

## Grade 9 Science Chemistry Final



Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Modified True/False

Answer the following questions on the Bubble Answer Sheet. A=True, B=False.

Indicate whether the sentence or statement is true or false. **If false, change the identified word or phrase to make the sentence or statement true.**

- T 1. A change of state is an example of a physical change. \_\_\_\_\_
- F 2. The total volume of the new substances in a chemical change is always the same as that of the original substances. Mass
- F 3. Pure water is an element. compound
- T 4. When water is decomposed, there is twice as much hydrogen gas produced as oxygen gas. \_\_\_\_\_
- T 5. The symbols for calcium, carbon and chlorine are Ca, C, and Cl, respectively.  
\_\_\_\_\_

### Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- A 6. When this WHMIS safety symbol is present on a container, it indicates that the substance is
- poisonous and infectious causing other toxic effects.
  - flammable and combustible.
  - corrosive.
  - dangerously reactive.



- D 7. Which of the following is **not** a chemical change?
- Rusting
  - Burning
  - Baking
  - Dissolving

- B 8. Which of the following questions is the **most important** one to ask when you are trying to determine if a change is chemical or physical?
- Has the colour changed?
  - Is a new substance produced?
  - Is heat or light given off?
  - Have bubbles of gas formed?

9.

**Physical Properties of Four Elements**

Element	Melting Point (°C)	Boiling Point (°C)	Colour	Conductivity	Malleability
1	962	2 162	Lustrous silver	Good conductor	Very malleable
2	-218	-183	Colourless	Good insulator	Not malleable
3	115	445	Yellow	?	Not malleable
4	1 064	2 856	Lustrous yellow	?	Very malleable

Which of the following statements describes the conductivity of elements 3 and 4?

- Both elements are good insulators.
- Both elements are good conductors.
- Element 3 is a good conductor and element 4 is a good insulator.
- Element 3 is a good insulator and element 4 is a good conductor.

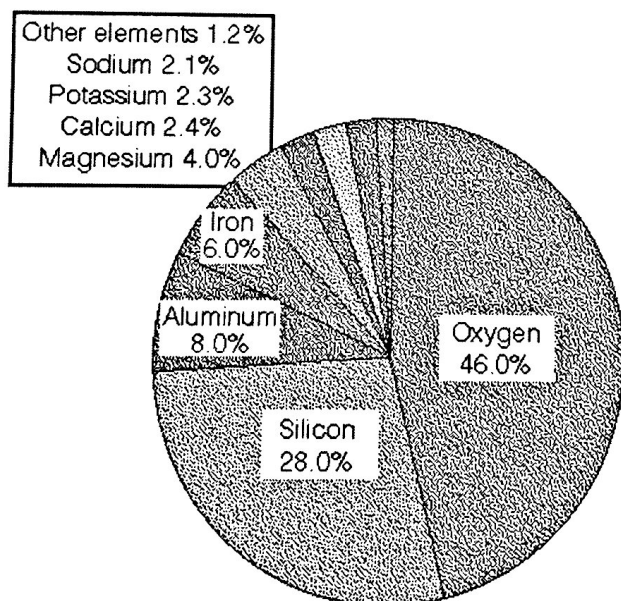
D

- C 10. "The manner in which a substance behaves" would best define which of the following terms?
- Chemical reactions
  - Physical properties
  - Chemical properties
  - Properties

- A 11. Thomson's "plum pudding" atomic model states that
- negatively charged electrons are embedded in a mass that is positively charged.
  - the centre of an atom is called the atomic nucleus.
  - most electrons are found near the nucleus.
  - most of an atom is occupied by very small electrons.

- C 12. Which of the following statements are true?
- A compound is always a pure substance.
  - A pure substance is always an element.
  - An element is always a pure substance.
  - Some compounds are elements.
- II and III
  - I and IV
  - I and III
  - III only

The following graph illustrates the composition of Earth's crust.



- A 13. The graph above displays the principal elements present in Earth's crust. Which of the elements are non-metals?
- Oxygen
  - Sodium
  - Potassium and magnesium
  - Oxygen and calcium

- D 14. When the "staircase" is drawn into the periodic table, where are the metals found?
- The metals are separated by the staircase.
  - The metals are found to the right of the staircase.
  - The metals are found along the top row of the staircase.
  - The metals are found to the left of the staircase.

- B 15. Magnesium reacts in the presence of hydrochloric acid to produce hydrogen magnesium oxide. Which of the following steps could slow this reaction?
- Increase the surface area of the magnesium metal.
  - Decrease the concentration of the hydrochloric acid.
  - Increase the concentration of the hydrogen magnesium oxide.
  - Increase the surrounding temperature.

