

Temperature and Heat
Chemistry

Name

Use the given temperature conversions for each problem.

$$F = \frac{5}{9}C + 32$$

$$C = \frac{5}{9}(F - 32)$$

$$K = C + 273$$

- 1 The weatherman tells you that today will reach a high of 45°F. Your friend from Sweden asks what the temperature will be in degrees Celsius. What value would you report to your friend?

$$C = 7.2^\circ$$

- 2 Your father orders a fancy oven from England. When it arrives, you notice that the temperature dial is calibrated in degrees Celsius. You wish to bake a cake at 350°F. At what temperature will you have to set the dial on this new oven?

$$C = 180^\circ$$

a little less, actually

- 3 Your new German automobile's engine temperature gauge reads in Celsius, not Fahrenheit. You know that the engine temperature should not rise above about 225°F. What is the corresponding Celsius temperature on your new car's gauge?

$$C = 107^\circ \rightarrow 110^\circ$$

**both acceptable*

- 4 Your grandmother in Ireland sends you her favorite cookie recipe. Her instructions say to bake the cookies at 190.5°C. To what Fahrenheit temperature would you set the oven to bake the cookies?

$$F = 375^\circ$$

- 5 A scientist wishes to generate a chemical reaction in his laboratory. The temperature values in his laboratory manual are given in degrees Celsius. However, his lab thermometers are calibrated in degrees Fahrenheit. If he needs to heat his reactants to 232°C, what temperature will he need to monitor on his lab thermometers?

$$F = 450^\circ$$

- 6 A gas has a boiling point of -175°C. At what Kelvin temperature would this gas boil?

$$K = 98^\circ$$

- 7 A chemist notices some silvery liquid on the floor in her lab. She wonders if someone accidentally broke a mercury thermometer, but did not thoroughly clean up the mess. She decides to find out if the silver stuff is really mercury. From her tests with the substance, she finds out that the melting point for the liquid is 275 K. A reference book says that the melting point for mercury is -38.87°C . Is this substance mercury? Explain your answer and show all relevant calculations.

$$275 = C + 273 \rightarrow C = 2^{\circ}$$

much higher than Mercury, so NO

Use the following table of specific heats to find the value for c in the following problems. Apply the heat formula to solve each problem.

$$Q = m \cdot c \cdot \Delta T$$

Substance	Specific heat ($\text{J/g}^{\circ}\text{C}$)	Specific heat ($\text{cal/g}^{\circ}\text{C}$)
Water	4.184	1.000
Ethyl alcohol	2.138	0.511
Ice	2.059	0.492
Aluminum	0.900	0.215
Iron	0.473	0.113
Copper	0.385	0.0921
Gold	0.131	0.0312
Lead	0.128	0.0305

- 8 How many joules of heat are required to heat 125 g aluminum from 19.0°C to 95.5°C ?

$$Q = 8600 \text{ J}$$

- 9 How many joules of heat are required to heat 65 g lead from 22.0°C to 98.5°C ?

$$Q = 640 \text{ J}$$

- 10 How many joules of heat are required to heat 25.0 g of ethyl alcohol from the prevailing room temperature, 22.5°C , to its boiling point, 78.5°C ?

$$Q = 2860 \text{ J}$$

- 11 How many joules of heat are required to heat 35.0 g of isopropyl alcohol from the prevailing room temperature, 21.2°C , to its boiling point, 82.4°C ? (The specific heat of isopropyl alcohol is $2.604 \text{ J/g}^{\circ}\text{C}$.)

$$Q = 5600 \text{ J}$$