

## Ideal Gases and Kinetic Theory

1. Complete the following table:

Variable	Meaning	Units
$P$	pressure	
$V$	volume	
$T$	temperature	
$n$	number of moles	
$N$	number of molecules	
$K_{av}$	average kinetic energy	
$v_{RMS}$	root mean square speed of a gas molecule	
$U$	internal energy of a monatomic ideal gas	

2. Complete the following table:

Constant	Meaning	Numeric value	Units
$K$	Boltzmann constant	$1.38 \times 10^{-23}$	
$N_A$	Avogadro's number	$6.023 \times 10^{23}$	
$R$	universal gas constant	8.31	

3. Write the equation of state for an ideal gas.
4. What is the mathematical relationship among  $R$ ,  $k$ , and  $N_A$ ?
5. Write the equation for Boyle's law. Under what situation is this law valid?
6. Write the equation for Charles' law. Under what situation is this law valid?
7. Write the equation for pressure for the kinetic theory of gases.
8. Write the equation for kinetic energy for a gas.
9. Write the equations for the RMS speed of a gas molecule.
10. Write the equation for the internal energy of a monatomic ideal gas.