Name: _____ Date: _____

1. A physical property is:

A) a property that a sample displays without changing its composition.
B) the ability of a sample to undergo a chemical change.
C) a substance made of a single type of atom.
D) always visible.
E) a property which can not be determined without changing in composition.

2. How many significant figures should the answer to the following calculation have?

$$(1.4312 - 1.1 \times 10^{-2}) \div (1.0712 \times 10^{-4})$$

A) 2
B) 5
C) 3
D) 4
E) 1

3. It takes light one second to travel 2.998×10^{8} m. How many kilometers does light travel in exactly 24 hours ?

A) 2.590×10^{10} km
B) 1.086×10^{9} km
C) 7.195×10^{9} km
D) 4.317×10^{8} km
E) 1.086×10^{8} km

4. Choose the pure substance from the list below.

A) air
B) coffee
C) sugar
D) lemon juice
E) milk

5. Calculate the density in g/cm^3 of a 15.0 lb block of aluminum which has a volume of 0.6657 U.S. gal. (1 gal = 3.785 L, 1 lb = 453.6 g)

A) 2.70 g/cm^3
B) **22.5 g/cm^3**
C) 11.5 g/cm^3
D) 0.371 g/cm^3
E) 2.25 g/cm^3

6. Which one of the following elements is most likely to be a good conductor of electricity?

A) V
B) N
C) S
D) He
E) Cl

7. In his oil-drop experiment, Millikan was able to:

A) measure the charge of the electron with a great precision.
B) determine the ratio of the electric charge to the mass of a single proton.
C) prove that different samples of a given compound always contain that same mass ratio of its elements.
D) verify the spontaneous emission by radioactive substances.
E) show that Thomson's atomic model can not be correct.

8. Bromine (Br) has two isotopes, with masses of 78.92 and 80.92 amu. What is the natural abundance of the heavier isotope?

A) 49%
B) 53%
C) 13%
D) 68%
E) 87%

9. Predict the formula of the binary compound which will form from the elements galiium and oxygen.

A) Ga_2O_3
B) Ga_3O_2
C) GaO_3
D) Ga_3O
E) Ga_3O_4

10. The correct name of the compound HIO_2 is

A) iodous acid
B) hypoiodous acid
C) hydrogen iodite
D) iodic acid
E) hydrogen monoiodo dioxide

11. What is the coefficient for H_2O when the following equation is balanced with the smallest whole numbers?

$$CH_4\,(g) + NH_3\,(g) + O_2\,(g) \rightarrow HCN\,(g) + H_2O(g)$$

A) 6
B) 5
C) 8
D) 4
E) 7

12. Propane (C_3H_8) reacts with oxygen to produce carbon dioxide and water. How many grams of propane is needed to produce 38.0 grams of carbon dioxide?

A) 12.7 g
B) 4.23 g
C) 0.236 g
D) 22.1 g
E) 44.2 g

13. Under appropriate conditions, nitrogen and hydrogen undergo a combination reaction to yield ammonia:

$$N_2\,(g) + 3\,H_2\,(g) \rightarrow 2NH_3\,(g)$$

If the reaction yield is 87.5%, how many moles of N_2 are needed to produce 51.0 g of NH_3?

A) 1.71
B) 0.166
C) 1.00
D) 1.16
E) 2.32

14. How many hydrogen atoms are present in 1.00 g of potassium ammonium sulfate?

A) 1.57×10^{22}
B) 4.33×10^{21}
C) 1.73×10^{22}
D) 3.93×10^{21}
E) 2.33×10^{21}

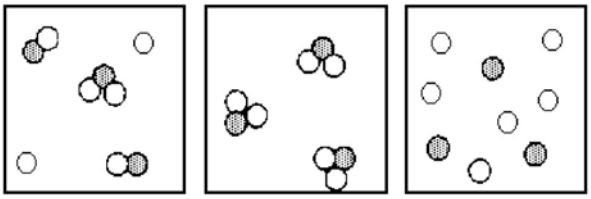
15. Determine the mass percent of iron in $Fe_4[Fe(CN)_6]_3$.

A) 45 %
B) 26 %
C) 33 %
D) 58 %
E) 29 %

16. Which one of the following aqueous solutions will react with aqueous potassium chloride to give precipitates?

A) lead(II) nitrate
B) calcium chlorate
C) iron(III) bromide
D) barium iodide
E) sodium sulfate

17. Three different substances, A_2X, A_2Y, and A_2Z, were dissolved in water with the following results. (Water molecules are omitted for clarity.) Which of the substances is the strongest electrolyte, and which is the weakest? **Select the correct statement:**



A) A_2Z is the strongest electrolyte and A_2Y is the weakest electrolyte.
B) **A_2X is the strongest electrolyte and A_2Y is the weakest electrolyte.**
C) A_2Y is the strongest electrolyte and A_2X is the weakest electrolyte.
D) A_2Y is the strongest electrolyte and A_2Z is the weakest electrolyte.
E) A_2Z is the strongest electrolyte and A_2X is the weakest electrolyte.

18. The reaction of 110. g of magnesium peroxide (MgO_2) with 0.350 L of a hydrobromic acid solution containing 2.72 g HBr per mL proceeds according to the following balanced equation:

$$MgO_2(s) + 2\ HBr(aq) \rightarrow \quad H_2O_2(aq) + MgBr_2(aq)$$

What mass of which reactant is left unreacted after the reaction is complete?

A) 636 g HBr
B) 55.0 g MgO_2
C) 66.5 g HBr
D) 9.23 g MgO_2
E) 360. g MgO_2

19. Which one is the *oxidizing agent* in the following reaction?

$$5H_2O_2 + 2MnO_4^- + 6H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5O_2$$

A) MnO_4^-
B) H_2O_2
C) H^+
D) Mn^{2+}
E) O_2

20. A 0.845 g sample of the an unknown diprotic acid requires 26.66 mL of 0.117 *M* NaOH to be completely neutralized. Calculate the approximate molar mass of the acid.

A) 542 g/mol
B) 341 g/mol
C) 641 g/mol
D) 271 g/mol
E) 135 g/mol

Answer Key

1. A
2. A
3. A
4. A
5. A
6. A
7. A
8. A
9. A
10. A
11. A
12. A
13. A
14. A
15. A
16. A
17. A
18. A
19. A
20. A