D16.

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Which of the following statements describes the conductivity of elements 3 and 4?

- A. Both elements are good insulators.
- B. Both elements are good conductors.
- C. Element 3 is a good conductor and element 4 is a good insulator.
- D. Element 3 is a good insulator and element 4 is a good conductor.

When two   i   elements are combined,   ii   compound is formed.

17. The statement above is completed by the information in row

D

Row	<i>i</i>	<i>ii</i>
A.	metallic	an ionic
B.	metallic	a molecular
C.	non-metallic	an ionic
D.	non-metallic	a molecular

Use the following information for the next 2 questions

1 1.01 1+ 1- <b>H</b> hydrogen								2 4.00 <b>He</b> helium
3 6.94 1+ <b>Li</b> lithium	4 9.01 2+ <b>Be</b> beryllium	5 10.81 <b>B</b> boron	6 12.01 <b>C</b> carbon	7 14.01 3- <b>N</b> nitrogen	8 16.00 2- <b>O</b> oxygen	9 18.00 1- <b>F</b> fluorine	10 20.18 <b>Ne</b> neon	
11 22.99 1+ <b>Na</b> sodium	12 24.31 2+ <b>Mg</b> magnesium	13 26.98 3+ <b>Al</b> aluminum	14 28.09 <b>Si</b> silicon	15 30.97 3- <b>P</b> phosphorus	16 32.07 2- <b>S</b> sulfur	17 35.45 1- <b>Cl</b> chlorine	18 39.95 <b>Ar</b> argon	

**Legend for Elements**

Solid	Gas
-------	-----

**Note:** The legend denotes the states of elements at a temperature of 25 °C.

**Key**

Atomic number →	3	6.94	← Atomic molar mass
	1+	1+	← Common ion charges (most common first)
Symbol →	<b>Li</b>		
	lithium		← Name

18. Which of the following statements about helium, neon, and argon is true?

- A. They have the same number of protons.
- B. They have the same number of neutrons.
- C. They are solids at a temperature of 25 °C.
- D. They react with other substances in a similar way.

D

19. Which of the following rows identifies both the elements and number of atoms that are present in one molecule of C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>?

Row	Elements	Number of Atoms
A.	Carbon, helium, and oxygen	12
B.	Carbon, helium, and oxygen	24
C.	Carbon, hydrogen, and oxygen	12
D.	Carbon, hydrogen, and oxygen	24

D

20.

A student tests the reactivity of four metals by placing a piece of each metal into hydrochloric acid. Each piece has an initial mass of 40 g. The student records her observations in the following table.

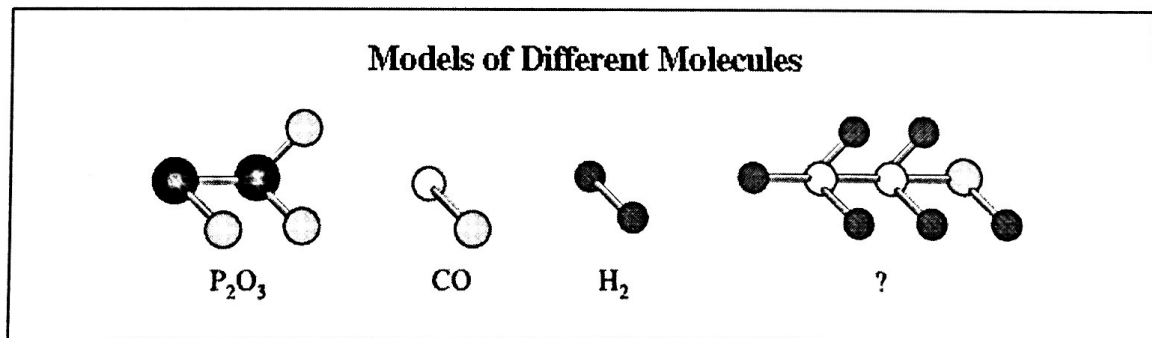
Metal	Initial acid concentration (g/L)	Temperature of solution after metal reacts with hydrochloric acid ( $^{\circ}\text{C}$ )	Mass of metal after it reacts with hydrochloric acid (g)
1	200	28	18
2	200	29	32
3	200	42	14
4	200	35	20

The information in the table shows that the metal that reacts **most readily** with hydrochloric acid is

- A. 1  
 B. 2  
 C. 3  
 D. 4

*B*      *C*

21.



