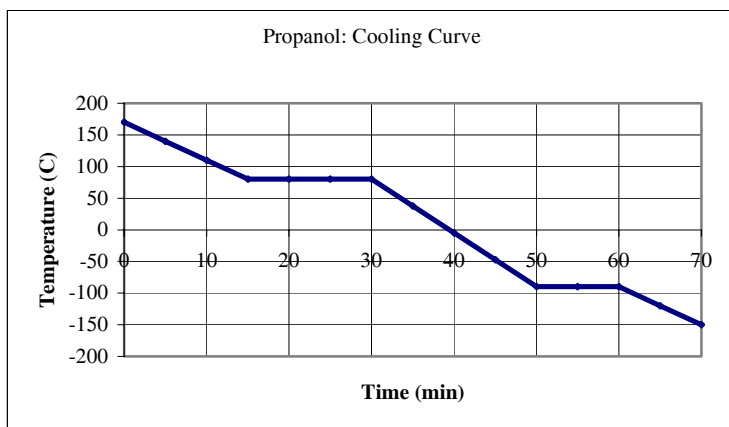
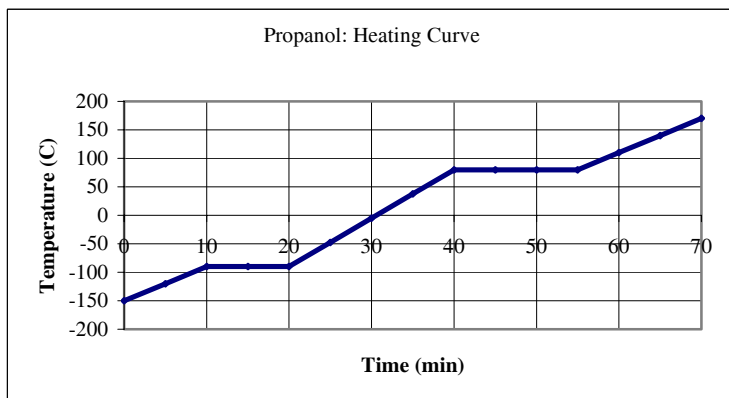


Name: _____
Period: ____

Review: Thermochemistry

I. Heating and Cooling

(1) Heating and cooling curves for propanol are shown.



- Label the curve to show where each phase is present.
(s = solid, l = liquid, and g = gas)
- Label the curves to show the phase changes.
(melting = s→l, boiling = l→g,
freezing l→s, and condensation g→l)
- What is the approximate melting point of propanol?
- What is the approximate boiling point of propanol?
- What is the approximate freezing point of propanol?
- What is the approximate condensation point of propanol?

(2) Calculate the amount of energy released when 150 g of ethanol freezes.

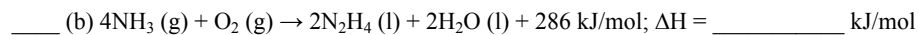
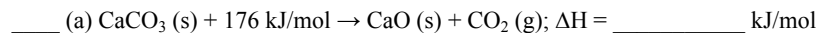
(3) Calculate the final temperature when 150 J of heat energy is applied to 40 g of iron at 25 °C.

(4) How much energy is required to turn 12 g of ice at -15 °C into steam at 105 °C? How many kJ is this?

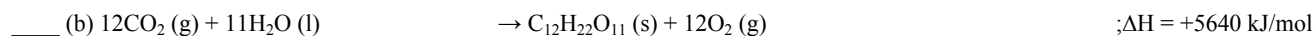
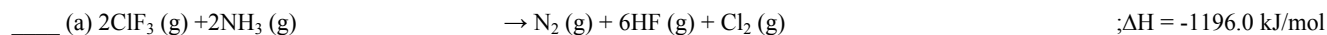
(5) A 2.40 g sample of glucose ($C_6H_{12}O_6$) is burned in a calorimeter filled with 1.5 kg of water. The water in the calorimeter changes from 18.0 °C to 22.0 °C. Calculate the heat given off by burning of glucose in kJ/mol.

II. Heats of Reaction

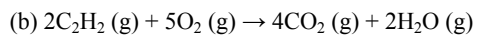
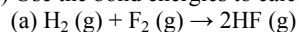
(1) Classify each reaction as endothermic or exothermic and determine ΔH .



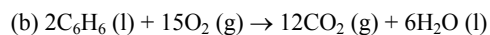
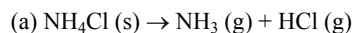
(2) Classify each reaction as endothermic or exothermic and rewrite the equation to include ΔH .



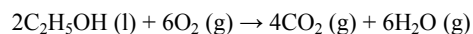
(3) Use the bond energies to calculate the heat of the reaction.



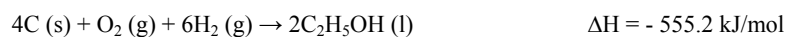
(4) Use the heats of formation to calculate the heat of the reaction.



(5) Use the steps provided to calculate the overall heat of the reaction.



Steps:

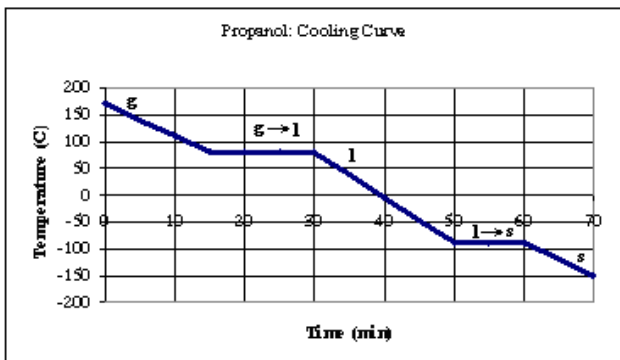
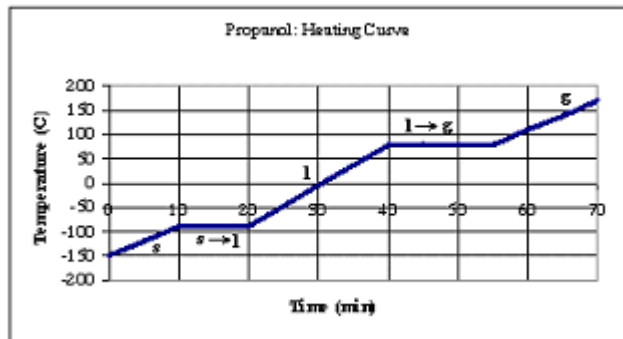


Answers:

I. Heating and Cooling

(1)

(a/b)



(c) -90 °C

(d) 80 °C

(e) -90 °C

(f) 80 °C

(2) 1.64×10^4 J

(3) 33 °C

(4) 3.7×10^4 J, 37 kJ

(5) 1.9×10^3 kJ/mol

II. Heats of Reaction

(1) (a) Endo; $\Delta H = +176$ kJ/mol

(b) Exo; $\Delta H = -286$ kJ/mol

(2) (a) Exo; $2\text{ClF}_3(\text{g}) + 2\text{NH}_3(\text{g}) \rightarrow \text{N}_2(\text{g}) + 6\text{HF}(\text{g}) + \text{Cl}_2(\text{g}) + 1196.0$ kJ/mol

(b) Endo; $12\text{CO}_2(\text{g}) + 11\text{H}_2\text{O}(\text{l}) + 5640$ kJ/mol $\rightarrow \text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s}) + 12\text{O}_2(\text{g})$

(3) (a) -541 kJ/mol

(b) -2476 kJ/mol

(4) (a) 176.2 kJ/mol

(b) -6534.8 kJ/mol

(5) -2733.6 kJ/mol