Chapter 18 Tutorial

Thermodynamics-I

Chapter 17 : Temperature and Heat

Question 1:

Helium gas with a volume of 2.60 L, under a pressure of 0.180 atm, and at a temperature of

41.0°C is warmed until both pressure and volume are doubled.

(a) What is the final temperature?
(b) How many grams of helium are there? The molar mass of helium is 4.00 g/mol.

Question 2:

Calculate the mean free path of air molecules at a pressure of 3.50×10^{-13} atm and a temperature of 300 K. Model the air molecules as spheres of radius 2×10^{-10} m.

Question 3:

Consider an ideal gas at 27°C and 1.00 atm pressure. To get some idea how close these molecules are to each other, on the average, imagine them to be uniformly spaced, with each molecule at the center of a small cube.

(a) What is the length of an edge of each cube if adjacent cubes touch but do not overlap?
(b) How does this distance compare with the diameter of a typical molecule?
(c) How does their separation compare with the spacing of atoms in solids, which typically are about 0.3 nm apart?