8 • How Do Hot Air Balloons Float?

STUDY LIST

I can…

- ☐ convert between pressure units (atm, mmHg, kPa)
- ☐ convert K to °C and °C to K
- ☐ explain that Kelvin temperature is always used in gas law calculations because 0 K actually means zero molecular motion whereas 0 °C is simply the freezing point of pure water
- ☐ identify a graph of two variables as directly proportional or inversely proportional
- ☐ identify a problem as $P \cdot V$, $\frac{P}{T}$, $\frac{V}{T}$, $\frac{PV}{T}$, or $PV=nRT$
- ☐ explain what temperature and pressure look like in terms of the Kinetic Molecular Theory
  temperature = motion of particles (KE) pressure = collisions with the walls of the container
- ☐ convert grams into moles, n, to use in $PV=nRT$
- ☐ recognize which value of R to use in a $PV=nRT$ problem
- ☐ substitute and evaluate the $PV=nRT$ equation correctly so I can solve the equation for various variables.
- ☐ explain that Graham's Law explains why all gases act the same.
  I can state that heavy particles move slowly and lighter particles move faster.
  I can calculate how much faster the light particle is moving than the heavier particle.

Useful Information Given on the Exam

STP = 0°C = 273 K and 1 atm
1 atm = 760 torr = 760 mmHg = 101.3 kPa = 14.7 psi

Boyle's Law $PV = \text{constant}$

Charles' Law $\frac{V}{T} = \text{constant}$

Gay-Lussac's Law $\frac{P}{T} = \text{constant}$

Combined Gas Law $\frac{PV}{T} = \text{constant}$

Ideal Gas Law
$PV = nRT$

$KE = {}^1/_2\, m \cdot v^2$

Graham's Law of Effusion
$$\frac{\text{Velocity A}}{\text{Velocity B}} = \sqrt{\frac{\text{M.W. B}}{\text{M.W. A}}}$$

Ideal Gas Constant, R
$= 62.4 \frac{L \cdot mmHg}{mol \cdot K}$
$= 0.0821 \frac{L \cdot atm}{mol \cdot K}$
$= 8.31 \frac{L \cdot kPa}{mol \cdot K}$