The chemical formula for the unknown molecule shown above is

- A.  $\text{P}_2\text{H}_5\text{OH}$   
 B.  $\text{P}_2\text{H}_5\text{CH}$   
 C.  $\text{C}_2\text{H}_5\text{OH}$   
 D.  $\text{O}_2\text{H}_5\text{CH}$

*C*

**Numeric Response Question #1.**

Use the following information to answer numerical-response question 1

A student burns a piece of magnesium that has a mass of 70.2 g and makes the following observations.

- Heat is generated.
- An intense white light is emitted.
- A mass of 130.8 g of white magnesium oxide ash is produced.

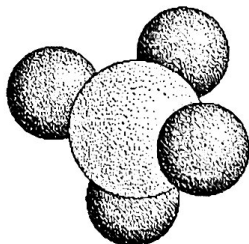
**Numerical Response**

- 1 The mass of oxygen that reacts in the chemical reaction described above is \_\_\_\_\_ g.

60.6

(Record your answer in the numerical-response section on the answer sheet.)

The following molecule has one carbon atom (light) and four hydrogen atoms (dark).



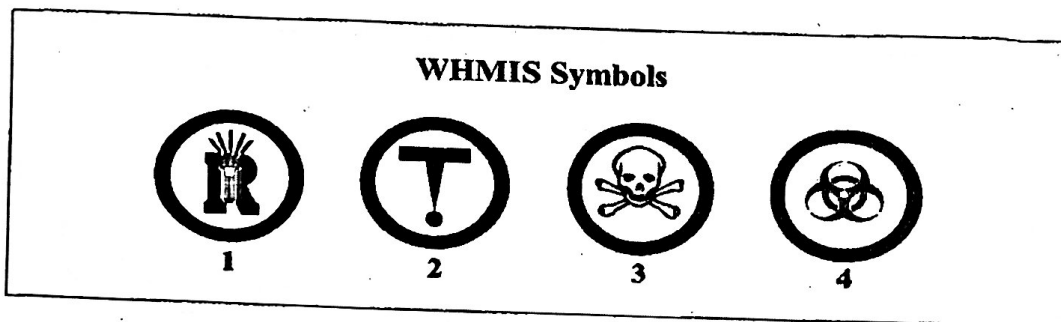
A

- A 22. The molecule shown above is
- a molecular compound.
  - an ionic compound.
  - a molecular atom.
  - an ionic atom.

- A 23. Which of the following are noble gases?
- Helium
  - Argon
  - Krypton
  - Bromine
  - Xenon
  - Astatine
- I, II, III, and V
  - II, III, IV, and VI
  - III, IV, V, and VI
  - All are noble gases.



Numeric Response Question #2



**Numerical Response**

Match each WHMIS symbol above with its corresponding description, as given below. Use each number only once.

<b>WHMIS Symbol:</b>	3	4	1	2
<b>Description:</b>	<b>Poisonous and infectious material causing immediate and serious toxic effects</b>	<b>Biohazardous infectious material</b>	<b>Dangerously reactive material</b>	<b>Poisonous and infectious material causing other toxic effects</b>

(Record all four digits of your answer in the numerical-response section on the answer sheet.)

- A 24. The element sodium has the following properties: silver lustre, reactivity, electrical conductivity, malleability. Potassium is found directly below sodium in the periodic table. You can expect potassium to
- a. have similar properties to sodium since they are in the same family.
  - b. have very different properties from sodium since it is in a different period. A
  - c. be malleable and a good conductor, but to be unreactive.
  - d. have fewer electrons than sodium.

- C 25. The chemical formula for propane is  $C_3H_8$ . Which of the following accurately depicts the ratio of elements in this compound?
- a. 3 atoms of carbon, 8 atoms of helium.
  - b. 3 atoms of calcium, 8 atoms of helium.
  - c. 3 atoms of carbon, 8 atoms of hydrogen.
  - d. 3 atoms of chlorine, 8 atoms of hydrogen.

C 26. What does the acronym WHMIS stand for?

- a. Workplace Hazardous Meanings & Information System
- b. Workplace Hazardous Materials in Symbols
- c. Workplace Hazardous Materials Information System
- d. Working Hazardous Materials in Systems

B 27. You are frying an egg over a campfire. Which of the following reactions taking place is endothermic

- a. The fire burning
- b. The egg frying
- c. Both the fire burning and the egg frying
- d. Neither the fire burning nor the egg frying

C 28.

Use the following table to answer question

**Observations from Four Experiments That Involve Mixtures**

Experiment	Procedure	Observation
I	White powder is added to water.	Gas is given off.
II	A solution is heated until it boils.	Vapour rises, and solute is left in the beaker.
III	Yellow powder is added to water.	Powder dissolves.
IV	A pure solution is added to another pure solution.	A powder appears at the bottom of the beaker.

