

Exercise 98

The label on a pressurized can of spray disinfectant warns against heating the can above 130 °F. What are the corresponding temperatures on the Celsius and kelvin temperature scales?

Solution

Begin with the formula relating Fahrenheit and Celsius temperature.

$$^{\circ}\text{F} = \frac{9}{5}(^{\circ}\text{C}) + 32.0$$

$$^{\circ}\text{F} - 32.0 = \frac{9}{5}(^{\circ}\text{C})$$

$$\frac{5}{9}(^{\circ}\text{F} - 32.0) = ^{\circ}\text{C}$$

Consequently, the Celsius temperature is

$$\begin{aligned}^{\circ}\text{C} &= \frac{5}{9}(^{\circ}\text{F} - 32.0) \\ &= \frac{5}{9}(130 - 32.0) \\ &= \frac{5}{9}(98) \\ &\approx 54 \quad (\text{rounded to two significant figures}),\end{aligned}$$

and the Kelvin temperature is

$$\begin{aligned}\text{K} &= ^{\circ}\text{C} + 273.15 \\ &= \frac{5}{9}(98) + 273.15 \\ &\approx 54 + 273.15 \\ &\approx 328 \quad (\text{rounded to the ones place}).\end{aligned}$$