Bleach kills bacteria.	

Name _____ Date _____

Assessment
Topic 2.2

Properties of matter

Use with textbook pages 106–111.

Match each Term on the left with the Descriptor on the right. Each Descriptor may be used only once.	
Term	**Descriptor**
1. _____ solubility **2.** _____ state **3.** _____ lustre **4.** _____ conductivity **5.** _____ boiling point	**A.** can be solid, liquid, or gas **B.** measure of how easily electricity or heat can pass through **C.** the amount of one substance that can dissolve in another substance **D.** the temperature at which a liquid becomes a gas **E.** how well the surface of a substance reflects light

6. What is the temperature at which a solid changes into a liquid called?

_____

7. Explain why copper is used in electrical wires.

_____

_____

8. Explain how a physical property is different from a chemical property.

_____

_____

9. a) State two physical properties of wood.

_____

b) What is one chemical property of wood?

_____

c) Explain, using the properties of each substance, why tires are now made using rubber rather than wood.

_____

_____

_____

10. a) Crystals of iodine are reacted with ammonia, and a precipitate, nitrogen triiodide, forms. Identify a chemical property of iodine.

_____

b) Explain how you know it is a chemical property.

_____

_____

11. a) When dry, the nitrogen triiodide is touched with a feather. There is a loud *snap* and a cloud of purple vapour appears. The nitrogen triiodide has turned into nitrogen and iodine gas. Identify a chemical property of nitrogen triiodide.

_____

_____

b) Explain how you know it is a chemical property.

_____

_____