

CP Chemistry  
Energy and Energy Calculations Quiz

Name: \_\_\_\_\_

- 1) What is ENERGY?
- 2) The S.I. unit for energy is the \_\_\_\_\_.
- 3) As water freezes it becomes \_\_\_\_\_ dense than liquid water.
- 4) Most substances become \_\_\_\_\_ dense as they go from liquid phase to liquid phase.
- 5) Phase changes are \_\_\_\_\_ changes.
- 6) Phase changes involve overcoming \_\_\_\_\_ forces.
- 7) The normal boiling point of water is \_\_\_\_\_ (number and unit).
- 8) The normal freezing point of water is \_\_\_\_\_ (number and unit).
- 9) The amount of energy needed to melt ice into water is known as \_\_\_\_\_
- 10) The amount of energy needed to turn water into steam is known as \_\_\_\_\_
- 11) Which is larger, one calorie or one joule?
- 12) Explain the difference between an endothermic process and an exothermic process. (2 pts)
- 13) Describe the energy changes as a piece of ice melts into liquid water and is then boiled into water vapor. Be sure to discuss the relative movement (speed) of the particles. (3 points)
- 14) My friend Ike is confused after I tell him there is a difference between the calories we talk about in Chemistry and the Calories that are listed on the nutrition label of his granola bar. Please help my friend by explaining, in a few sentences, the difference between a chemistry calorie and a nutritional Calorie. **Be sure to include a definition of a chemistry calorie in your explanation.** (3 points)

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State whether each of the following examples is exothermic or endothermic.

15) The process of boiling water. \_\_\_\_\_

16) The process of water freezing. \_\_\_\_\_

17) A burning campfire. \_\_\_\_\_

Energy Conversion Problems: Show your work (2 points)

18) Convert 35.8 calories to kilojoules.

19) Convert 5670.0 joules to kilocalories.

20) Convert 67 joules to calories.

21) Convert 455 kilocalories to kilojoules.

22) Convert 937 calories to joules.

Specific Heat Calculations: Show your work (3 points)

- 23) The amount of energy needed to heat 2.00 g of carbon from 50.0°C to 80.0°C is 42.6 J. What is the specific heat capacity of carbon?
- 24) A 6.75-g sample of gold (specific heat = 0.130 J/g °C) is heated using 50.6 J of energy. If the original temperature of the gold is 25.0°C, what is its **final temperature**? Hint: Final temperature = original temperature + temperature change.
- 25) The specific heat of iron is 0.45 J/g °C. How many joules of energy are needed to warm 1.50 g of iron from 20.00°C to 29.00°C?
- 26) How much energy will be needed to heat 60.0 gal of water from 22.0°C to 110.0°C? (Note: 1.00 gal weighs 3770 g and that water has a specific heat of 4.184 J/g °C.)
- 27) What is the mass of my aluminum (specific heat = 0.890 J/g °C) sample if it requires 0.890 kilojoules of energy to raise the temperature of my sample from 22.0°C to 24.0°C?

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Solve the following problems. Point values listed after each problem.

You may need the following information to answer the questions:

Specific heat of water=  $4.184 \text{ J/g}^\circ\text{C}$

Specific heat of steam=  $1.84 \text{ J/g}^\circ\text{C}$

Specific heat of ice=  $2.09 \text{ J/g}^\circ\text{C}$

Heat of fusion of water=  $6.02 \text{ kJ/18 grams}$

Heat of vaporization of water=  $40.6 \text{ kJ/18 grams}$

28) Calculate the amount of energy in JOULES required to heat 25 grams of water from  $13^\circ\text{C}$  to  $89^\circ\text{C}$ . The specific heat of water is  $4.184 \text{ J/g}^\circ\text{C}$ . (3 points)

29) Determine the amount of energy required to melt 354 grams of ice at  $0.0^\circ\text{C}$ . (3 points)

30) Calculate the amount of energy required to heat an 897 gram block of ice from  $0.0^\circ\text{C}$  to steam at  $100^\circ\text{C}$ . (6 points)

31) Calculate the amount of energy taken away while cooling a 37.2 gram sample of water at  $100.0^\circ\text{C}$  to  $-208.0^\circ\text{C}$ . (6 points)

32) Calculate the amount of energy needed to take a 45.3 gram sample of ice at  $-10.0^\circ\text{C}$  to steam at  $128.0^\circ\text{C}$ . (10 points)