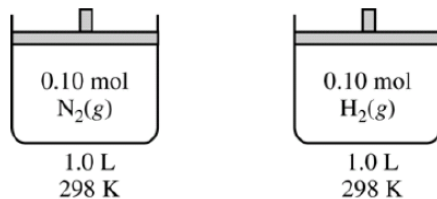


Gases & States of Matter Study Guide Part 1



Consider two containers of volume 1.0 L at 298 K, as shown above. One container holds 0.10 mol N₂(g) and the other holds 0.10 mol H₂(g). The average kinetic energy of the N₂(g) molecules is 6.2×10^{-21} J. Assume that the N₂(g) and the H₂(g) exhibit ideal behavior.

- Is the pressure in the container holding the H₂(g) less than, greater than, or equal to the pressure in the container holding the N₂(g)? Justify your answer.
- What is the average kinetic energy of the H₂(g) molecules?
- The molecules of which gas, N₂ or H₂, have the greater average speed? Justify your answer.
- What change could be made that would decrease the average kinetic energy of the N₂(g) molecules in the container?
- If the volume of the container holding the H₂(g) was decreased to 0.50 L at 298 K, what would be the change in each of the following variables? In each case, justify your answer.
 - The pressure within the container
 - The average speed of the H₂(g) molecules

Multiple Choice

1.

In which of the following processes are covalent bonds broken?

- A) $\text{I}_2(s) \rightarrow \text{I}_2(g)$
- B) $\text{CO}_2(s) \rightarrow \text{CO}_2(g)$
- C) $\text{NaCl}(s) \rightarrow \text{NaCl}(l)$
- D) $\text{C}(\text{diamond}) \rightarrow \text{C}(g)$

2.

In solid methane, the forces between neighboring CH_4 molecules are best characterized as

- A) London (dispersion) forces
- B) covalent bonds
- C) hydrogen bonds
- D) ion-dipole forces

3.

On a mountaintop, it is observed that water boils at 90°C , not at 100°C as at sea level. This phenomenon occurs because on the mountaintop the

- A) equilibrium water vapor pressure is higher due to the higher atmospheric pressure
- B) equilibrium water vapor pressure is lower due to the higher atmospheric pressure
- C) equilibrium water vapor pressure equals the atmospheric pressure at a lower temperature
- D) water molecules have a higher average kinetic energy due to the lower atmospheric pressure

4.

Which of the following substances involves the breaking of covalent bonds in order to melt?

- A) Salt, NaCl
- B) Sand, SiO_2
- C) Ice, H_2O
- D) Paraffin, $\text{C}_{31}\text{H}_{64}$

5.

On the basis of strength of intermolecular forces, which of the following elements would be expected to have the highest melting point?

- A) Br_2
- B) Cl_2
- C) F_2
- D) N_2