Section 1C – Review

Show your work and include units!!

1) The resources for all human activities must be obtained from Earth's atmosphere, hydrosphere, and outer layer of its lithosphere. These resources are not uniformly distributed. Briefly define these three layers of the planet and list two resources they provide.

Atmosphere – the air above the surface of the Earth – provide nitrogen, oxygen, helium, neon
Hydrosphere – water on the surface of the Earth (oceans, lakes, rivers) – provide hydrogen, oxygen, sodium, chlorine
Lithosphere – land and soil, Earth's crust. – provide all metals, iron, nickel, carbon

2) The feasibility of mining and extracting a mineral resource depends, in part, on how easily a particular metal can be processed and used, which largely depends on its chemical reactivity. What factors determine the possibility of mining a particular metallic ore at a certain site?

Ease of access to mineral (how deep/accessible is mineral?)
Amount of desired element in mineral (how much metal is in mineral?)
Ease of extraction (how easy is it to extract metal from mineral?)

3) Based on your metal activity series, which metals would be the easiest to process? In other words, which metals would be easiest to remove from all compounds?

Elements lower on the activity series would be easier to process, because they are not as active and can be pushed out by other elements.

4) Find the molar mass of each substance: Show your work and include units.
a) oxygen gas, O_2 d) limestone, calcium carbonate

      32.0 g/mol   100.1 g/mol

b) a typical antacid, magnesium hydroxide   e) aspirin, $C_9H_8O_4$

      58.3 g/mol   180.0 g/mol

c) bornite, Cu_5FeS_4 f) potash, potassium sulfate

      504.7 g/mol   174.3 g/mol

5) A major advantage of the mole concept is that it enables a chemist to "count by weighing." If one mole of potassium metal has a mass of 39.1 g, calculate the mass of the following:
a) 2 moles of potassium?   b) ½ moles of potassium?

      78.2 g   19.5 g

6) How many atoms are in 4 moles of aluminum? How many grams of aluminum would that be?

$4 (6.02 \times 10^{23}) = 2.4 \times 10^{24}$ atoms $4(27g) = 108 \ g$

7) Find the percent metal (by mass) in each compound:
a) Ag_2S b) Al_2O_3 c) $CaCO_3$

       87% Ag   53% Al   40% Ca

8) A 50.0 g sample of ore contains 5.00 g lead (II) sulfate, PbSO4. What is the percent by mass:
a) lead (Pb) in $PbSO_4$?   b) $PbSO_4$ in the ore sample?   c) Pb in the total ore sample?

       68% Pb   3.42 g Pb   6.8%

9) In water, two-thirds of the atoms are hydrogen atoms; however, the percent hydrogen by mass is not 67%. Explain.

2 out of 3 of the atoms in water are hydrogen (2/3 = 67%). However, hydrogen weighs a lot less than oxygen (H = 1g, O = 16g). When you figure in the mass of the H is only 2 out 18 g, the true percent of hydrogen by mass is only 11%.

10) How many moles are in 320 grams of magnesium chloride?

       3.36 moles

11) Calculate the mass of 4.6 moles of calcium sulfate .

       627 g

12) Calculate the moles of 2.2×10^{24} molecules of Br_2.

       3.65 moles

13) How many atoms are in 1.4 moles of Aluminum?

       8.43×10^{23} atoms

14) How many grams of CrS are in 5.7×10^{22} molecules?

       7.95 g

15) How many molecules of water are in 500 grams?

       1.67×10^{25} molecules