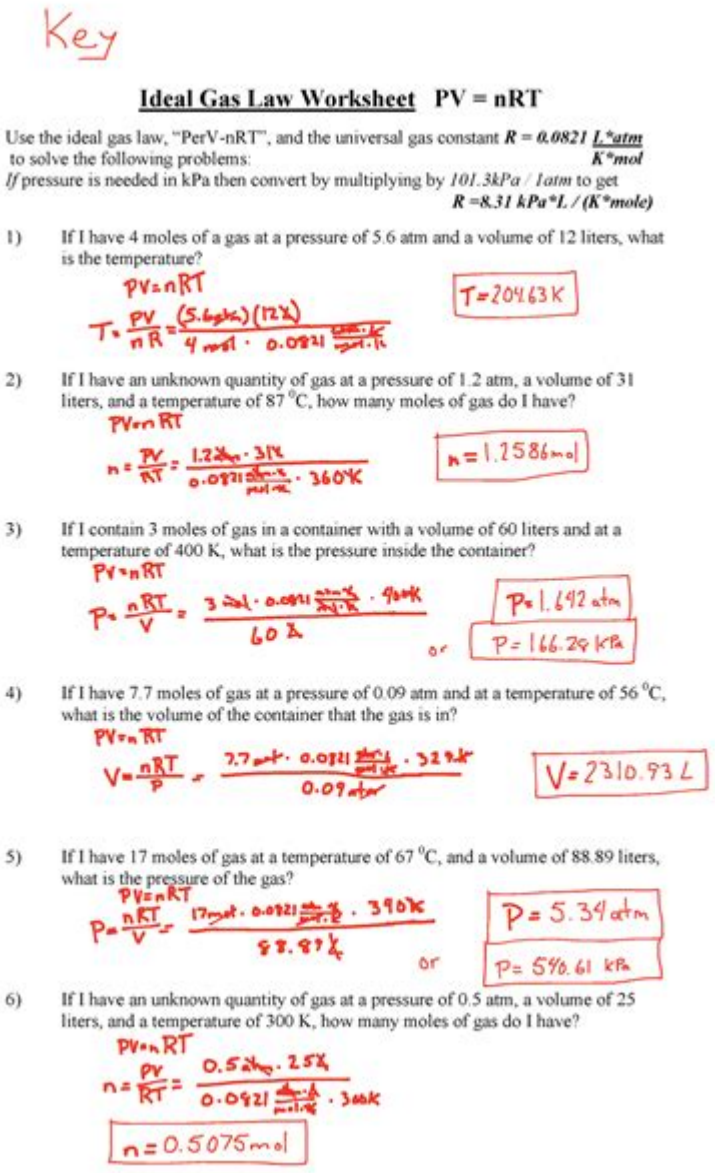
Ideal Gas Law Worksheet Answers



Key

Ideal Gas Law Worksheet PV = nRT

Use the ideal gas law, "PerV-nRT", and the universal gas constant $R = 0.0821 \frac{L*atm}{K*mol}$ to solve the following problems:

If pressure is needed in kPa then convert by multiplying by *101.3kPa / 1atm* to get

$R = 8.31\ kPa*L/(K*mole)$

1) If I have 4 moles of a gas at a pressure of 5.6 atm and a volume of 12 liters, what is the temperature?

PV=nRT

$T = \frac{PV}{nR} = \frac{(5.6atm)(12L)}{4\ mol \cdot 0.0821 \frac{L \cdot atm}{mol \cdot K}}$

T=204.63K

2) If I have an unknown quantity of gas at a pressure of 1.2 atm, a volume of 31 liters, and a temperature of 87 °C, how many moles of gas do I have?

PV=nRT

$n = \frac{PV}{RT} = \frac{1.2atm \cdot 31L}{0.0821 \frac{L \cdot atm}{mol \cdot K} \cdot 360K}$

n=1.2586mol

3) If I contain 3 moles of gas in a container with a volume of 60 liters and at a temperature of 400 K, what is the pressure inside the container?

PV=nRT

$P = \frac{nRT}{V} = \frac{3mol \cdot 0.0821 \frac{L \cdot atm}{mol \cdot K} \cdot 400K}{60L}$

P=1.642 atm

or P=166.29 kPa

4) If I have 7.7 moles of gas at a pressure of 0.09 atm and at a temperature of 56 °C, what is the volume of the container that the gas is in?

PV=nRT

$V = \frac{nRT}{P} = \frac{7.7mol \cdot 0.0821 \frac{L \cdot atm}{mol \cdot K} \cdot 329K}{0.09atm}$

V=2310.93L

5) If I have 17 moles of gas at a temperature of 67 °C, and a volume of 88.89 liters, what is the pressure of the gas?

