

Phase Change Worksheet

- 1) A 12 oz. can of soda weighs about 450 grams. How many joules are released when a can of soda is cooled from 25 degrees Celsius (room temperature) to 4 degrees Celsius (the temperature of a refrigerator). **The heat capacity of liquid water is 4.18 J / gram x °C.**
- 2) How many joules are required to heat 250 grams of liquid water from 0⁰ to 100⁰ C ?
- 3) How many joules are required to melt 100 grams of water? **The heat of fusion of water is 6.01 kJ / mole.**
- 4) How many joules are required to boil 150 grams of water? **The heat of vaporization of water is 40.67 kJ / mole.**
- 5) How many joules are required to heat 200 grams of water from 25 °C to 125 °C? **The heat capacity of steam is 1.84 J / g · °C**

- 6) How many joules are given off when 120 grams of water are cooled from 25°C to -25°C ? **The heat capacity of ice is $2.09 \text{ J / g} \cdot ^{\circ}\text{C}$.**
- 7) How many joules are required to heat 75 grams of water from -85°C to 185°C ? **The heat capacity of steam is $1.84 \text{ J / g} \cdot ^{\circ}\text{C}$.**
- 8) How many joules are required to heat a frozen can of juice (360 grams) from -5°C (the temperature of an overcooled refrigerator) to 110°C (the highest practical temperature within a microwave oven)?
- 9) How many joules are released when 450 grams of water are cooled from $4 \times 10^7^{\circ}\text{C}$ (the hottest temperature ever achieved by man) to $1 \times 10^{-9}^{\circ}\text{C}$ (the coldest temperature achieved by man).
- 10) How many joules are required to raise the temperature of 100 grams of water from -269°C (the current temperature of space) to $1.6 \times 10^{15}^{\circ}\text{C}$ (the estimated temperature of space immediately after the big bang)?

Phase Change Worksheet – Answer Sheet

- 1) A 12 oz. can of soda weighs about 450 grams. How many joules are released when a can of soda is cooled from 25 degrees Celsius (room temperature) to 4 degrees Celsius (the temperature of a refrigerator). **The heat capacity of liquid water is 4.18 J / gram x °C. 39.5 kJ**
- 2) How many joules are required to heat 250 grams of liquid water from 0° to 100° C ? **104.5 kJ**
- 3) How many joules are required to melt 100 grams of water? **The heat of fusion of water is 6.01 kJ / mole. 33.4 kJ**
- 4) How many joules are required to boil 150 grams of water? **The heat of vaporization of water is 40.67 kJ / mole. 338.8 kJ**
- 5) How many joules are required to heat 200 grams of water from 25 °C to 125 °C? **The heat capacity of steam is 1.84 J / g · °C 523.9 kJ**
- 6) How many joules are given off when 120 grams of water are cooled from 25 °C to -25°C? **The heat capacity of ice is 2.09 J / g · °C. 63.9 kJ**
- 7) How many joules are required to heat 75 grams of water from -85 °C to 185°C? **The heat capacity of steam is 1.84 J / g · °C. 250.9 kJ**
- 8) How many joules are required to heat a frozen can of juice (360 grams) from -5 °C (the temperature of an overcooled refrigerator) to 110 °C (the highest practical temperature within a microwave oven)? **1094.46 kJ**
- 9) How many joules are released when 450 grams of water are cooled from 4×10^7 °C (the hottest temperature ever achieved by man) to 1×10^{-9} °C (the coldest temperature achieved by man). **3.31×10^{10} J**
- 10) How many joules are required to raise the temperature of 100 grams of water from -269 °C (the current temperature of space) to 1.6×10^{15} °C (the estimated temperature of space immediately after the big bang)? **2.94×10^{17} J**