Q 10] Since carbon monoxide consists of carbon and oxygen, I would call it a compound.

Q 17] Silver atoms weigh more than hydrogen atoms, so approximately one gram of silver contains fewer atoms than one g. of H.

Q 18] One mole of anything consists of exactly one Avogadro's number of that thing, whether it is hydrogen or silver.

Q 20] One assumed property of ideal gases is that one liter at standard temperature and pressure always contains the same number of molecules regardless of what the gas is made of. Oxygen gas, O₂, contains two atoms per molecule, while carbon dioxide, CO₂, has three. Thus, one liter of CO₂ has more atoms than one liter of O₂, if both are at the same T and press.

Q 38] 190°F = 88°C, see Figure 7-10 in the book.

Q 41] The freezing point of water is 0°C, and this is equivalent to 273 K.

Q 49] Remember the ideal gas law: PV = cT. If P is constant while T doubles, then V must double.
As the tea cools, so does the tea vapor that fills the rest of the bottle. The vapor is mostly ideal, so obeys $PV = cT$. As $T$ goes down, so does $P$ or $V$. In either case, the bottle compresses — the pressure outside is greater than pressure inside.

**E 1**] The combination ratio is $\frac{8gO}{1gH}$. With 32 g of O, you need $(32gO) \cdot \frac{1gH}{8gO} = 4gH$.

**E 4**] The ratio is $\frac{12gC}{16gO} = \frac{3}{4} \left( \frac{C}{O} \right)$. 80 g of O requires $(80gO) \cdot \frac{3}{4} \left( \frac{C}{O} \right) = 60gC$. 48 g of carbon needs $(48gC) \cdot \frac{3}{4} \left( \frac{O}{C} \right) = 64gO$. I can use all of the carbon and make $48 + 64 = 112gCO$.

**E 5**] The ratio is $\frac{10g\text{ ham}}{50g\text{ bread}} = \frac{1}{5} \left( \frac{h}{b} \right)$. Sandwiches require more grams of bread, so bread is the limiting substance. 1 kg of bread allows $(1kg)/(50g) = 20$ sandwiches. Each sandwich weighs 60 g, so 20 makes $1,200$ kg. This uses $200g$ of ham, leaving $800g$. 
The ratio is \( 1 \text{ mole } H_2O = \frac{16}{2} \text{ g } O = 8 \text{ g } H \). 

Water needs more grams of oxygen, so it is the limiting substance. One kg of oxygen allows 
\[ (1 \text{ kg}) \cdot \left( \frac{1 \text{ mole}}{16 \text{ g}} \right) = 62.5 \text{ moles } H_2O \text{ one mole weights } 18 \text{ g}, \text{ so } 62.5 \text{ makes } 1125 \text{ g}. \text{ This uses } 125 \text{ g of H, leaving } 875 \text{ g}. \]

**E 17** Pressure is force per area. The area of the tack is 
\[ A = \pi (\text{Radius})^2 = \pi \left( 0.005 \text{ m} \right)^2 = 7.85 \times 10^{-5} \text{ m}^2. \text{ The pressure is } P = \frac{F}{A} = 25 \text{ N} / (7.85 \times 10^{-5} \text{ m}) = 3.18 \times 10^5 \frac{\text{N}}{\text{m}^2} = 3.1 \text{ atm}. \]

**E 19** Ideal gas law: \( PV = cT \). If \( P_{\text{new}} = 3P_{\text{old}}, \) 
Then \( V_{\text{new}} = \frac{cT}{P_{\text{new}}} = \frac{cT}{3P_{\text{old}}} = \frac{1}{3} V_{\text{old}} \). One liter compresses into \( \frac{1}{3} \text{ L} \).

**E 21** Again, \( PV = cT \). Here, \( V_{\text{old}} \) the gas starts at 100 atm, filling a volume of 2 L. In the balloons, the pressure is 1.25 atm. 
\[ V_{\text{new}} = \frac{cT}{P_{\text{new}}} \text{, but also, } cT = P_{\text{old}} V_{\text{old}}, \] 
so 
\[ V_{\text{new}} = \frac{P_{\text{old}}}{P_{\text{new}}} V_{\text{old}} = \left( \frac{100 \text{ atm}}{1.25 \text{ atm}} \right) 2 \text{ L} = 160 \text{ L}. \]

Each balloon takes one liter, so 160 balloons.
\( P V = cT \), so \( c = \frac{P_i V_i}{T_i} \), and \( P_f = \frac{c T_f}{V_f} = \frac{V_i}{T_i} \frac{T_f P_i}{V_f} \).

Now, \( T \) should be expressed in Kelvin.

\( T_i = 20 + 273 = 293 \text{ K} \), \( T_f = 40 + 273 = 313 \text{ K} \).

\( V \) should be in liters, so \( V_i = (150 \text{ cm}^3) \cdot \left( \frac{1 \text{ L}}{1000 \text{ cm}^3} \right) \)

\( = \frac{150 \text{ L}}{1000} = 0.150 \text{ L} \).

\( V_f = \frac{100 \text{ cm}^3}{100} = 0.100 \text{ L} \).

Thus, \( P_f = \frac{(0.150 \text{ L}) (313 \text{ K})}{293 \text{ K}} \cdot \frac{1 \text{ atm}}{0.100 \text{ L}} \)

\( = 1.6 \text{ atm} \).