Ideal Gas Equation Worksheet

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Part 1: Building a Foundation

What is the ideal gas law equation?

Hint: Think about the relationship between pressure, volume, temperature, and moles.

- ◯ A) PV = nRT
- ◯ B) P = nRT/V
- ◯ C) PV = nR/T
- ◯ D) P = VnRT

Which of the following are units for the universal gas constant (R)?

Hint: Consider the different forms of energy and pressure.

- ☐ A) J/(mol·K)
- ☐ B) L·atm/(mol·K)
- ☐ C) Pa
- ☐ D) mmHg

Explain why it is important to convert temperature to Kelvin when using the ideal gas law.

Hint: Consider the absolute temperature scale.

List the variables in the ideal gas law and their corresponding units.

Hint: Think about pressure, volume, temperature, and moles.

1. P

2. V

3. n

4. R

5. T

Part 2: Comprehension and Interpretation

If the temperature of a gas is given in Celsius, what is the first step you should take before using the ideal gas law?

Hint: Consider the correct temperature scale for calculations.

- ◯ A) Convert to Fahrenheit
- ◯ B) Convert to Kelvin
- ◯ C) Convert to Rankine
- ◯ D) Convert to liters

Which of the following statements about the ideal gas law are true?

Hint: Think about the assumptions made by the ideal gas law.

- ☐ A) It assumes gas particles have no volume.
- ☐ B) It is accurate for all gases under all conditions.
- ☐ C) It assumes no interactions between gas particles.
- ☐ D) It is more accurate at high pressures.

Describe a scenario where the ideal gas law might not accurately predict the behavior of a gas.

Hint: Consider extreme conditions or specific gas types.

Part 3: Application and Analysis

A gas occupies 10 liters at a pressure of 2 atm and a temperature of 300 K. How many moles of gas are present? (R = 0.0821 L·atm/(mol·K))

Hint: Use the ideal gas law to solve for n.

- ◯ A) 0.82 moles
- ◯ B) 0.81 moles
- ◯ C) 0.80 moles
- ◯ D) 0.79 moles

When using the ideal gas law, which of the following conditions would require you to adjust your calculations?

Hint: Consider the effects of pressure and temperature on gas behavior.

- ☐ A) High pressure
- ☐ B) Low temperature
- ☐ C) Large volume
- ☐ D) High temperature

Calculate the pressure of a gas if 2 moles occupy a volume of 5 liters at a temperature of 350 K. Use R = 0.0821 L·atm/(mol·K).

Hint: Use the ideal gas law to find pressure.

Which variable in the ideal gas law is directly proportional to both pressure and volume?

Hint: Think about the relationships in the ideal gas law.

- ◯ A) Temperature
- ◯ B) Number of moles
- ◯ C) Universal gas constant
- ◯ D) None of the above

Analyze the following scenarios and select those where the ideal gas law would likely be inaccurate:

Hint: Consider extreme conditions for gases.

- ☐ A) Gas at very high pressure
- ☐ B) Gas at very low temperature
- ☐ C) Gas at room temperature and atmospheric pressure
- ☐ D) Gas in a small container

Compare and contrast the assumptions of the ideal gas law with the behavior of real gases.

Hint: Think about the ideal conditions versus real-world conditions.

Part 4: Evaluation and Creation

If a gas behaves ideally at low pressure, what might you infer about its behavior at high pressure?

Hint: Consider the relationship between pressure and ideal behavior.

- ◯ A) It will behave more ideally.
- ◯ B) It will deviate from ideal behavior.
- ◯ C) It will have no change in behavior.
- ◯ D) It will behave less ideally at low temperature.

Evaluate the following modifications to the ideal gas law for real gases and select those that could improve accuracy:

Hint: Consider factors that affect gas behavior.

- ☐ A) Consideration of intermolecular forces
- ☐ B) Inclusion of gas particle volume
- ☐ C) Use of a higher universal gas constant
- ☐ D) Adjustment for temperature fluctuations

Propose a real-world experiment to test the accuracy of the ideal gas law under different conditions, detailing the variables you would control and measure.

Hint: Think about how you would set up an experiment to gather data.