

Name: \_\_\_\_\_

**Quiz #8**  
**CHEM 1411 — Fall 2009**

1. What is the oxidation number of the indicated element in each of the following species?(20 pts)

a. N in  $\text{NO}_2$  \_\_\_\_\_ c. Cl in  $\text{ClO}_3^-$  \_\_\_\_\_

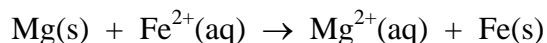
b. Cr in  $\text{Cr}_2\text{O}_7^{2-}$  \_\_\_\_\_ d. Mn in  $\text{KMnO}_4$  \_\_\_\_\_

2. What is the oxidation state of Cl in each of the following species? (20 pts)

a.  $\text{Cl}_2$  \_\_\_\_\_ c.  $\text{Cl}_2\text{O}$  \_\_\_\_\_

b.  $\text{Cl}^-$  \_\_\_\_\_ d.  $\text{ClO}_4^-$  \_\_\_\_\_

3. In the following reaction, identify the substance oxidized, the substance reduced, the oxidizing agent, and the reducing agent. (20 pts)



a. substance oxidized \_\_\_\_\_ c. oxidizing agent \_\_\_\_\_

b. substance reduced \_\_\_\_\_ d. reducing agent \_\_\_\_\_

4. Predict the product(s) of the following reactions and write a balanced molecular equation (including phase labels). If no reaction occurs, write "NR" after the arrow. (20 pts)

a. \_\_\_  $\text{Mg(s)}$  + \_\_\_  $\text{NiCl}_2(\text{aq}) \rightarrow$

b. \_\_\_  $\text{Ni(s)}$  + \_\_\_  $\text{AlCl}_3(\text{aq}) \rightarrow$

5. The pressure on the top of Mount Everest averages about 235 mmHg. Convert this pressure to torr and atm. (1 mmHg = 1 torr, 1 atm = 760 mmHg) (20 pts)

## THE ACTIVITY SERIES OF THE METALS

### Behavior toward H<sub>2</sub>

|                     |   |                      |                                       |
|---------------------|---|----------------------|---------------------------------------|
| <i>Most active</i>  | ↑ | Li                   |                                       |
|                     |   | K                    |                                       |
|                     |   | Ba                   |                                       |
|                     |   | Sr                   |                                       |
|                     |   | Ca                   |                                       |
|                     |   | Na                   | ↑ displace H <sub>2</sub> from water  |
|                     |   | Mg                   |                                       |
|                     |   | Al                   |                                       |
|                     |   | Mn                   |                                       |
|                     |   | Zn                   |                                       |
|                     |   | Cr                   |                                       |
|                     |   | Fe                   |                                       |
|                     |   | Cd                   | ↑↑ displace H <sub>2</sub> from steam |
|                     |   | Co                   |                                       |
|                     |   | Ni                   |                                       |
|                     |   | Sn                   |                                       |
|                     |   | Pb                   | ↑↑↑ displace H <sub>2</sub> from acid |
|                     |   | <u>H<sub>2</sub></u> |                                       |
|                     |   | Cu                   | ↓ do not displace H <sub>2</sub>      |
|                     |   | Hg                   |                                       |
|                     |   | Ag                   |                                       |
| <i>Least active</i> |   | Au                   |                                       |

**Table 1. Solubility Rules for Ionic Compounds in Aqueous Solution**

| IONS  | SOLUBLE COMPOUNDS  | INSOLUBLE COMPOUNDS  |
|---|--|--|
| <b>Salts Predominantly Soluble</b>  |  |  |
| Cl <sup>-</sup> , I <sup>-</sup> , Br <sup>-</sup>  | Most   | Ag <sup>+</sup> , Hg <sub>2</sub> <sup>2+</sup> , Pb <sup>2+</sup> , Cu <sup>+</sup>         |
| F <sup>-</sup>  | Most   | Mg <sup>2+</sup> , Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ba <sup>2+</sup> , Pb <sup>2+</sup> |
| Group I cations   | All  | None   |
| NH <sub>4</sub> <sup>+</sup>  | All  | None   |
| NO <sub>3</sub> <sup>-</sup> , ClO <sub>3</sub> <sup>-</sup> , ClO <sub>4</sub> <sup>-</sup> ,<br>C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> (CH <sub>3</sub> COO <sup>-</sup> ) | All  | None   |
| SO <sub>4</sub> <sup>2-</sup>   | Most   | Sr <sup>2+</sup> , Ba <sup>2+</sup> , Pb <sup>2+</sup> , Hg <sub>2</sub> <sup>2+</sup>       |
| <b>Salts Predominantly Insoluble</b>  |  |  |
| CO <sub>3</sub> <sup>2-</sup> , PO <sub>4</sub> <sup>3-</sup><br>oxalates (C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> )<br>chromates (CrO <sub>4</sub> <sup>2-</sup> )                         | Group I cations, NH <sub>4</sub> <sup>+</sup>  | Most   |
| S <sup>2-</sup>   | Group I & II cations, NH <sub>4</sub> <sup>+</sup>   | Most   |
| OH <sup>-</sup> , O <sup>2-</sup>   | Group I, Sr <sup>2+</sup> , Ba <sup>2+</sup> , Ra <sup>2+</sup> , NH <sub>4</sub> <sup>+</sup> | Most   |