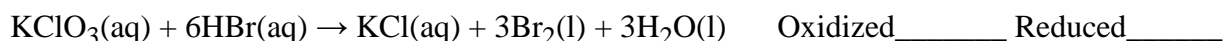


- 1) A 0.1326 g sample of magnesium was burned in an oxygen bomb calorimeter. The total heat capacity of the calorimeter plus water was 5,760 J/°C. If the temperature rise of the calorimeter with water was 0.570°C, calculate the enthalpy of combustion of magnesium in kJ/mol.
 $\text{Mg(s)} + 1/2\text{O}_2(\text{g}) \rightarrow \text{MgO(s)}$
- 2) Acetylene (C_2H_2) undergoes combustion in excess oxygen to generate gaseous carbon dioxide and water. Given $\Delta H^\circ_f[\text{CO}_2(\text{g})] = -393.5 \text{ kJ/mol}$, $\Delta H^\circ_f[\text{H}_2\text{O}(\text{g})] = -241.8 \text{ kJ/mol}$, and $\Delta H^\circ_f[\text{C}_2\text{H}_2(\text{g})] = 226.6 \text{ kJ/mol}$, how much energy is released (kJ) when 10.5 moles of acetylene is burned?
- 3) Calculate the standard enthalpy change for the reaction
 $2\text{C}_8\text{H}_{18}(\text{l}) + 21\text{O}_2(\text{g}) \rightarrow 8\text{CO}(\text{g}) + 8\text{CO}_2(\text{g}) + 18\text{H}_2\text{O}(\text{l})$.
Given:
 $2\text{C}_8\text{H}_{18}(\text{l}) + 25\text{O}_2(\text{g}) \rightarrow 16\text{CO}_2(\text{g}) + 18\text{H}_2\text{O}(\text{l}) \Delta H^\circ = -11,020 \text{ kJ/mol}$
 $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) \Delta H^\circ = -566.0 \text{ kJ/mol}$
- 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 $\text{Na}_2\text{SO}_4(\text{aq})$, $\text{Ba}(\text{NO}_3)_2(\text{aq})$, and $\text{NH}_4\text{ClO}_4(\text{aq})$ are mixed.

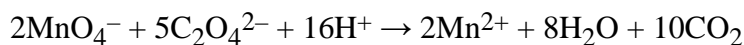
7) Write the correct *net ionic equation* for the reaction that occurs when solutions of Na_3PO_4 and $\text{Ca}(\text{NO}_3)_2$ are mixed.

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



9) What volume (mL) of a 0.2450 M $\text{KOH}(\text{aq})$ solution is required to completely neutralize 55.25 mL of a 0.5440 M $\text{H}_3\text{PO}_4(\text{aq})$ solution? You must write a balanced equation.

10) The concentration of oxalate ion ($\text{C}_2\text{O}_4^{2-}$) 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



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) _____



- A) $\text{ZnCo}(\text{aq}) + \text{Cl}_2(\text{g})$
- B) No reaction occurs
- C) $\text{CoCl}(\text{aq}) + \text{ZnCl}(\text{aq})$
- D) $\text{Co(s)} + \text{ZnCl}_2(\text{aq})$
- E) $\text{ZnCoCl}_2(\text{aq})$

12) Which of the following will occur when a solution of $\text{Pb}(\text{NO}_3)_2(\text{aq})$ is mixed with a solution of $\text{KI}(\text{aq})$?

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 $\text{Pb}(\text{NO}_3)_2$ will form; K^+ and I^- are spectator ion

