

Exercise 97

Convert the boiling temperature of liquid ammonia, $-28.1\text{ }^{\circ}\text{F}$, into degrees Celsius and kelvin.

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

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

$$= \frac{5}{9}(-28.1 - 32.0)$$

$$= \frac{5}{9}(-60.1)$$

$$\approx -33.4 \quad (\text{rounded to three significant figures}),$$

and the Kelvin temperature is

$$\text{K} = ^{\circ}\text{C} + 273.15$$

$$= \frac{5}{9}(-60.1) + 273.15$$

$$\approx -33.4 + 273.15$$

$$\approx 239.8 \quad (\text{rounded to the tenths place}).$$