

## Chemistry Review

1. The elements whose symbols are P, C, and N are

- (a) potassium, cadmium, and nickel.
- (b) potassium, carbon, and nitrogen.
- (c) phosphorus, calcium, and neon.
- (d) phosphorus, carbon, and nitrogen.

2. Which of the following statements are true?

- (a) The formula of hydrochloric acid is HCl.
- (b) The formula of dinitrogen trioxide is  $N_2O_3$ .
- (c) The formula of hypochlorous acid is HClO.
- (d) The formula of phosphoric acid is  $H_2PO_3$ .

- a) all of the above      b) a&b      c) a,b&c      d) a,b&d

3. Which of the following sets of elements are all in the same group of the periodic table?

- (a) I, Br, F
- (b) Na, Ca, Mg
- (c) C, Si, N
- (d) F, C, O

- a) a only      b) b,c&d      c) b&c      d) a&c

4. Compounds in which the negative ion is  $O^{2-}$  and the positive ion is either  $Fe^{+2}$  or  $Fe^{+3}$  can have the formulae

- (a)  $O_2Fe_3$  or  $Fe_3O_2$
- (b) FeO or  $FeO_2$
- (c)  $Fe_2O$  or  $Fe_3O$
- (d)  $Fe_2O_3$  or FeO

5. Sodium

- (a) is an alkaline earth metal.
- (b) forms ions with a +2 charge.
- (c) can combine with iodine to form  $Na_2I$ .
- (d) is a nonmetal.

- a) a,b&c      b) d only      c) b&d      d)none

6. Which of the following ions are most likely to form?

- (a)  $Ba^{+1}$       (b)  $Al^{+2}$       (c)  $Li^{+2}$       (d)  $S^{-2}$

- a) a&c      b)b&d      c) c only      d) a,b&c

7. The names of the polyatomic ions  $NH_4^+$ ,  $SO_3^{-2}$ , and  $CO_3^{-2}$  are:

- (a) nitrite, sulfate, and carbonate
- (b) nitrate, sulfoxylate, and carboxide
- (c) nitrohydride, sulfotrioxylate, and oxocarbonium
- (d) ammonium, sulfite, and carbonate

8. Which of the following contains 15 protons and 10 electrons?

- (a)  $\text{Mg}^{+2}$
- (b)  $\text{P}^{+5}$
- (c)  $\text{Al}^{+3}$
- (d)  $\text{H}_2\text{O}$

9. Which of the following are elements?

- (a) water
  - (b) sugar
  - (c) table salt (NaCl)
  - (d) the atmosphere
- a) a&d   b) b&d   c) b only   d) none

10. The formula of the compound ammonium carbonate is

- (A)  $\text{NH}_4\text{CO}_3$
- (B)  $\text{NH}_4\text{CO}_4$
- (C)  $\text{NH}_4\text{HCO}_3$
- (D)  $(\text{NH}_4)_2\text{CO}_3$

11. Which element is **INCORRECTLY** matched with its symbol?

- a) Cu / copper
- b) Pb / lead
- c) K / potassium
- d) Cr / chromium
- e) B / bismuth

a) a&c   b) b&d   c) c only   d) a,b&c

12. Identify the compound below which is an ionic compound.

- a)  $\text{CH}_4$
- b)  $\text{H}_2\text{O}_2$
- c)  $\text{Na}_2\text{CO}_3$
- d)  $\text{NH}_3$
- e)  $\text{SO}_2$

13. Identify the compound formula that is **INCORRECT**.

- a)  $\text{Ca}_3(\text{PO}_4)_2$  for calcium phosphate
- b)  $\text{NaNO}_3$  for sodium nitrate
- c)  $\text{K}_2\text{CO}_3$  for potassium carbonate
- d)  $\text{NH}_4\text{SO}_4$  for ammonium sulfate
- e)  $\text{KCl}$  for potassium chloride

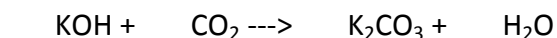
14. Identify the **INCORRECT** statement below:

- a) The atomic weight is the number of atoms in one mole of the element.
- b) The electron and proton have charges of equal magnitude and opposite sign.
- c) The atomic number is the number of protons in the nucleus.
- d) An atom is the smallest particle of an element that maintains the chemical identity of that element.
- e) The number above the element symbol on the periodic chart is the atomic number.

