10.36 (cont) determine empirical formula from elemental composition:

$C: 81.7\,g\,C \times \frac{1\,mole\,C}{12.011\,g\,C} = 6.80\,mole\,C$ $H: 18.3\,g\,H \times \frac{1\,mole\,H}{1.008\,g} = 18.2\,mol\,H$

reduce to simplest ratio: $\frac{6.80\,mole\,C}{6.80\,mole\,C} = 1$ + $\frac{18.2\,mole\,H}{6.80\,mole\,C} = 2.67$

and simple whole # ratio: C_3H_8 (mw. = 44.1 g/mole, so empirical formula and molecular formula are the same)

10.45 use the formula $V_{rms} = \sqrt{\frac{3RT}{mw}}$

(a) both are the same (b) both are the same (c) Ar

(d) $\frac{V_{rms}(Kr)}{V_{rms}(CO_2)} = \frac{\sqrt{\frac{1000\,K}{83.80\,g/mol}}}{\sqrt{\frac{500\,K}{44.01\,g/mol}}} = 1.02 \Rightarrow$ Kr @ 1000 K has a slightly higher V_{rms} that CO_2 @ 500 K.

chapter 11

11.6 a gas is ideal at high temp, low pressure and density. Deviations from ideality are more pronounced at low temperature (near or below the critical temperature) and at high pressure (when interactions between molecules occur).

11.7 density for all is 1.00 m/L so $\frac{n^2}{V^2} = (1.00\,m/L)^2$

so, the Van der Waals equation is $P = \frac{nRT}{V-nb} - a\left(1.00\frac{m^2}{L^2}\right)$

you are being given the density, so you could divide the top + bottom by V to get $P = \frac{\frac{n}{V}RT}{1-\frac{n}{V}b} - a\left(1.00\frac{m^2}{L^2}\right) = \frac{1.00\,m/L\,RT}{1-(1.00\,m/L)(b)} - a(1.00\,m^2/L^2)$

	P_{vdw} (300 K)	P_{vdw} (1000 K)	P_{ideal} (300 K)	P_{ideal} (1000 K)
Kr	23.3	83.1	24.6	82.1
Ar	24.1	83.4	"	"
H_2	25.0	84.0	"	"