

74 .calculate the average kinetic energy of the  $N_2$  molecules in a sample of  $N_2$  gas at 273K and at 546K.

**80.** Consider separate 1.0-L gaseous samples of  $\text{H}_2$ ,  $\text{Xe}$ ,  $\text{Cl}_2$ , and  $\text{O}_2$  all at STP.

- Rank the gases in order of increasing average kinetic energy
- Rank the gases in order of increasing average velocity
- How can separate 1.0-L samples of  $\text{O}_2$  and  $\text{H}_2$  each have the same average velocity?

**110.** Without looking at tables of values, which of the following gases would you expect to have the largest value of the van der Waals constant  $b$ :  $\text{H}_2$ ,  $\text{N}_2$ ,  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ , or  $\text{C}_3\text{H}_8$ ?

**111.** From the values in Table 5.3 for the van der Waals constant  $a$  for the gases  $\text{H}_2$ ,  $\text{CO}_2$ ,  $\text{N}_2$ , and  $\text{CH}_4$ , predict which of these gas molecules show the strongest intermolecular attractions.