

# Science 9 - Unit B Review Sheet

## Learning Outcomes

Can you?

- identify and evaluate dangers of caustic materials and potentially explosive reactions
- investigate and describe properties of materials
- describe and apply different ways of classifying materials based on their composition and properties
- distinguish between observation and theory, and provide examples of how models and theoretical ideas are used in explaining observations
- demonstrate understanding of the origins of the periodic table, and relate patterns in the physical and chemical properties of elements to their positions in the periodic table
- use the periodic table to:
  - identify the number of protons and electrons in each atom, as well as other information about each atom
  - describe the relationship between the structure of atoms in each group and the properties of elements in that group
- distinguish between ionic and molecular compounds, and describe the properties of some common examples
- read and interpret chemical formulas for compounds of two elements, and give the IUPAC name and common name of these compounds
- identify/describe chemicals commonly found in the home, and write the chemical symbols
- identify examples of combining ratios/number of atoms per molecule found in some common materials, and use information on ion charges to predict combining ratios in ionic compounds of two elements
- assemble or draw simple models of molecular and ionic compounds
- identify conditions under which properties of a material are changed, and critically evaluate if a new substance has been produced
- observe and describe evidence of chemical change in reactions between familiar materials
- distinguish between materials that react readily and those that do not
- observe and describe patterns of chemical change
- describe familiar chemical reactions, and represent these reactions by using word equations and chemical formulas and by constructing models of reactants and products

## Unit at a Glance

- All chemicals should be treated with respect. The WHMIS safety symbols have been adopted to safeguard the classroom, home, and workplace.
- All matter is made of atoms and can exist in three states. Matter can be divided into mixtures and pure substances.
- Physical changes cause a change in state, shape, or size of matter.
- Chemical changes create new substances.
- Pure substances can be divided into elements and compounds. A chemical formula is used to describe elements and compounds.
- Elements are organized into a periodic table according to similarities in their properties. Many scientists, including Mendeleev, Dalton, Thomson, Rutherford, and Bohr helped to develop the modern view of the elements, compounds, and atoms.
- The law of conservation of mass and the law of definite composition help explain the behaviour of elements and compounds in chemical reactions.
- Atoms are composed of small particles including electrons, protons, and neutrons. Electrons have a tendency to be found in pairs.
- Elements can be divided into metals, non-metals, and metalloids depending on their physical and chemical properties.
- Chemical symbols are used to represent elements and compounds. Chemical equations are used to represent chemical reactions.
- Chemical reactions are indicated by the creation of heat, light, the presence of a precipitate or gas, or a change in colour or odour.
- Compounds can be identified as molecular or ionic. Compounds are named according to rules established by IUPAC.
- Exothermic reactions produce heat. Endothermic reactions require heat.
- Catalysts speed up chemical reactions. Inhibitors slow down chemical reactions.
- Some metals corrode when they are exposed to air and moisture.
- Combustion is a highly exothermic combination of a substance with oxygen.

## Unit B: Matter and Chemical Change

### Science 9 Review

Wherever necessary, answer questions on a separate sheet of paper. All questions will be marked.

1. What safety issues should you consider before working around an open flame?
2. When sodium carbonate and hydrochloric acid are combined, gas bubbles and a white residue are formed. Is this a chemical or physical change? Explain your answer.
3. Create a chart to illustrate the relationships between the following types of matter: mixtures, solutions, pure substances, suspensions, mechanical mixtures, and elements.
4. What are the physical properties of ice cream?
5. Why is it important to understand the physical and chemical properties of different substances?
6. Describe one discovery made by an alchemist that is still used today.
7. Compare how Dalton and Bohr viewed the structure of the atom.
8. Why was Lavoisier considered the “father of chemistry”?
9. Use the periodic table to help you fill in the table below.

Element	Number of Electrons	Atomic Mass
Na		
	35	
		32.1

10. Did Mendeleev’s work on the periodic table represent only his work or did it represent work done by many people? Explain your answer.

11. Label the following compounds as ionic or molecular.

a) lithium oxide \_\_\_\_\_

b) nitrogen monoxide \_\_\_\_\_

c) calcium chloride \_\_\_\_\_

12. What are the elements in the following compounds?

a) MgO \_\_\_\_\_

b) FeF<sub>2</sub> \_\_\_\_\_

c) CO<sub>2</sub> \_\_\_\_\_

13. Write the names for each of the compounds in question 8.

a) MgO \_\_\_\_\_

b) FeF<sub>2</sub> \_\_\_\_\_

c) CO<sub>2</sub> \_\_\_\_\_

14. Describe how models of ionic and molecular compounds have helped you understand how atoms form compounds.

15. Describe two chemical reactions that require oxygen.

*Write the chemical symbols for the reactions in questions 16 and 17.*

16. Iron sulfide and hydrogen chloride react to form iron chloride and hydrogen sulfide.

17. Lithium chloride and magnesium oxide are the products of the reaction of magnesium chloride and lithium oxide.

18. Compare and contrast an enzyme and an inorganic catalyst.

19. Describe one thing you learned in this section that gave you a better understanding of the chemical world around you.

**20.** Briefly describe how the following people viewed the structure of matter.

a) Aristotle

b) Hantaro Nagaoka

c) James Chadwick

**21.** Describe a property for each of the following families.

a) alkali

b) halogen

c) noble gas

**22.** How many atoms of each element are in the following compounds?

a) sodium oxide

b) aluminum fluoride

c) magnesium phosphide

**23.** Use the correct chemical symbols to write the chemical equations for these reactions:

a) Sodium and fluorine combine to form sodium fluoride.

b) Mercury(II) oxide decomposes to form mercury and oxygen gas.

**24.** Nicole measures 25 g of sodium carbonate with 10 mL of vinegar and determines the total mass of the reactants and the beaker to be 100 g. After mixing the two reactants, she observes bubbling and a white residue. The total mass is now 98 g. Did the principle of the conservation of mass apply in this example? Explain your answer.

- 25.** A new period of very heavy elements from another galaxy has been discovered. Use the information following to group each element. Place each new element into the appropriate group in the periodic table below.

Element A: bonds with sodium to form  $\text{Na}_3\text{A}$

Element D: has the lowest atomic number of the elements in the new period

Element E: one atom reacts with one atom of calcium to form a new compound

Element G: forms an ion with a 3+ charge

Element J: most stable element of all eight discovered

Element L: most reactive non-metal

Element M: bonds with chlorine to form the compound  $\text{MCl}_2$

Element Q: forms  $\text{QS}_2$ — a molecular compound

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
New Period of Elements	11 Na Sodium 23	12 Mg Magnesium 24	13 Al Aluminum 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulfur 32	17 Cl Chlorine 35	18 Ar Argon 40

- 26.** Why do the body's chemical reactions slow down when a person experiences hypothermia?
- 27.** Combustion and corrosion are unrelated chemical reactions, yet they have something in common. Explain what that is.
- 28.** Describe a system of organizing chemical matter that required the contributions of many different people.