

Pre-requisite Evaluation Quiz

1. Perform the following conversions.

68 ng to g

1.36×10^{-4} cm to pm

251 °F to K

2. The density of gasoline is 0.894 g/mL. What mass of gasoline, in pounds, occupies 1.34 L ?
(1 pound = 454 g). Use dimensional analysis to solve.

3. Identify the following as either homogeneous (HM) or heterogeneous (HT).

_____ calcium carbonate

_____ scrambled eggs

4. Identify the following as either physical (P) or chemical (C) properties.

_____ gold does not react with concentrated hydrochloric acid

_____ diluting copper sulfate solutions make them lighter in color.

5. Fill in the chart of the following isotopes.

| <u>symbol</u> | <u>mass#</u> | <u>#p</u> | <u>#n</u> | <u>#e</u> |
|-----------------------|--------------|-----------|-----------|-----------|
| $^{131}_{53}\text{I}$ | _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | 20 | 17 |

6. Given the following elements, select only those that fit the following categories.

Si S Cr Ce K Kr Br Cu Ca Th

transition metals _____

metalloids _____

lanthanides _____

alkalai metals _____

halogens _____

non-metals _____

7. Technetium has been analyzed by mass spectrometry to be comprised of 3 isotopes. From the data below calculate the average atomic mass of technetium. **SHOW ALL WORK.**

| isotope | relative mass | % abundance |
|---------------|---------------|-------------|
| technetium-97 | 96.9832 amu | 2.13 % |
| technetium-98 | 97.9598 amu | 86.32 % |
| technetium-99 | 98.9384 amu | 11.55 % |

8. Write the complete electron configurations for the following

Cl _____

As _____

9. Draw an energy level diagram for phosphorous.

10. Iron ore is 36.0% FeO by mass.

How many grams of FeO are contained in 875 g of ore?

How many grams of Fe are contained in the 875g of ore?

a. 0.255 mols SO_2 into grams

b. 4.66×10^{24} molecules dichlorine monoxide into grams

c. 245 g $\text{Ca}(\text{NO}_3)_2$ into atoms of O.

17. A compound was analyzed to contain 39.33% C, 8.27% H, and 52.40% O by mass. The molar mass of the compound is 183.21 g/mol.

a. Determine the empirical formula for the compound.

b. Determine the true molecular formula for the compound.

18. Complete and balance the following.

sodium + nitrogen \rightarrow

aluminum + hydrocyanic acid \rightarrow

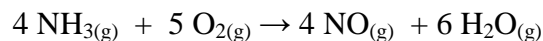
zinc iodate + potassium phosphate \rightarrow

the combustion of $\text{C}_2\text{H}_6\text{O}$

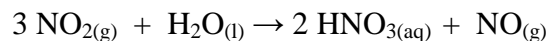
perchloric acid + scandium hydroxide \rightarrow

NH_3 decomposes to the elements by an electrical current

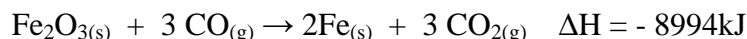
19. a. How many grams of water can be formed by the reaction of 185 g NH₃, according to the following.



b. How many liters of NO₂ at STP are required to make 97.6 g of HNO₃ according to the following.



c. How many grams of CO are required to react in order to release 3565 kJ of energy according to:



20. Illustrate, with drawings, how water molecules can solvate (hydrate) both cations and anions in solution.

21. True (T) or false (F):

_____ solids are more soluble in water at elevated temperature

_____ gases are more soluble in water at low temperature

_____ stirring increases the amount of solute that can dissolve in a given amount of solvent

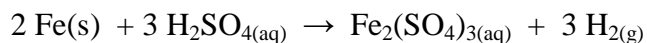
_____ small particles dissolve faster than large particles due to increased surface area

_____ in an unsaturated solution the rate of dissolved particles being deposited is greater than the rate of solid being dissolved.

22. What mass of a 23.4% LiCl solution is required to contain 75.5 g of LiCl? Use dimensional analysis to solve.

23. How many grams of scandium nitrate are contained in 375 mL of a 1.55 mol/L solution? Show all work.

24. According to the following:



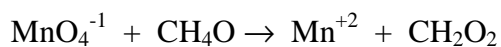
How many grams of iron are required to react completely with 175 mL of a 0.975 mol/L solution of H_2SO_4 ? Show all work.

25. Determine the oxidation number for the bold faced symbol.

a. H_2CrO_4 _____

b. HSO_3^{-1} _____

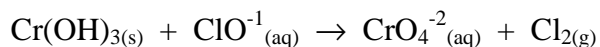
26. According to the following equation:



a. write the oxidation half reaction

b. write the reduction half reaction

27. According to the following equation:



a. _____ is the species oxidized

b. _____ is the species reduced

c. _____ is the oxidizing agent

d. _____ is the reducing agent