In which two of the experiments above did a physical change occur?

- A. I and III
- B. I and IV
- C. II and III
- D. II and IV

C

### Numeric Response Question #3

Identify each element as either

1. Noble Gas
2. Alkali Metal
3. Halogen
4. Alkaline Earth Metal

Fluorine

3

Francium

2

Neon

1

Magnesium

4

Use the following information to answer questions 29 and 30.

You observe a metal being placed into a beaker of green coloured acid. Very soon, a gas is being given off, the green colour begins to fade, and the temperature of the solution in the beaker increases.

29. Which statement best describes the changes that take place?
- A. endothermic chemical reaction
  - B. exothermic chemical reaction
  - C. endothermic corrosion reaction
  - D. exothermic respiration reaction
30. Which of the following observations of the reaction is **not** evidence of a chemical change?
- A. melting
  - B. temperature change
  - C. color change
  - D. gas being produced
31. The combination of baking soda ions ( $\text{HCO}_3^-$ ) and acetic acid ( $\text{HC}_2\text{H}_3\text{O}_2$ ) forms water and carbon dioxide. What is the correct word equation for this reaction?
- A. baking soda  $\rightarrow$  water + carbon dioxide
  - B. acetic acid + water  $\rightarrow$  carbon dioxide
  - C. baking soda + acetic acid  $\rightarrow$  water + carbon dioxide
  - D. acetic acid  $\rightarrow$  water + carbon dioxide

B

A

C

True and False.

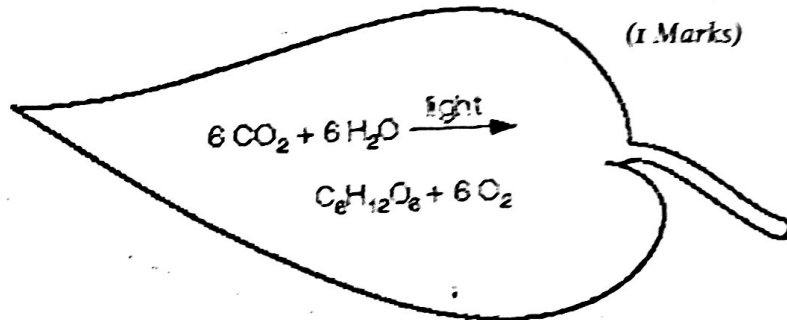
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Written Response and Fill in the Blank.

1. You have been given a substance and are told that it is a compound in which each molecule contains two atoms of chloride and one atom of calcium. What is the chemical name and formula for this compound? (1 Mark)

$\text{CaCl}_2$  Calcium Chloride

2. Most of the oxygen in Earth's atmosphere is produced by plants through the process of photosynthesis. This reaction is illustrated in the following diagram. (1 Mark)



- a) Write the word equation for the photosynthesis reaction shown above.

Carbon dioxide and water in the presence of light make  $\text{C}_6\text{H}_{12}\text{O}_6$  (sugar) and oxygen

- b) Identify the reactants and the products in the photosynthesis reaction shown above.

$\text{CO}_2 + \text{H}_2\text{O}$   
Reactants

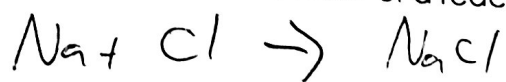
$\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$   
Products

2. Fill in the following table with the appropriate name, formula and category. (7 Marks)

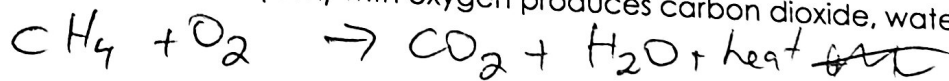
Formula	Compound Name	Ionic or Molecular
MgCl <sub>2</sub>	Magnesium Chloride	I
CaO	Calcium oxide	I
FeS	Iron Sulfide	I
NO <sub>2</sub>	Nitrogen dioxide	M
AgBr	silver bromide	I
P <sub>4</sub> Cl <sub>6</sub>	tetraphosphorus hexachloride	M
Br <sub>3</sub> O <sub>6</sub>	Tribromine Hexaoxide	M

3. Write chemical equations to represent each of the following statements. (6 Marks)

a) Salt (NaCl) forms as a result of a reaction between sodium and chlorine (Cl<sub>2</sub>).



b) The reaction of methane (CH<sub>4</sub>) with oxygen produces carbon dioxide, water, and heat.



c) Dihydrogen Monoxide is broken down using electrolysis into Hydrogen and Oxygen.

