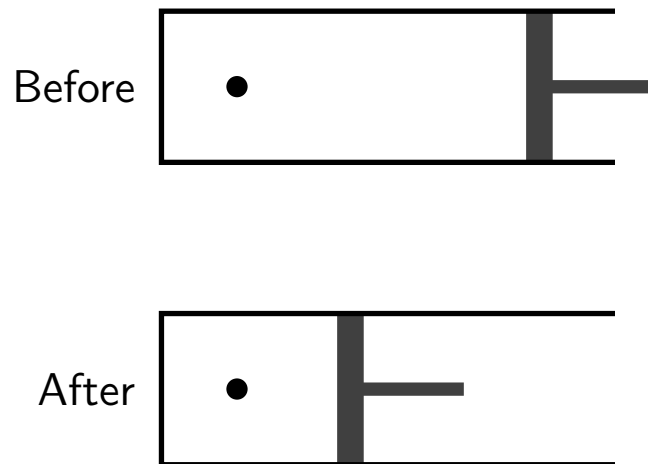


Question 1

A cylinder, equipped with a movable piston, contains a single gas molecule that moves horizontally. The piston is moved in so that the volume of the cylinder halves.



Which of the following is true regarding the rate at which the molecule collides with the walls and the pressure exerted by the “gas” after the volume halves?

1. The collision rate doubles and the pressure doubles.
2. The collision rate doubles and the pressure halves.
3. The collision rate halves and the pressure doubles.
4. The collision rate halves and the pressure halves.
5. The collision rate remains the same and the pressure doubles.

Question 2

A flask of Helium and a flask of Argon are both at room temperature. Let K_{Ar} denote the average translational kinetic energy of an Argon molecule and v_{Ar} the rms velocity of an Argon molecule, etc,

Which of the following is true?

1. $K_{\text{Ar}} = K_{\text{He}}$ and $v_{\text{Ar}} = v_{\text{He}}$.
2. $K_{\text{Ar}} = K_{\text{He}}$ and $v_{\text{Ar}} > v_{\text{He}}$.
3. $K_{\text{Ar}} = K_{\text{He}}$ and $v_{\text{Ar}} < v_{\text{He}}$.
4. $K_{\text{Ar}} < K_{\text{He}}$ and $v_{\text{Ar}} < v_{\text{He}}$.
5. Need P and V to decide.

Question 3

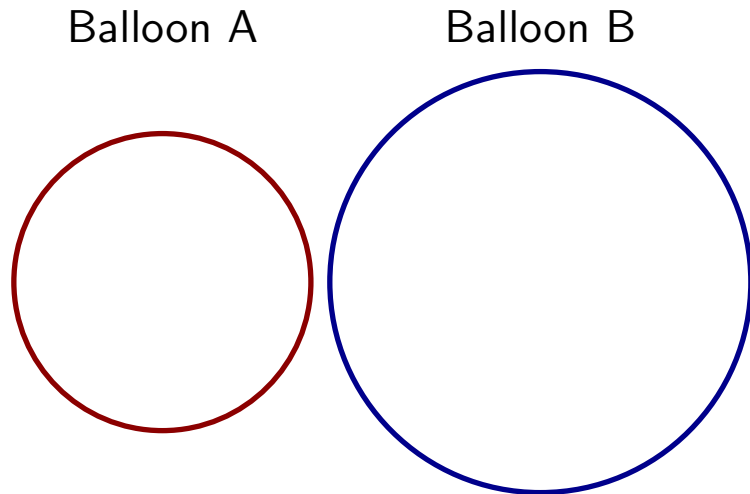
A gas contains a mixture of equal masses of helium gas and oxygen both at the same temperature. An oxygen gas molecule has mass 8 times as large as that of a helium gas molecule.

Which of the following statements made about these gases are true?

1. The **average kinetic energy** of the oxygen molecules equals that of the helium molecules.
2. The **total kinetic energy** of all of the oxygen molecules equals that of all of the helium molecules.
3. The average speed of the helium molecules equals that of the oxygen molecules.
4. The average speed of the helium molecules is eight times that of the oxygen molecules.

Question 4

Two balloons each contain neon gas at the same temperature and pressure. The volume of balloon A is half that of balloon B.



Which of the following is true for A in comparison to B?

1. K_{ave} is same and E_{th} is same.
2. K_{ave} is same and E_{th} is half.
3. K_{ave} is same and E_{th} is double.
4. K_{ave} is half and E_{th} is same.
5. K_{ave} is half and E_{th} is half.