
Constitutive relations

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Useful **models** that relate physical quantities to each other

Not universally applicable

Often called “laws” anyway

Examples

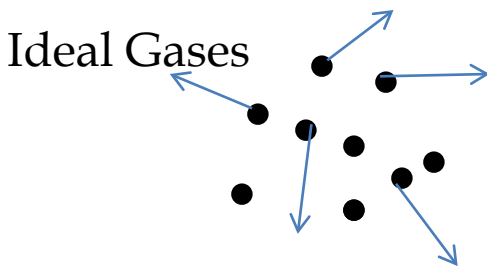
Ohm’s “Law”

$$V = IR$$

Linear spring

$$F = kx$$

Ideal gas equation

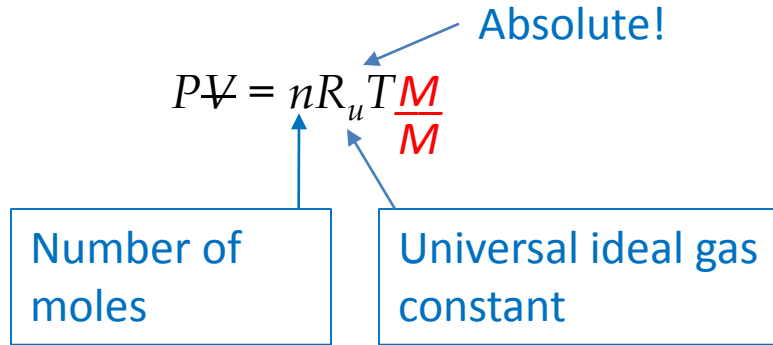


- Point masses
- Have translational KE only*
- Completely elastic collisions
- Reasonable model in many situations
- Strictly true as $P \rightarrow 0$

* Perfect vs. ideal gas

Forms of the ideal gas equation

From chemistry:



$$nM = m$$

$$\frac{R_u}{M} = R$$

Ideal gas constant

$$P\psi = mRT$$



$$R_u = 8.314 \text{ KJ/kmol-K} = 8.314 \text{ J/mol-K}$$

$$R = \text{???? KJ/kg-K} \quad \text{Different for different gases}$$

Other forms

