

CEM 141 Final Exam Fall 2006

Name _____

1. (12) Give the four tenants of Dalton's atomic theory

2. (9) List the three types of radiation and explain the difference between each.

3. (12) _____ and _____ regulate H^+ in cell fluids. _____ promotes growth and heals wounds. _____ is needed for strong healthy teeth. _____ is important for nervous system and reproduction. _____ is important for the metabolism of glucose.

4. (22) For the molecule ClO_3^{1-} answer the following:

a. Give the chemical name for the molecule. _____

b. The chlorine and oxygen atoms in the molecule are NOT neutral, they are charged (think oxidation state) Give the complete electron configuration of each in the molecule.

Cl: _____ O: _____

c. What is the EDG of the molecule? _____ d. What is the MG of the molecule? _____

e. What are the approximate bond angles between the atoms? _____

5. (6) Why does ammonia have a bond angle of 107.1 when VSEPR says it should be 109.5?

6. (22) A compound has the following mass %s'. 6.6 % H, 40.0 %C and 53 % O with molar mass of 30.0 g/mol.

a. (6)What is the molecular formula of this compound? _____

b. (6) Draw the Lewis structure of this compound----->>

c. (3) What is the molecular geometry of the molecule? _____

d. (3) What is the hybridization of the orbitals around the C atom? _____

e. (4) The molecules has _____ sigma bonds and _____ pi bonds.

7. (14) Given the following precipitation reaction between 6.56 g of aqueous zinc (II) nitrate and 9.54 g of aqueous potassium carbonate in 1.33 L of solution.

a) write the balanced chemical equation

b) What is the maximum mass of precipitate that could form, assuming complete reaction?

9. (48) One day Doc Ott bought his wife a beautiful mink coat to celebrate their 10th wedding anniversary. Well, that didn't sit too well with those green peace hippies. So they splashed red paint all over it. That angered the good doctor so in retaliation he decided to cut down all the trees in his forest, pile up the logs with as much coal as he could find. All the while dowsing the pile with as much petroleum as financially possible. And then lighting that mess in hopes of producing a giant acid rain cloud that will float across the ocean to Europe where most of those darn hippies live!

a. (6) Acid rain is generally comes from what two groups of compounds. Give names/ chemical formulas of each **and** the resultant acid in the clouds.

b. (5) Petroleum is C_8H_{18} . write the balanced chemical equation associated with the combustion of petroleum.

c. (8) Assuming there is plenty of oxygen in the system, How many moles of CO_2 were formed when Doc Ott lit up his 43.2 L of petroleum (density = 0.854 g/ml)

Coal also contains iron (I) sulfide and when burned together with excess oxygen Sulfur dioxide is produced.

d. (4) What is the formula of iron (I) sulfide? _____

e. (6) What is the mass% of iron in Iron(I) sulfide? _____ show calculation here:

f. (6) Why is iron important in my diet? Where can I get it from (besides coal effluent)

Ok, now all the SO_2 reacts with the H_2O in the clouds (and from the fire actually) to form H_2SO_4 via a series of complex reactions.

g. (4) What is the oxidation state of Sulfur in sulfuric acid. _____

h. (3) When going from SO_2 to H_2SO_4 , is the S oxidized or reduced? _____

i. (6) Coal also contains many different things in addition to carbon and sulfites such as Iron, uranium, Plutonium and Mercury and cadmium. Why is mercury and cadmium so bad for me?