Chemistry CP Name:_____
Energy Calculation Worksheet #3

You may need the following information to answer the questions:

Specific heat of water= 4.184 J/g°C

Specific heat of steam= 1.84 J/g°C

Specific heat of ice= 2.09 J/g°C

Specific heat of aluminum = 0.890 J/g°C

Specific heat of iron= 0.445 J/g°C

Specific heat of gold= 0.130 J/g°C

Heat of fusion of water= 6.02 kJ/18 grams

Heat of vaporization of water= 40.6 kJ/18 grams

1. A 79 gram sample of water at 21°C is heated until it becomes steam with a temperature of 100.0°C. How many joules of energy were used to heat the water?

2. A 445 gram sample of ice at -58°C is heated until the temperature reaches -29°C. How many joules of energy were needed to make this temperature change?

3. A 12 oz can of soda weighs 450 grams. Soda is mostly water. How many joules of energy are released when a can of soda is cooled from 25°C (room temperature) to 4°C (refrigerator temperature)?

4. How many kilojoules of energy are required to heat 250 grams of water from 0.0°C to 100.0°C?

5. How many joules of energy are required to melt 100.00 grams of ice?

6. How many kilojoules of energy are required to boil 150 grams of water into steam at 100°C?

7. A 125 gram sample of ice at -20.0°C is heated until it changes to steam at 150°C. How much total energy (in joules) has been added to the system?

8. How many joules of energy are given off when 120. grams of water are cooled from 25°C to -25°C ?

9. How many kilojoules of energy are given off when 340 grams of water are cooled from 150°C to -35°C?

10. How many joules of energy are required to heat 360 grams of frozen juice (mostly water) from -5°C to 110°C?

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11. How many joules of energy are required to heat 45 grams of water from -205°C to 150°C?

12. How many joules of energy are required to heat 200. grams of water from 25°C to 125°C?

13. A 235 gram sample of aluminum gains 2500 joules of energy. If the sample's starting temperature was 10.0°C, what is the final temperature of the sample?

14. A 459 gram sample of water reaches a temperature of 87°C with the addition of 3567 joules of energy. What was the initial temperature of the water?

15. A sample of iron with an unknown mass is heated from 45°C to 85°C using 780 joules of energy. What is the mass of the sample?

16. A 240. gram sample of water, initially at 20.0°C, is mixed with an unknown mass of iron, initially at a temperature of 500°C. When the temperature equalizes, the system (iron + water) has a temperature of 42°C. What is the mass of the iron that was added to the water?

17. A 350 gram sample of water, initially at 25.3 °C, is mixed with a 300 gram sample of aluminum. The temperature of the equalized system (water + aluminum) is 58.2°C. What was the initial temperature of the aluminum sample?

18. A 800 gram sample of water is mixed with a 250 gram sample of iron that has an initial temperature of 85°C. The equalized temperature of the system (water + iron) is 50.0°C. What was the initial temperature of the water?

19. If a 25 grams sample is heated with 2.5 kilojoules of energy and the temperature of the sample changes from 20.0°C to 75°C, is the sample pure gold?

20. If you are holding an aluminum rod in one hand and an iron rod in the other, which rod will warm to your external body temperature first? Both rods have the same mass and starting temperature. Explain your answer.