15. Identify the **INCORRECT** statement below:

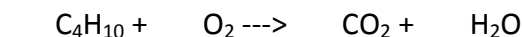
- a) Atoms cannot be created, destroyed, or transformed into atoms of another element except by nuclear reactions.
- b) Some elements exist in pure form as polyatomic molecules.
- c) All atoms of a given element have identical properties, which differ from those of other elements.
- d) Compounds form when masses of different elements combine in small whole-number ratios.
- e) The relative numbers and kinds of atoms are constant in a given compound.

16. Balance the following chemical equation with the smallest **whole number** coefficient.



- a) 2:1:1:4
- b) 1:1:1:1
- c) 2:1:1:2
- d) 2:1:1:1
- e) 2:2:1:4

17. Balance the following chemical equation with the smallest **whole number** coefficients. What is the value of the coefficient of  $\text{CO}_2$ ?



- a) 5
- b) 4
- c) 13
- d) 10
- e) 8

18. Identify the compound below which is a molecular (covalent) compound:

- a)  $\text{CaF}_2$
- b)  $\text{NaCl}$
- c)  $\text{Na}_2\text{CO}_3$
- d)  $\text{NH}_4\text{NO}_3$
- e)  $\text{SO}_3$

19. Identify the compound formula that is **INCORRECT**.

- a)  $\text{AgCl}$  = silver chloride
- b)  $\text{KNO}_3$  = potassium nitrate
- c)  $\text{CuCO}_3$  = copper(I) carbonate
- d)  $\text{NH}_4\text{Cl}$  = ammonium chloride
- e)  $\text{ZnBr}_2$  = zinc bromide

20. Which of the following is **NOT** a typical property of a metal?

- a) forms ionic compounds with nonmetals
- b) tendency to lose electrons to form cations
- c) outer electron shells contain 4 or more electrons
- d) high electrical conductivity
- e) high heat conductivity

21. A negative ion, symbolized by  $\text{X}^{2-}$ , forms a compound with a metal M, of the formula  $\text{M}_2\text{X}$ . What is the charge on the metal, M?

- a) +1
- b) +2
- c) +3
- d) +4

1. Which of the following **unbalanced** processes best describes a neutralization reaction of an acid and a base?

- (a)  $\text{NaOH} + \text{Al} \rightarrow \text{NaAlO}_3 + \text{H}_2$
- (b)  $\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}(\text{HSO}_4)_3 + \text{H}_2\text{O}$
- (c)  $\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$
- (d)  $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$

- (e) both 1 and 2;
- (f) both 2 and 3;
- (g) both 3 and 4.

23. In a solution with a pH of 3 the color of

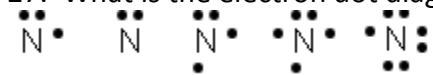
- (1) litmus is red;                      (2) litmus is blue;
- (3) phenolphthalein is red;      (4) phenolphthalein is                      blue.

24. The formula for sulfuric acid is (a)  $\text{H}_2\text{SO}_3$ ; (b)  $\text{H}_2\text{SO}_4$ ; (c)  $\text{H}_2\text{S}$ ; (d)  $\text{HCl}$ ; (e)  $\text{H}_2\text{PO}_3$ ; (f)  $\text{H}_2\text{PO}_4$ ; (g)  $\text{H}_2\text{PO}_5$ ; (h)  $\text{HC}_2\text{H}_3\text{O}_2$ ; (i)  $\text{HNO}_2$ ; (j)  $\text{HNO}_3$ ; (k)  $\text{H}_2\text{SeO}_4$ .

