

Problem of the Day 6 CHEM 1252

1. Air that enters the lungs end up in tiny sacs called alveoli. It is from the alveoli that oxygen diffuses into the blood. The average radius of an alveoli is 0.0050 cm and, the air inside contains 14 percent oxygen. Assuming that the pressure in the alveoli is 1.0 atm and the temperature is 37 °C, calculate the number of oxygen molecules in one alveoli. (Hint: The volume of a sphere is $\frac{4}{3} \pi r^3$.)

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2. Methane gas molecules, CH₄, have a higher u_{rms} than silane gas molecules SiH₄.

a) Calculate u_{rms} for each gas at STP.

CH ₄	SiH ₄
4	4

b) It is observed that some silane molecules have a higher speed than some of the methane molecules. Using the kinetic-molecular theory of gases, rationalize this observation.

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3. Consider the following samples of gases under identical conditions: O₂, N₂, SF₆, WCl₆, and Kr.

a) Place the molecules in order of increasing density.

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b) Place the molecules in order of increasing room mean square speed (u).

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