Chem P Heat Review

1. Find the energy needed to warm 17 g of water from 10 °C to 150°C.

2. If 70 g of Q (Cp =1.2 J/g°C) is at 80°C is dropped into 50 g of water at 10°C, find the final temperature.

3. 80 g of X at -10°C is added to 60 g of water at 50°C. The final temp is 41°C. Find the specific heat of X.

4. How much energy is needed to melt 50 g of ice at its melting point?

5. It took 200,000 J to vaporize 150 g of Substance Z at its boiling point. Find the heat of vaporization of Z.

6. A student tried to find the heat of fusion of ice in a lab. He added 10 g of ice at 0°C to 50 g of water at 30°C. The final temperature was 8°C. Find his value for the heat of fusion and his percent error.

7. Find ΔH_{rxn} for $2KClO_3 \rightarrow 2KCl + 3O_2$

8. If 8 g of C_2H_6 burn, how much heat is released?

9. $H_2SO_4 + 2NaOH \rightarrow 2H_2O_{(l)} + Na_2SO_4$
   a. 10 g sulfuric acid are used, find the heat released.
   b. If 204 kJ are released, what mass of water is produced?
   c. If 4 g NaOH are used and the heat produced is used to warm 100 g of water, find the change in temperature of the water.

10. Write the formation equation and show ΔH_f for
   a. Carbon dioxide
   b. Sodium hydroxide
   c. Carbon monoxide
   d. Aluminum oxide

11. Write a dissociation reaction for
   a. NaCl
   b. KOH
   c. $MgCl_2$

12. Find the heat released when 10 g of CO_2 is formed from its pure elements.

13. Find the heat released when 10 g of NaOH dissociates.

14. Find ΔH_{rxn} for the dissociation of NH_4NO_3.

For H_2O, Cp_s = 2.06 J/g°C, Cp_l = 4.18 J/g°C, Cp_g= 2.02 J/g°C, H_{fus} = 334 J/g, H_{vap}= 2260J/g

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15. If 10 g of ammonium nitrate dissolved in 50 g of water at 40° C, find the final temperature of the water.

16. Find the heat released when one mole of MgO forms from its elements.

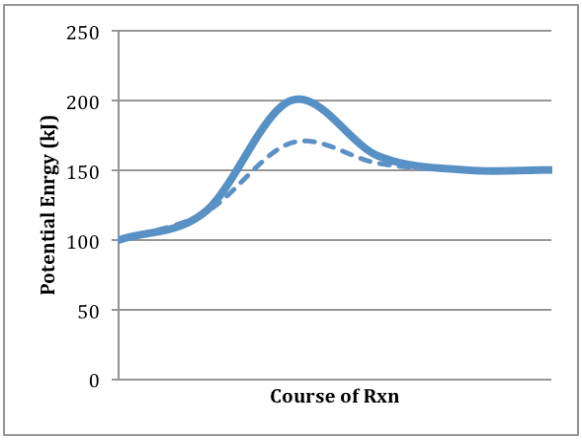
17. If 200 kJ of heat is released when MgO is formed as in #16, what mass of MgO forms?

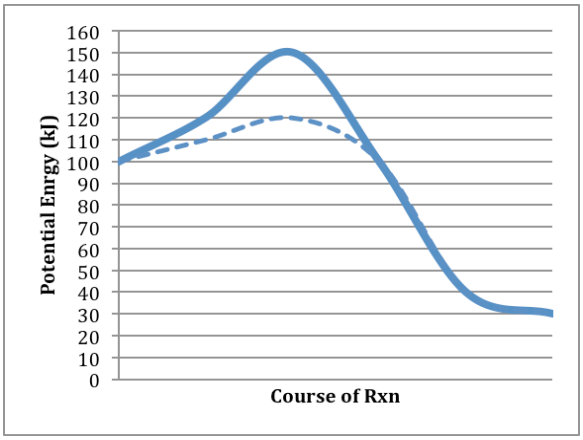
18. 4 g of magnesium chloride are dissolved in 90 g of water at 20°C. Find the final temperature of the water.

19. $2C_3H_6 + 9O_2 \rightarrow 6CO_2 + 6H_2O_{(g)}$ $\Delta H_{rxn} = -2785\ kJ/mol_{rxn}$
Find ΔH_f for C_3H_6.

20. $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O_{(l)}$ $\Delta H_{rxn} = +250\ kJ/mol_{rxn}$
Find ΔH_f for $CaSO_4$.

21. For each curve, find
    i. ΔH_{rxn}
    ii. ΔH_{rxn} reverse
    iii. Activation energy
    iv. Activation energy of the reverse rxn
    v. Catalyzed activation energy
    vi. Catalyzed activation energy of the reverse rxn





22. The heat produced from the burning of methane (CH_4) is used to take 2000 g of water from 10°C to 95°C. What mass of methane is burned?

For H_2O, $Cp_s = 2.06\ J/g°C$, $Cp_l = 4.18\ J/g°C$, $Cp_g = 2.02\ J/g°C$, $H_{fus} = 334\ J/g$, $H_{vap} = 2260 J/g$