PV=nRT

$P = \frac{nRT}{V} = \frac{17mol \cdot 0.0821 \frac{L \cdot atm}{mol \cdot K} \cdot 340K}{88.89L}$

P=5.34atm

or P=540.61 kPa

6) If I have an unknown quantity of gas at a pressure of 0.5 atm, a volume of 25 liters, and a temperature of 300 K, how many moles of gas do I have?

PV=nRT

$n = \frac{PV}{RT} = \frac{0.5atm \cdot 25L}{0.0821 \frac{L \cdot atm}{mol \cdot K} \cdot 300K}$

n=0.5075mol

Ideal Gas Law Worksheet Answers: A Comprehensive Guide

Are you struggling with your ideal gas law worksheet? Feeling overwhelmed by PV=nRT and its various applications? You're not alone! Many students find the ideal gas law challenging, but mastering it is crucial for success in chemistry. This comprehensive guide provides not just answers to common ideal gas law worksheet problems, but also a thorough explanation of the concepts involved, ensuring you understand the why behind the calculations. We'll break down the ideal gas law, its applications, and offer strategies for tackling various problem types. Prepare to conquer your worksheet and truly grasp the ideal gas law!

Understanding the Ideal Gas Law: PV=nRT

The ideal gas law, PV=nRT, is a cornerstone of chemistry. Let's break down each variable:

P: Pressure (typically measured in atmospheres, atm, or Pascals, Pa)
V: Volume (typically measured in liters, L, or cubic meters, m^3)
n: Number of moles (a measure of the amount of substance)
R: The ideal gas constant (a proportionality constant; its value depends on the units used for other variables. Common values include 0.0821 L·atm/mol·K and 8.314 J/mol·K)
T: Temperature (always measured in Kelvin, K; remember to convert Celsius to Kelvin using K = °C + 273.15)

Understanding the relationships between these variables is key to solving problems. For instance, at constant temperature and amount of gas, pressure and volume are inversely proportional (Boyle's Law). At constant pressure and amount of gas, volume and temperature are directly proportional (Charles's Law). These relationships are all embedded within the ideal gas law.

Common Types of Ideal Gas Law Problems

Ideal gas law worksheets typically cover several problem types. Let's examine some common scenarios and how to approach them:

1. Finding an Unknown Variable:

These problems provide values for three of the four variables (P, V, n, T) and ask you to solve for the fourth. The process is straightforward: plug in the known values and solve algebraically for the unknown. Remember to always use consistent units!

2. Problems Involving Gas Stoichiometry:

These problems combine the ideal gas law with stoichiometric calculations. You'll need to use the balanced chemical equation to determine the moles of gas produced or consumed in a reaction, then use the ideal gas law to find other properties like volume or pressure.

3. Problems Involving Gas Mixtures:

Dalton's Law of Partial Pressures states that the total pressure of a gas mixture is the sum of the partial pressures of each individual gas. These problems often involve calculating the partial pressure of a specific gas within a mixture or determining the total pressure.

4. Problems Involving Changes in Conditions:

These problems involve a gas undergoing a change in one or more of its properties (P, V, n, T). You'll need to use the ideal gas law to relate the initial and final conditions. For instance, you might be given the initial pressure and volume and asked to find the final volume after a pressure change.

Strategies for Solving Ideal Gas Law Worksheets

Here are some tips to help you successfully tackle your worksheet:

Write down all known variables and the unknown variable. This helps organize your thoughts and ensures you don't miss any information.
Convert all units to consistent units. Using a mixture of units will lead to incorrect answers.
Show your work clearly. This helps you identify errors and makes it easier to understand the solution process.
Check your answers. Make sure your answers are reasonable and consistent with the information given in the problem.
Practice, practice, practice! The more problems you solve, the more comfortable you'll become with the ideal gas law.

Ideal Gas Law Worksheet Answers: Example Problems

While providing specific answers to a generic worksheet isn't possible without the specific questions, we can illustrate the process with examples:

Example 1: A gas occupies 2.5 L at 25°C and 1 atm. What is its volume at 100°C and 2 atm?

Solution: This is a problem involving a change in conditions. First convert Celsius to Kelvin (25°C + 273.15 = 298.15 K and 100°C + 273.15 = 373.15 K). Then use the ideal gas law to set up a proportion and solve for the unknown final volume.

Conclusion

Mastering the ideal gas law is a crucial step in your chemistry journey. By understanding the underlying principles and practicing regularly, you can confidently tackle any ideal gas law worksheet. Remember to always show your work, double-check your units, and approach each problem systematically. This guide provides a solid foundation, but don't hesitate to consult your textbook or instructor for further assistance. Good luck!

