

Discussion Quiz #4 2019 Thursday
Key

1. (6 points) A container is filled with Ne at 18°C and 9.00 bar. The pressure of the container drops by 50% in 55 minutes, due to a small hole. If the container instead were filled with Xe at 18°C and 9.00 bar, what would be the pressure of the Ne after 35 minutes? Express your answer in bar.

2. T-constant, time is the same

$$|\Delta P_{He}| = 0.50 * 9.00 \text{ bar} = 4.5 \quad \text{2 points} \quad \Delta P_{He} = -4.5$$

$$\frac{\text{rate}_{He}}{\text{rate}_{Ne}} = \frac{\frac{\Delta P_{He}}{t}}{\frac{\Delta P_{Ne}}{t}} = \frac{\Delta P_{He}}{\Delta P_{Ne}} = \sqrt{\frac{M_{Ne}}{M_{He}}} = 2.246 \quad \text{1 point or} \quad \sqrt{\frac{M_{He}}{M_{Ne}}} = 0.445$$

$$|\Delta P_{Ne}| = |\Delta P_{He}| \sqrt{\frac{M_{He}}{M_{Ne}}} = 2.00 \quad \text{2 points or 22.26\%}$$

$$\Delta P_{Ne} = -2.00$$

$$P_{Ne} = (9.00 - 2.00) \text{ bar} = 7.00 \text{ bar} \quad \text{1 point}$$

3. (4 points) Match the molecules below with their corresponding **a** and **b** van der Waals coefficients. **1 point each**

| <u>Gas</u> | <u>a (L² atm mol⁻²) / b (L mol⁻²)</u> |
|--|--|
| Ethanol (C ₂ H ₅ OH) | 6.309 / 0.05303 |
| Hydrogen Chloride (HCl) | 2.56 / 0.08710 |
| Hydrogen Iodide (HI) | 3.700 / 0.04061 |
| Hydrogen bromide (HBr) | 4.500 / 0.04415 |

Discussion Quiz #4 2019 Friday
Key

1. (6 points) A container is filled with Ne at 18°C and 8.00 bar. The pressure of the container drops by 50% in 50 minutes, due to a small hole. If the container instead were filled with Xe at 18°C and 8.00 bar, what would be the pressure of the Ne after 50 minutes? Express your answer in bar.

T-constant, time is the same

$$|\Delta P_{He}| = 0.50 * 8.00 \text{ bar} = 4.00 \quad \text{2 points}$$

$$\frac{\text{rate}_{He}}{\text{rate}_{Ne}} = \frac{\frac{\Delta P_{He}}{t}}{\frac{\Delta P_{Ne}}{t}} = \frac{\Delta P_{He}}{\Delta P_{Ne}} = \sqrt{\frac{M_{Ne}}{M_{He}}} = 2.246 \quad \text{1 point or} \quad \sqrt{\frac{M_{He}}{M_{Ne}}} = 0.445$$

$$|\Delta P_{Ne}| = |\Delta P_{He}| \sqrt{\frac{M_{He}}{M_{Ne}}} = 1.78 \quad \text{1 points or 22.26\%}$$

$$\Delta P_{Ne} = -1.78$$

$$P_{Ne} = (8.00 - 1.78) \text{ bar} = 6.22 \text{ bar} \quad \text{2 points}$$

2. (4 points) Match the molecules below with their corresponding **a** and **b** van der Waals coefficients.

1 point each

| <u>Gas</u> | <u>a (L² atm mol⁻²) / b (L mol⁻²)</u> |
|--|--|
| Ethanol(C ₂ H ₅ OH) | 6.309 / 0.05303 |
| Hydrogen Chloride (HCl) | 2.56/0.08710 |
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