Chem 130: Chemistry for Funeral Services
Problem Set 4: Due 2/21/06

Name: **KEY** Date:

Each question is worth one point. Show your work wherever calculations are required.

1. What is the difference between oxidation and reduction?

Oxidation involves the loss of electrons (often the gain of oxygen). Reduction involves the gain of electrons (often the gain of hydrogen).

2. Explain what a catalyst does.

A catalyst speeds the rate of a chemical reaction without being consumed in the reaction. It usually works by providing a surface or space in which the reactants can align or at least be in close proximity

3. In each reaction below, identify what is being oxidized and what is being reduced? (Be careful! Remember that the question only refers to reactants.)

$2\ Li + 2\ HCl \rightarrow 2\ LiCl + H_2$ **Li oxidized, H+ reduced**

$2\ C_2H_6 + 7\ O_2 \rightarrow 4\ CO_2 + 6\ H_2O$ **C_2H_6 oxidized, O_2 reduced**

$Zn + CuCl_2 \rightarrow ZnCl_2 + Cu$ **Zn oxidized, Cu^{+2} reduced (remember LEO GER!)**

4. Complete the following equations. Write NR if no reaction occurs. (Remember the activity series!)

$Fe + HOH \rightarrow$ **NR**

$Ca + 2\ HOH \rightarrow$ **$Ca(OH)_2 + H_2$**

$Mg + H_2SO_4 \rightarrow$ **$MgSO_4 + H_2$**

$Ag + HCl \rightarrow$ **NR**

5. How is an allotrope different from an isotope? Give a common example of an allotrope

An allotrope is a different arrangement of the atoms of the same element. An isotope is an atom with different number of neutrons in the nucleus of another atom of the same element. A common allotrope is molecular oxygen (diatomic oxygen) O_2 and ozone O_3.

6. Give the oxidation number for each element in the following compounds.

$FeCl_3$ **Fe +3, Cl -1** AgBr **Ag +1, Br -1**

Mg_3N_2 **Mg +2, N -3** NiO **Ni +2, O -2**

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7. How is blood clotting related to using purified water in embalming fluids? Why is it important to use purified water in embalming fluids (give the prim ary reason)?

   Blood clotting involves the presence of calcium ions. If calcium ions are present in embalming fluids, they would help promote clotting—an undesirable situation. This means that purified water should be used with embalming fluids.

8. Explain how hydrogen bonding takes place in water. Be sure to discuss bond polarity in your answer. Why is hydrogen bonding important?

   Water is a polar molecule with the electron density more concentrated around the oxygen atom than the two hydrogen atoms. This makes the oxygen end of the water molecule more negative and the hydrogen ends of the water molecule more positive. The negative end of with oxygen "lines up" with the positive ends of hydrogens from other water molecules forming a hydrogen bond. Hydrogen bonding is very important in organic chemistry and biochemistry.

9. Describe in some detail one method of purifying water.

   Looking for a description of precipitation methods or ion exchange methods. See the book or class notes for further details.

10. Give three factors that can change the speed of a chemical reaction. Give an example of each one.

Temperature, pressure (for gases), the presence of a catalyst, reactant concentration, surface area of the reactants.