Exam 3 Prep

1. Use the following information to answer the questions below:

$$C_3H_8\,(g) + 5O_2\,(g) \rightarrow 3CO_2\,(g) + 4H_2O\,(g)$$

| Compound | ▲$H_f$ (kJ/mol) |
|---|---|
| $C_3H_8$ (g) | -393.5 |
| $O_2$ (g) | 0 |
| $CO_2$ (g) | -241.8 |
| $H_2O$ (g) | -103.8 |

Calculate the change in enthalpy:

Is the reaction endothermic or exothermic?

2. Use the following information to answer the question below:

$$Al_2O_3\,(s) + 3H_2 \rightarrow 2Al\,(s) + 3H_2O\,(g)$$

| Compound | S (J/mol-K) |
|---|---|
| Al | 28.32 |
| $Al_2O_3$ | 51.00 |
| $H_2O$ | 188.8 |
| $H_2$ | 130.58 |

Calculate the standard entropy change:

3. Use the following information to calculate the Gibb's free energy and determine whether the reaction is spontaneous:

$$CO(NH_2)_2\ (aq) + H_2O\ (l) \rightarrow CO_2\ (g) + 2NH_3\ (g)$$

▲H = 119 kJ

▲S = 354.8 J/K

T = 25 C

Calculate ▲G:

Is the reaction spontaneous?

4. Determine which compound is oxidized and which is reduced and identify the reducing and oxidizing agents for the following reactions.

$MnO_4^-\ (aq) + SO_3^{2-}\ (aq) \rightarrow MnO_4^{2-}\ (aq) + SO_4^{2-}\ (aq)$

$Cl_2\ (aq) + 2KI\ (aq) \rightarrow I_2\ (s) + 2KCl\ (aq)$

5. Calculate the standard cell potential for the following reaction:

$$Al\ (s) + 3Ag^{+}\ (aq) \rightarrow Al^{3+}\ (aq) + Ag\ (s)$$

$Ag^{+}\ (aq) + e^{-} \rightarrow Ag\ (s)$ $\quad E = +0.80\ V$

$Al^{3+}\ (aq) + 3e^{-} \rightarrow Al\ (s)$ $\quad E = -1.66\ V$

What if the reaction was:

$Al^{3+} + 3Ag \rightarrow Al + 3Ag^{+}$

6. Balance the following redox reactions using the half-reaction method:

$Al + Ni^{2+} \rightarrow Al^{3+} + Ni$

$Zn + BrO_3^{-} \rightarrow Zn^{2+} + Br^{-}$

7. Balance the following redox reaction in basic conditions:

$Al + ClO_4^- \rightarrow Al(OH)_4^- + Cl^-$

8. Complete and determine which type of radioactive decay is occurring in the following:

$_{80}^{197}Hg + \quad \rightarrow {}_{79}^{197}Au$

$_{8}^{15}O \rightarrow \quad + {}_{+1}^{0}e$

$\rightarrow {}_{82}^{214}Pb + {}_{2}^{4}He$

$_{19}^{40}K + {}_{-1}^{0}e \rightarrow$

$_{82}^{214}Pb \rightarrow {}_{83}^{214}Bi +$

$\rightarrow {}_{84}^{218}Po + {}_{+1}^{0}e$

9. The atomic # is equal to:

10. The atomic mass is equal to:

11. What are the five layers of the atmosphere from farthest from us to closest to us?

12. Which part of the atmosphere do we live in?

13. Using arrows (right, left, up, down), explain how the following trends change across the periodic table and define them?

A) Ionization Energy

B) Atomic Radius

C) Electronegativity