

AP CHEM II WORKSHEET ON TEMPERATURE AND HEAT

Name: _____ Date: _____ Period: _____

- (1) Perform the following conversions:
- The temperature on a hot summer day is 99.5°F . What is this temperature in Celsius?
 - The melting point of potassium iodide (an ionic compound) is 681°C . What is this temperature in Kelvins?
 - Carbon tetrachloride (CCl_4) freezes at 250.2 K . What is this freezing point in Fahrenheit?
 - Thermodynamic tables are based on **standard laboratory temperature** (not to be confused with STP). Standard Laboratory Temperature is 25°C . What is standard laboratory temperature in Fahrenheit?
 - Neon, an inert gas used to make electrical signs, has a melting point of -248.6°C and a boiling point of -246.1°C . What are these temperatures expressed in Kelvins?
- (2) At what temperature will a Fahrenheit thermometer:
- Give the same reading as a Celsius thermometer?
 - Give a reading that is twice that of a Celsius thermometer?
 - Give a reading that is numerically equal but opposite in sign from the reading of a Celsius thermometer?
- (3) On the Réaumur scale, which is no longer used, water freezes at 0°R and boils at 80°R .
- Derive an equation that relates this to the Celsius scale.
 - Mercury is a liquid metal at room temperature that boils at 356.6°C . What is the boiling point of mercury on the Réaumur scale?

- (4) Temperature scales can be based on the freezing and boiling points of many pure liquids. If a temperature scale was based on the freezing point (5.5°C) and boiling point (80.1°C) of pure benzene (C_6H_6) and the temperature difference between these points was divided into 50 units (called $^{\circ}\text{X}$), what would be the freezing and boiling points of water (in $^{\circ}\text{X}$)?
- (5) The specific heat of aluminum is $0.895 \text{ J/g} \cdot ^{\circ}\text{C}$. Calculate the amount of heat required to raise the temperature of 15.8 grams of aluminum from 27.0°C to 41.0°C .
- (6) In some solar-heated homes, heat from the sun is stored in rocks during the day, and then released during the cooler night.
- Calculate the amount of heat required to raise the temperature of 85.0 kg of rocks from 25.0°C to 45.0°C . Assume that the rocks are limestone, which is essentially pure calcium carbonate. The specific heat of calcium carbonate is $0.818 \text{ J/g} \cdot ^{\circ}\text{C}$
 - Suppose that when the rocks in part (a) cool to 30.0°C , all the heat released goes to warm the 10,000 cubic feet (2.83×10^5 liters) of air in the house, originally at 10.0°C . To what final temperature would the air be heated? The specific heat of air is $1.004 \text{ J/g} \cdot ^{\circ}\text{C}$., and its density is $1.20 \times 10^{-3} \text{ g/mL}$.
- (7) A 20.0 gram sample of calcium initially at 26.1°C absorbs 905 J. What is the final temperature of the sample (the specific heat of calcium is $0.628 \text{ J/g} \cdot ^{\circ}\text{C}$).

KEY: WORKSHEET ON TEMPERATURE AND HEAT

- (1) a. 37.5 °C
b. 954 K
c. -9.04 °F
d. 77 °F
e. melting point: 24.4K
boiling point: 26.9K
- (2) a. -40 °F
b. -12.3 °F
c. 11.4 °F
- (3) a. °R = (0.8) · °C
b. 285.3 °R
- (4) freezing point: -3.69 °C
boiling point: 63.34 °C
- (5) 198 J
- (6) a. 1.39 x 10⁶ J or 1.39 x 10³ kJ
b. 13.1 °C
- (7) 98.2 °C