

WORKSHOP 7:
Gas Laws

NAME _____

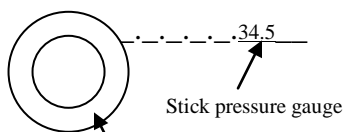
Section _____

Introduction to Gases

Show your work. Be careful to give answer in correct number of significant figures and in scientific notation if the answer is very large or very small.

1. The atmospheric pressure on Mars is about 2.00 torr, depending on the location.
Express this pressure in atm, psi and kPa

2. A pressure gauge measures the difference in the pressures inside and outside a tire.



The gauge pressure is 34.5 psi.
The atmospheric pressure outside the tire is 14.7 psi.

What is the actual air pressure inside the tire?

If this tire goes flat, what is the gauge pressure? _____
What is the actual air pressure inside the flat tire? _____

If you take this same inflated tire that has a gauge pressure of 34.5 psi up the mountain to an altitude where the atmospheric pressure is 11.4 psi, what gauge pressure will you read? Explain.

3. What is the basic reason that gases exert pressure equally in all directions?
(Think about what molecules of gas are doing.)

4. According to Dalton, the pressure exerted by a gas inside a container is proportional to the number of molecules of that gas. If 4.00×10^{23} molecules of N_2 and 2.00×10^{23} molecules of O_2 are mixed in a container they exert a total pressure of 1686 torr. What portion of that pressure (in torr units) is exerted by the N_2 ?

Simple gas law problems.

5. A sample of O_2 gas occupies a volume of 314 mL at 57.0°C and 1.97 atmospheres. What volume will it occupy when the pressure changes to 872.0 torr?
6. A sample of nitrogen gas occupies a volume of 3.87 liters at 52.8°C and 2.11 atm. What will the new temperature (in $^\circ\text{C}$) when the volume increases to 4.55 liters and the pressure remains constant?
7. A sample of hydrogen gas occupies a volume of 22.0 mL at STP. What will be the new pressure (in mmHg) when the temperature changes to 45.0°C and the volume expands to occupy 34.8 mL?
8. The atmosphere on the planet Venus exerts a pressure of 90.0 atm at the surface, at a temperature of 900°F . If an interplanetary vehicle goes to Venus and collects 2.50 L of this gas and brings it back to Earth, what volume would the gas occupy at STP?
9. Think about a hot air balloon. It is open at the bottom, so the pressure inside the balloon is constant. Why is the hot air balloon buoyant in air?