FAQs

1. What happens if I use the wrong value for R (the ideal gas constant)? Using the wrong R value will

directly impact your final answer, leading to an incorrect result. Ensure you select the R value that matches the units used in the problem.

2. Can the ideal gas law be applied to all gases? The ideal gas law is a model, and real gases deviate from ideal behavior, especially at high pressures and low temperatures. However, it's a good approximation for many gases under typical conditions.

3. How do I convert between different units of pressure (atm, Pa, mmHg)? You can find conversion factors in your textbook or online. Remember to be consistent in your unit usage throughout your calculations.

4. Why is temperature always in Kelvin? Kelvin is an absolute temperature scale, meaning it starts at absolute zero (0 K), where all molecular motion ceases. Using Kelvin avoids inconsistencies and ensures accurate calculations.

5. Are there online resources that can help me check my ideal gas law answers? Yes, many online calculators and simulations are available. However, understanding the process is key – these tools should supplement, not replace, your own problem-solving efforts.

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show students how to use basic principles of physics and chemistry to describe a complex system such as the atmosphere. He also seeks to give students an overview of the current state of research and the work that led to this point. Jacob begins with atmospheric structure, design of simple models, atmospheric transport, and the continuity equation, and continues with geochemical cycles, the greenhouse effect, aerosols, stratospheric ozone, the oxidizing power of the atmosphere, smog, and acid rain. Each chapter concludes with a problem set based on recent scientific literature. This is a novel approach to problem-set writing, and one that successfully introduces students to the prevailing issues. This is a major contribution to a growing area of study and will be welcomed enthusiastically by students and teachers alike.

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ideal gas law worksheet answers: Chemistry Nivaldo J. Tro, 2022 As you begin this course, I invite you to think about your reasons for enrolling in it. Why are you taking general chemistry? More generally, why are you pursuing a college education? If you are like most college students taking general chemistry, part of your answer is probably that this course is required for your major and that you are pursuing a college education so you can get a good job some day. Although these are good reasons, I would like to suggest a better one. I think the primary reason for your education is to prepare you to live a good life. You should understand chemistry-not for what it can get you-but for what it can do to you. Understanding chemistry, I believe, is an important source of happiness and fulfillment. Let me explain. Understanding chemistry helps you to live life to its fullest for two basic reasons. The first is intrinsic: through an understanding of chemistry, you gain a powerful appreciation for just how rich and extraordinary the world really is. The second reason is extrinsic: understanding chemistry makes you a more informed citizen-it allows you to engage with many of the issues of our day. In other words, understanding chemistry makes you a deeper and richer person and makes your country and the world a better place to live. These reasons have been the foundation of education from the very beginnings of civilization--

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introductory, algebra-based, two-semester college physics book is grounded with real-world examples, illustrations, and explanations to help students grasp key, fundamental physics concepts. ... This online, fully editable and customizable title includes learning objectives, concept questions, links to labs and simulations, and ample practice opportunities to solve traditional physics application problems.--Website of book.

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school and college in Pune; then IIT (Bombay). This propelled him into some of the world's best universities–UC (Berkeley) and Stanford. He managed to get away from the ivory towers of USA and devote to more challenging and rewarding Indian chemical industry with more useful R&D and project engineering. Another success story was his own business of specialty filters for the mech. engineering industry, with over hundred reputed customers. So here he is – with a fully enjoyable career of fifty years with over fifty projects and many publications. Having spent all his life in technical investigation and improvements, he has brought to you vast variety of 500 interesting puzzles from various fields. Most are actually encountered in daily life. Many are truly unique and some quite advanced. Further, over 500 jokes are added for relaxing in between. So go ahead – struggle, laugh and learn a lot! This small book is highly recommended for students of final years of school, all college students in science/ engineering and tech. professionals. Even teachers will find it interesting for setting tests. Of course riddles and easy puzzles can be enjoyed by everyone. Free quarterly updates are assured on your email id for 1 year.

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mechanics and reference to molecular structure are, barring an occasional allusion, avoided. The treatment is, therefore, 'classical', or - using a perhaps more appropriate word - 'phenomenological'. The volume almost exclusively deals with 'ideal' systems, given that the treatment of 'real' systems properly belongs in the realm of applied, rather than theoretical thermodynamics. For these reasons, only selected ideal systems are covered. Ideal gases are discussed extensively. The ideal solution is treated as an example of a liquid system. The amorphous ideal rubber serves as an example of a solid. The formalism developed in these sections is a model for the treatment of other, more complex systems. This short structural overview is written in the hope that a knowledge of steady-state theory will deepen readers' understanding of thermodynamics as a whole.

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