25. Which of the responses in question above is the correct formula for acetic acid? Phosphoric acid?

26. In a substance litmus is blue. The pH of the solution could be (1) 10; (2) 2; (3) 3; (4) 4.

27. What is the electron dot diagram for the nitrogen atom?



28. Atoms of element X, having two valence electrons each, combine with atoms of element Y, having six valence electrons each. The compound formed is expected to have the formula

- A. XY
- B.  $\text{X}_3\text{Y}$
- C.  $\text{XY}_3$
- D.  $\text{X}_2\text{Y}$
- E.  $\text{XY}_2$

29. If X represents any of the elements of the carbon family, then the general formula for the hydrogen compound of X is

- A.  $\text{XH}_5$
- B.  $\text{X}_2\text{H}_3$
- C. XH
- D.  $\text{XH}_2$
- E.  $\text{XH}_4$

**Short and long answer**

**1. Complete the chart below:**

Element Name	Valence	Lewis Structure	Family
Potassium			
Magnesium			
Argon			
Oxygen			
Calcium			

**2. Define the following:**

a. Ionic bond: \_\_\_\_\_  
\_\_\_\_\_

b. Covalent bond: \_\_\_\_\_  
\_\_\_\_\_

**3. Using Lewis dot diagrams draw the following ionic molecules.**

K + F	Be + S
Mg + Cl	2Na + O

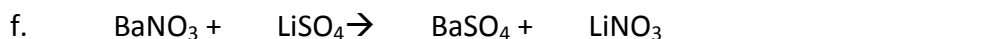
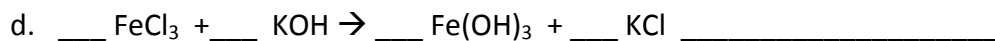
4. Using Lewis dot diagrams draw the following covalent molecules.

H <sub>2</sub>	F <sub>2</sub>
O <sub>2</sub>	H <sub>2</sub> O

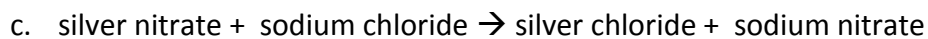
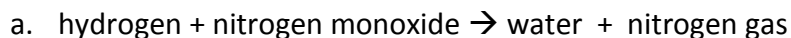
5. Complete the chart

Formula	Name	ionic/covalent
a. MgS		
b.	Sulfur trioxide	
c. Ba <sub>3</sub> N <sub>2</sub>		
d. P <sub>2</sub> O <sub>5</sub>		
e.	Aluminum Oxide	
f. KNO <sub>3</sub>		
g.	Sodium Sulfate	
h. N <sub>2</sub> O		
i. CaCO <sub>3</sub>		
j. Mg(OH) <sub>2</sub>		

**6. Balance each of the following chemical reactions and determine the reaction type.**



**7. For each of the following write and balance the chemical reactions.**





**8. Define the following terms:**

a) Acid: \_\_\_\_\_  
\_\_\_\_\_

b) Base: \_\_\_\_\_  
\_\_\_\_\_

c) Neutralization reaction: \_\_\_\_\_  
\_\_\_\_\_

d) pH : \_\_\_\_\_  
\_\_\_\_\_

**9. Characteristics of ....**

	Acids	Bases
a.		a.
b.		b.
c.		c.
d.		d.
example:		example:

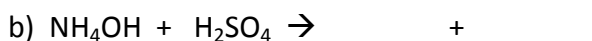
10. a) List 3 examples of acids found in your home.

\_\_\_\_\_

b) List 3 examples of bases found in your home.

\_\_\_\_\_

11. Neutralization reactions result in the formation of a salt (ionic compound) and water. Given the following reactants, predict the products.



Hint: Neutralization reactions are a type of double displacement reaction.

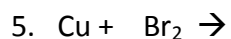
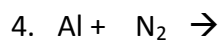
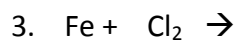
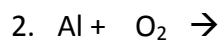
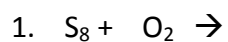
12. Rewrite the above reactions in their balanced form.

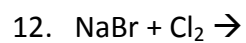
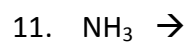
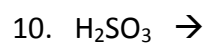
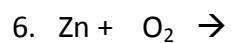
a) \_\_\_\_\_

b) \_\_\_\_\_

c) \_\_\_\_\_

13. Complete and balance the equation and give the reaction type.





14. In one or two sentences explain these chemistry terms:

Element

Atom

Proton

Neutron

Electron

Atomic Number

Atomic Mass

Periods

Groups

Valence Shell

Metals

Non-metals

Ions

Ionic Compound

Covalent Compound

Law of Conservation of Mass

Coefficient

Subscript

Single Replacement

Double replacement

Synthesis

Decomposition

Combustion

Product

Reactant

Indicators

Neutral