7.2 Quick Check - Changes in State

Check off each item if you can do the question. Write down a question to ask if you cannot do the question.

□ Changes in States
Name each process, and appropriately write “heat” in the chemical equation. Determine whether it’s endothermic or exothermic.

- \( \text{H}_2\text{O} \,(\text{s}) \rightarrow \text{H}_2\text{O} \,(\ell) \) _________________ endo | exo
- \( \text{H}_2\text{O} \,(\ell) \rightarrow \text{H}_2\text{O} \,(\ell) \) _________________ endo | exo
- \( \text{H}_2\text{O} \,(\ell) \rightarrow \text{H}_2\text{O} \,(s) \) _________________ endo | exo
- \( \text{H}_2\text{O} \,(\ell) \rightarrow \text{H}_2\text{O} \,(g) \) _________________ endo | exo

□ Heats of Fusion / Vaporization
- Samples of solid ethanol (\( \Delta H_{\text{fus}} = 26 \text{ cal/g} \)) and ice (\( \Delta H_{\text{fus}} = 80 \text{ cal/g} \)) have the same mass and were heated at their melting points. Which will require less energy to melt completely?
- When samples of liquid propane and liquid ethanol were heated with 400 J of energy at their boiling points, twice as many grams of propane vaporized as ethanol. Which has a higher \( \Delta H_{\text{vap}} \)?

□ Heat Calculations
For water, \( \Delta H_{\text{fus}} = 333 \text{ J/g}, \Delta H_{\text{vap}} = 2260 \text{ J/g} \)
\[ C_{p,\text{ice}} = 2.10 \text{ J/g} \cdot ^\circ \text{C}, C_{p,\text{water}} = 4.18 \text{ J/g} \cdot ^\circ \text{C}, C_{p,\text{steam}} = 2.08 \text{ J/g} \cdot ^\circ \text{C} \]
Show your work for each problem (list variables, write formula, substitute values, and write final answer).
- What is the value of \( Q \) when 70.0 g of steam condenses at 100°C?
- What mass of water freezes when 400 J of energy is released?

□ Heating Curve
Sketch how the temperature changes as heat is added to ice at -20 °C until it vaporizes to steam at 150°C. Identify the state(s) in each segment.