

AP CHEMISTRY WORKSHEET ON SPECIFIC HEAT

NAME: _____ DATE: _____ PERIOD: _____

SHOW YOUR WORK!!!!!! SHOW YOUR WORK!!!!!! SHOW YOUR WORK!!!!!!

- (1) An electric range burner weighing 583 grams is turned off after reaching a temperature of 535°C . Assume an average specific heat of $0.400\text{ J/g}\cdot^{\circ}\text{C}$ for the burner. Approximately how much heat will the burner exchange with the surroundings in cooling back to room temperature (room temperature is 20°C).

- (2) Approximately how much water, in GRAMS, could be heated from room temperature to the boiling point if ALL of the heat in question (1) could be transferred to the water? The specific heat of water is $4.184\text{ J/g}\cdot^{\circ}\text{C}$.

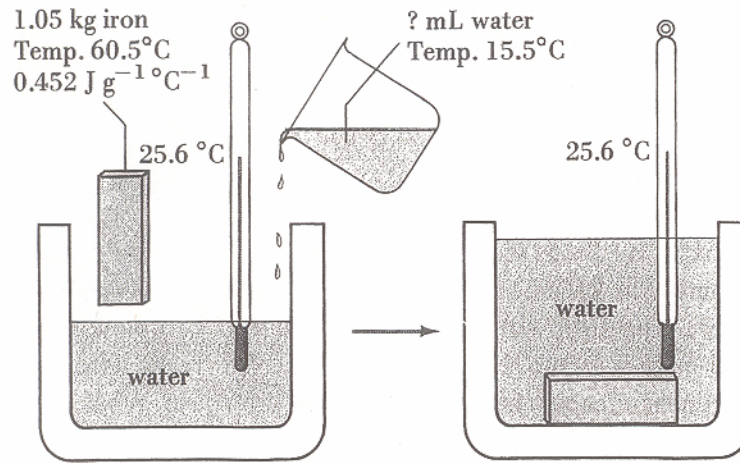
- (3) Magnesium metal has a specific heat of $1.04\text{ J/g}\cdot^{\circ}\text{C}$. A 70.0 g sample of this metal, at a temperature of 99.8°C , is added to a beaker containing 50.0 g of water at 30.0°C . The final water temperature is found to be 47.2°C . Is this result consistent with the Law of Conservation of Energy? EXPLAIN YOUR ANSWER.

- (4) 150.0 g of zinc at a temperature of 100.0°C is added to a beaker containing 50.0 g of water at 22.0°C . The final temperature of the zinc-water mixture has a temperature of 28.8°C . What is the specific heat of zinc?

- (5) A 625 g chunk of iron is removed from an oven and plunged into 525 g of water in an insulated container. The temperature of the water increases from 24.0°C to 92.0°C . If the specific heat of iron is $0.450\text{ J/g}\cdot^{\circ}\text{C}$, what must have been the original oven temperature?

- (6) A piece of stainless steel (specific heat = $0.500\text{ J/g}\cdot^{\circ}\text{C}$) is transferred from an oven at 152°C to 125 mL of water at 24.8°C , into which it is immersed. The water temperature rises to 40.3°C . What is the mass of the steel?

- (7) What volume of water at $15.5\text{ }^{\circ}\text{C}$ must be added, together with a 1.05 kg piece of iron at $60.5\text{ }^{\circ}\text{C}$, so that the temperature of the water in the insulated container shown in the diagram remains constant at $25.6\text{ }^{\circ}\text{C}$?



- (8) To bring 36.2 g of sulfur from $25.0\text{ }^{\circ}\text{C}$ to its melting point, the sulfur must absorb 2402 J of heat. What is the melting point of sulfur? (specific heat of sulfur is $0.706\text{ J/g }^{\circ}\text{C}$)
- (9) A 2.29 kg iron skillet (specific heat = $0.449\text{ J/g }^{\circ}\text{C}$) is heated to $375\text{ }^{\circ}\text{F}$, and 453 g of water at $11.5\text{ }^{\circ}\text{C}$ is poured into the skillet. Assuming no loss of heat, will the water reach its boiling point?
- (10) A 1.35 kilogram piece of iron at $132.0\text{ }^{\circ}\text{C}$ is dropped into 825 grams of water at $23.3\text{ }^{\circ}\text{C}$. The temperature rises to $39.6\text{ }^{\circ}\text{C}$. What is the specific heat of iron?

KEY: WORKSHEET ON SPECIFIC HEAT

- (1) $q = -1.2 \times 10^2 \text{ kJ}$ (or $-1.2 \times 10^5 \text{ J}$)
- (2) $m = 359 \text{ g H}_2\text{O}$
- (3) For this result to be consistent with the Law of Conservation of Energy,
 $q_{\text{Mg}} + q_{\text{Water}} = 0$.
 $-3829.28 \text{ J} + 3598.24 \text{ J} \neq 0$
 \therefore this result is not consistent with the Law of Conservation of Energy.
- (4) $C_{\text{Zn}} = 0.133 \text{ J/g} \cdot ^\circ\text{C}$
- (5) $T_{\text{F}} = 623 ^\circ\text{C}$
- (6) 145 g steel
- (7) $m = 392 \text{ mL}$
- (8) $119 ^\circ\text{C}$
- (9) $T_{\text{F}} = 74.6 ^\circ\text{C}$; no, will not reach boiling point
- (10) $0.451 \text{ J/g} \cdot ^\circ\text{C}$