Name STURMAN Date ______ Class ______

14.3 IDEAL GASES 22 poss. ≥ 15½

Section Review

Objectives

- Compute the value of an unknown using the ideal gas law
- Compare and contrast real and ideal gases

Vocabulary

- ideal gas constant (R)
- ideal gas law

Key Equation

- Ideal gas law: $P \times V = n \times R \times T$ or $PV = nRT$

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The ideal gas law permits you to solve for the __1__ of a contained gas when the pressure, volume, and temperature are known. The ideal gas law is described by the formula __2__ where the variable __3__ represents the number of moles of gas and the letter R is the __4__. R is equal to __5__.

A gas that conforms to the gas laws at all conditions of temperature and pressure is an __6__ gas. No __7__ gas behaves ideally at all temperatures and pressures. Deviations from ideal behavior at high pressures can be explained by the intermolecular __8__ between particles in a gas and the actual __9__ of the particles.

1. # moles
2. PV = nRT
3. n
4. ideal gas constant
5. 8.31 LkPa/kmo
6. ideal
7. real
8. forces of attraction
9. volume

PV = nRT   R = 8.21 LkPa/kmol

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

AT 10. The ideal gas law allows you to solve for the number of moles of a contained gas when pressure, volume, and temperature are known.

ST 11. The ratio $(P \times V)/(R \times T)$ is equal to 1 for real gases.

NT 12. The behavior of a gas is most likely to approach ideal behavior at a high pressure and a low temperature.

NT 13. For an ideal gas, pressure and volume are directly proportional to each other when all other factors remain constant.

AT 14. The number of moles of gas is directly proportional to the number of particles.

Part C Matching

Match each description in Column B to the correct term in Column A.

	Column A		Column B
d	15. ideal gas law	a.	$8.31 \times \frac{L \cdot kPa}{K \cdot mol}$
c	16. real gas	b.	a gas that follows the gas laws at all conditions of pressure and temperature
b	17. ideal gas	c.	a gas that can be liquefied by applying pressure
a	18. ideal gas constant (R)	d.	$PV = nRT$

Part D Questions and Problems

Answer the following in the space provided.

19. Calculate the number of moles of oxygen in a 12.5-L tank if the pressure is 25,325 kPa and the temperature is 22°C.

(1/2) +1 work +1 ans.

n = ? P = 25325 kPa PV = nRT
V = 12.5L T = 22° + 273° = 295 k
25325(12.5) = n (8.311)(295)
n = 129 mol

20. Calculate the mass of nitrogen dioxide present in a 275-mL container if the pressure is 240.0 kPa and the temperature is 28°C.

(1/2)

m_{NO_2} = ?
V = 275 ml = .275
P = 240.0 kPa
T = 28° + 273 = 301 k

PV = nRT
240.0(.275) = n (8.31)(301)
n = .0264 mol +1

.0264 mol / 1 · 46.09 / 1 mol = 1.21 g +1

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14.4 GASES: MIXTURES AND MOVEMENTS

19≥1 (+3)

Section Review

Objectives

- Relate the total pressure of a mixture of gases to the partial pressures of the component gases
- Explain how the molar mass of a gas affects the rate at which the gas diffuses and effuses

Vocabulary

- partial pressure
- Dalton's law of partial pressures
- diffusion
- effusion
- Graham's law of effusion

Key Equations

- Dalton's law of partial pressures: $P_{total} = P_1 + P_2 + P_3 + \ldots$
- Graham's law of effusion: $\frac{Rate_A}{Rate_B} = \sqrt{\frac{molar\ mass_B}{molar\ mass_A}}$

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

According to Dalton's law of partial pressures, at constant volume and temperature, the __1__ pressure exerted by a mixture of gases is equal to the __2__ of the partial pressures of the component gases.

Molecules tend to move to areas of __3__ concentration until the concentration is __4__. This process is called __5__. During __6__ a gas escapes through a tiny __7__ in its container.

The rate of effusion of a gas is __8__ proportional to the square root of the gas's __9__. This relationship is described by __10__ of effusion.

1. total
2. sum
3. lower
4. equal or uniform
5. diffusion
6. effusion
7. holes
8. inversely
9. molar mass
10. Graham's Law

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Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

AT 11. The fraction of the pressure exerted by a gas in a mixture does not change as the temperature, pressure, or volume changes.

NT 12. The rate of diffusion of a gas is not influenced by its molar mass.

ST 13. Two objects with the same mass move at the same velocity.

AT 14. Diffusion is the tendency of molecules to move towards areas of lower concentration until the concentration is uniform throughout.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A	Column B
a 15. partial pressure	a. the pressure exerted by each gas in a gaseous mixture
b 16. effusion	b. the escape of a gas through a tiny hole in its container
c 17. Graham's law of effusion	c. The rate of effusion of a gas is inversely proportional to the square root of its formula mass.

Part D Questions and Problems

Answer the following in the space provided.

18. Explain, using kinetic theory, why molecules of low molar diffuse more rapidly than molecules with a higher molar mass.

+2 Assuming the molecules are at the same temperatures they therefore have to same avg KE. $KE = \frac{1}{2}mv^2$ so if mass is lower then velocity is higher so the light molecules would move through faster.