

# REVIEW OF BASIC CHEMISTRY

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1. Name the following elements. Spelling counts:

H \_\_\_\_\_

S \_\_\_\_\_

Cl \_\_\_\_\_

C \_\_\_\_\_

N \_\_\_\_\_

Na \_\_\_\_\_

Pb \_\_\_\_\_

Ag \_\_\_\_\_

2. Write the symbols for the following elements.

sodium \_\_\_\_\_

phosphorus \_\_\_\_\_

fluorine \_\_\_\_\_

magnesium \_\_\_\_\_

potassium \_\_\_\_\_

calcium \_\_\_\_\_

zinc \_\_\_\_\_

iron \_\_\_\_\_

3. Using a periodic table, record the atomic number for the following elements:

gold (Au)

copper (Cu)

4. Using a periodic table, record the atomic mass for the following elements to one decimal place:

chlorine (Cl)

calcium (Ca)

- 
5. Complete the following table. Use the information provided in the chart – not a periodic table – to determine atomic masses, but you may refer to a periodic table to name the element.

Element	Atomic Number	Atomic Mass	Protons	Neutrons	Electrons
	82			125	
			18	40	
Barium		137			
		89			50

6. Match the unit with its description:

\_\_\_\_ 1. amount of substance

\_\_\_\_ 2. density

\_\_\_\_ 3. mass

\_\_\_\_ 4. molar mass

\_\_\_\_ 5. energy

\_\_\_\_ 6. volume

A. joule

B. g

C. g/mL

D. g/mole

E. L

F. mole

7. Complete the following questions concerning the element **oxygen**:

- a. Number of protons \_\_\_\_\_
- b. Electron configuration \_\_\_\_\_
- c. Number of electrons (neutral atom) \_\_\_\_\_
- d. Number of valence electrons \_\_\_\_\_
- e. Electron-dot diagram (Lewis dot) \_\_\_\_\_
- f. Ion most commonly formed by oxygen \_\_\_\_\_
- g. Is the ion in part (f) an anion or a cation? \_\_\_\_\_
- h. Define these terms:  
Anion - \_\_\_\_\_  
Cation - \_\_\_\_\_

8. Draw electron-dot diagrams for:

- a. potassium \_\_\_\_\_
- b. nitrogen \_\_\_\_\_
- c. phosphorus \_\_\_\_\_
- d. krypton \_\_\_\_\_

9. What type of chemical bond (ionic or covalent) will most likely form between:

- a. sodium and chlorine \_\_\_\_\_
- b. carbon and oxygen \_\_\_\_\_

10. Define these terms:

- ionic bond - \_\_\_\_\_
- covalent bond - \_\_\_\_\_

11. These polyatomic ions are missing their charges. Please add the correct charge and name them:

- |                  |       |                                |       |
|------------------|-------|--------------------------------|-------|
| SO <sub>4</sub>  | _____ | NH <sub>4</sub>                | _____ |
| NO <sub>3</sub>  | _____ | OH                             | _____ |
| PO <sub>4</sub>  | _____ | CO <sub>3</sub>                | _____ |
| CrO <sub>4</sub> | _____ | Cr <sub>2</sub> O <sub>7</sub> | _____ |

12. Write chemical formulas for the compounds:

- |                      |       |                       |       |
|----------------------|-------|-----------------------|-------|
| a. sodium chloride   | _____ | e. magnesium fluoride | _____ |
| b. ammonium sulfate  | _____ | f. lead(II) phosphate | _____ |
| c. potassium nitrate | _____ | dinitrogen            | _____ |
| d. calcium hydroxide | _____ | g. pentoxide          | _____ |
|                      |       | h. sulphur trioxide   | _____ |

13. Name the following:

- |  |       |
|--|-------|
| a. CO  | _____ |
| b. CO <sub>2</sub>                                 | _____ |
| c. Na <sub>2</sub> SO <sub>4</sub>                 | _____ |
| d. H <sub>2</sub> O <sub>2</sub>                   | _____ |
| e. (NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> | _____ |

14. List the seven diatomic molecules, using proper notation:

15. Calculate the molar masses of the following:

- |                     |                      |  |                        |
|---------------------|----------------------|--|------------------------|
| a. H <sub>2</sub> O | b. CaCO <sub>3</sub> | c. (NH <sub>4</sub> ) <sub>3</sub> PO <sub>4</sub> | d. Al(OH) <sub>3</sub> |
|---------------------|----------------------|--|------------------------|

16. Solve for x:

a.	$39 = \frac{x^2}{5.2}$	b.	$20 = \frac{4x}{5}$	c.	$2.5 \times 10^{-8} = \frac{(6.2 \times 10^{-2})(8.3 \times 10^{-3})}{x}$
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17. Liquid water is produced when hydrogen gas and oxygen gas combine.
- List the reactant(s) in this reaction \_\_\_\_\_
  - List the product(s) \_\_\_\_\_
  - Write a balanced equation for the reaction, including physical states
  
  - 286 kJ of energy are released during the formation of one mole of water.  
Therefore, is the reaction endothermic or exothermic? \_\_\_\_\_
  - Rewrite the equation but now also include the energy term within the equation.

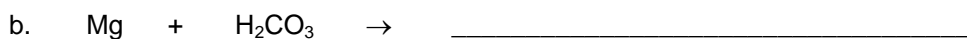
18. Perform the necessary calculations for the following questions, expressing the final answer to the correct number of significant digits. It is not necessary to show work.

- An empty beaker has a mass of 32.41 g. When some water is placed in the beaker, the total mass is 33.7822 g. Find the mass of the water.
  
- Convert 275 mL to litres.
  
- Ethyl alcohol has a density of 0.789 g/mL. Calculate the mass of 25.0 mL of this liquid.

19. Balance the following equations:

- $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
- $\text{Fe}_2(\text{SO}_4)_3 + \text{KOH} \rightarrow \text{K}_2\text{SO}_4 + \text{Fe}(\text{OH})_3$
- $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$

20. Predict the products of the following reactions:



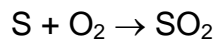
21. Write a net ionic equation for:  $\text{Cu(s)} + 2 \text{AgNO}_3(\text{aq}) \rightarrow \text{Cu(NO}_3)_2(\text{aq}) + 2 \text{Ag(s)}$

22. Perform the following calculations. Show your work.

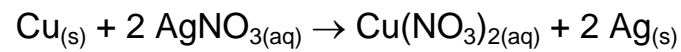
a. Calculate the mass of 0.500 mol of CO.

b. How many moles of KOH are present in a 25.0 g sample of the substance?

23. In a reaction between sulfur and oxygen, 80.0 g of sulfur dioxide is formed. What mass of sulfur was burned?



24. What mass of silver is precipitated (formed) when 40.0 g of copper reacts with an excess of silver nitrate in solution, according to the following equation:



25. (Challenge question) Some antacid products contain aluminium hydroxide,  $\text{Al}(\text{OH})_3$ , to neutralize excess stomach acid. What volume of a 0.10 mol/L stomach acid, HCl, can be neutralized by 912 mg of aluminium hydroxide. The reaction is shown:

