UNIVERSITY OF ALABAMA
Department of Physics and Astronomy

PH 125 / LeClair Spring 2009

Quiz 9: Temperature, Heat, & Thermodynamics

$$Q = cm\Delta T \qquad c_{\text{ice}} = 2.22\,\text{kJ/kg}\cdot\text{K}$$
$$Q = Lm \quad \text{phase change} \qquad c_{\text{water}} = 4.19\,\text{kJ/kg}\cdot\text{K}$$
$$T[K] = T[C] - 273.15 \qquad L_{F,\text{ice}} = 333\,\text{kJ/kg}$$

1. How much heat must be absorbed by ice of mass $m = 0.72\,\text{kg}$ at $T_i = -20°\text{C}$ to bring it to a liquid state at $T_f = 15°\text{C}$?

- 317 kJ
- 187 kJ
- 207 kJ
- 97 kJ

2. In the previous question, which step in the melting and heating process requires the *greatest* heat input?

- warming the ice
- melting the ice
- warming the liquid

3. In the previous question, which step in the melting and heating process requires the *smallest* heat input?

- warming the ice
- melting the ice
- warming the liquid

4. A $0.050\,\text{kg}$ ingot of metal is heated to 200°C and dropped into a beaker containing $0.400\,\text{kg}$ of water initially at 20.0°C. If the final equilibrium temperature is 22.4°C, what is the specific heat c of the metal? Ignore heat transferred to the beaker and boil-off of the water. Assume the system is isolated. (Note: $c_{\text{water}} = 4186\,\text{J/kg}\cdot\text{K}$.)

- 279 J/kg·°C
- 148 J/kg·°C
- 721 J/kg·°C
- 453 J/kg·°C

5. The temperature of a silver bar rises by 10°C when it absorbs $1.23\,\text{kJ}$ of energy by heat. The mass of the bar is $525\,\text{g}$. Determine the specific heat c of silver.

- 234 J/kg· K
- 1240 J/kg· K
- 1.95 J/kg· K
- 8820 J/kg· K