Quiz 1.1 – An Ideal Gas

Name:
Question 1
A weather balloon starts in Cedar City with with $P=0.82~atm$, $T=21.5~^{\circ}C$, and $V=18.75~L$
 Find the number of moles of gas inside the balloon
$\circ~$ If the balloon is filled with He gas, find the mass of the gas inside the balloon
$\circ~$ Find the density of the He-filled balloon (assume the instruments and balloon itself have no mass)
\circ Find the density of the surrounding air (assume it is $100\%~\mathrm{N_2~gas}$)

Question 2

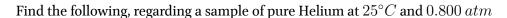
The weather balloon is released into the upper atmosphere and the instruments on-board indicate a pressure of 0.45~atm and a temperature of $-32.4~^{\circ}C$

What will the new volume of the balloon be?

Question 3

A car engine burns about 0.1~g of gasoline (C_8H_{18})for each engine cycle. A car engine may have a cylinder volume of 0.075~L at the point of ignition, and operate at a temperature of $80.0~^{\circ}C$. If the gasoline combusts completely inside the 0.075~L piston, what is the pressure of the combustion products?

Question 4



- $\circ v_{rms}$
- $\circ v_{rel}$
- Collision frequency
- $\circ \lambda$ (mean free path)

Question 5

What will be v_{rel} for collisions between O_2 and N_2 molecules in a sample of the atmosphere at $25^{\circ}C$ and 0.800 atm $\left(\chi_{N_2}=0.80,\ \chi_{O_2}=0.20\right)$

When I Heard the Learn'd Astronomer

By Walt Whitman

When I heard the learn'd astronomer,

When the proofs, the figures, were ranged in columns before me,

When I was shown the charts and diagrams, to add, divide, and measure them,

When I sitting heard the astronomer where he lectured with much applause in the lecture-room,

How soon unaccountable I became tired and sick,

Till rising and gliding out I wander'd off by myself,

In the mystical moist night-air, and from time to time,

Look'd up in perfect silence at the stars.