CHM151 Quiz6 Fall 2018 25 Pts Name_____

SHOW ALL WORK NEAT FORM TO RECEIVE CREDIT. Due Monday, Oct. 29th

1) A 0.1326 g sample of magnesium was burned in an oxygen bomb calorimeter. The total heat capacity of the calorimeter plus water was 5,760 J/°C. If the temperature rise of the calorimeter with water was 0.570°C, calculate the enthalpy of combustion of magnesium in kJ/mol.
$Mg(s) + 1/2O_2(g) \rightarrow MgO(s)$

2) Acetylene (C_2H_2) undergoes combustion in excess oxygen to generate gaseous carbon dioxide and water. Given $\Delta H°_f[CO_2(g)] = -393.5$ kJ/mol, $\Delta H°_f[H_2O(g)] = -241.8$ kJ/mol, and $\Delta H°_f[C_2H_2(g)] = 226.6$ kJ/mol, how much energy is released (kJ) when 10.5 moles of acetylene is burned?

3) Calculate the standard enthalpy change for the reaction
$2C_8H_{18}(l) + 21O_2(g) \rightarrow 8CO(g) + 8CO_2(g) + 18H_2O(l)$.
Given:
$2C_8H_{18}(l) + 25O_2(g) \rightarrow 16CO_2(g) + 18H_2O(l)$ $\Delta H° = -11{,}020$ kJ/mol
$2CO(g) + O_2(g) \rightarrow 2CO_2(g)$ $\Delta H° = -566.0$ kJ/mol

4) When an automobile engine starts, the metal parts immediately begin to absorb heat released during the combustion of gasoline. How much heat will be absorbed by a 165 kg iron engine block as the temperature rises from 15.7°C to 95.7°C? (The specific heat of iron is 0.489 J/g·°C.)

5) A feverish student weighing 75 kilograms was immersed in 400. kg of water at 4.0°C to try to reduce the fever. The student's body temperature dropped from 40.0°C to 37.0°C. Assuming the specific heat of the student to be 3.77 J/g·°C, what was the final temperature of the water (specific heat of water 4.184 J/g·°C)?

6) Identify the precipitate(s) formed when solutions of $Na_2SO_4(aq)$, $Ba(NO_3)_2(aq)$, and $NH_4ClO_4(aq)$ are mixed.

7) Write the correct *net ionic equation* for the reaction that occurs when solutions of Na_3PO_4 and $Ca(NO_3)_2$ are mixed.

8) Identify the elements that are oxidized and reduced in the following reaction.

$KClO_3(aq) + 6HBr(aq) \rightarrow KCl(aq) + 3Br_2(l) + 3H_2O(l)$ Oxidized_____ Reduced_____

9) What volume (mL) of a 0.2450 M KOH(aq) solution is required to completely neutralize 55.25 mL of a 0.5440 M $H_3PO_4(aq)$ solution? You must write a balanced equation.

10) The concentration of oxalate ion ($C_2O_4^{2-}$) in a sample can be determined by titration with a solution of permanganate ion (MnO_4^-) of known concentration. The net ionic equation for this reaction is

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 10CO_2$

A 30.00 mL sample of an oxalate solution is found to react completely with 21.93 mL of a 0.1725 M solution of MnO_4^-. What is the oxalate ion concentration in the sample?

11) Predict the products of the following single replacement reaction. 11) _____

$Zn(s) + CoCl_2(aq) \rightarrow$

A) $ZnCo(aq) + Cl_2(g)$

B) No reaction occurs

C) $CoCl(aq) + ZnCl(aq)$

D) $Co(s) + ZnCl_2(aq)$

E) $ZnCoCl_2(aq)$

12) Which of the following will occur when a solution of $Pb(NO_3)_2(aq)$ is mixed with a solution of KI(aq)? 12) _____

A) A precipitate of KNO_3 will form; Pb^{2+} and I^- are spectator ions.

B) A precipitate of PbI_2 will form; Pb^{2+} and I^- are spectator ions.

C) A precipitate of PbI_2 will form; K^+ and NO_3^- are spectator ions.

D) No precipitate will form.

E) A precipitate of $Pb(NO_3)_2$ will form; K^+ and I^- are spectator ion