



Important formulae on 1D Formulas

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Examples!

Conversions!

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List of 15 Important formulae on 1D Formulas

Important formulae on 1D 🗗

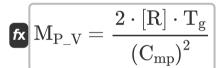
1) Mean Square Speed of Gas Molecule given Pressure and Volume of Gas in 1D



Open Calculator 🗗

$$ext{ex} \left[0.4816 ext{m/s} = rac{0.215 ext{Pa} \cdot 22.4 ext{L}}{100 \cdot 0.1 ext{g}}
ight]$$

2) Molar Mass given Most probable Speed and Temperature 🗹



Open Calculator

$$extbf{ex} egin{aligned} 1247.169 ext{g/mol} &= rac{2 \cdot [ext{R}] \cdot 30 ext{K}}{\left(20 ext{m/s}
ight)^2} \end{aligned}$$

3) Molar Mass of Gas given Average Velocity, Pressure, and Volume

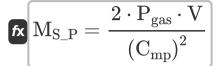
$$M_{
m AV_P} = rac{8 \cdot {
m P}_{
m gas} \cdot {
m V}}{\pi \cdot \left(({
m C}_{
m av})^2
ight)}$$

Open Calculator

$$extbf{ex} 0.490554 ext{g/mol} = rac{8 \cdot 0.215 ext{Pa} \cdot 22.4 ext{L}}{\pi \cdot \left(\left(5 ext{m/s}
ight)^2
ight)}$$

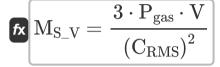


4) Molar Mass of gas given most probable Speed, Pressure and Volume



Open Calculator 🗗

- $ext{ex} \ 0.02408 ext{g/mol} = rac{2 \cdot 0.215 ext{Pa} \cdot 22.4 ext{L}}{\left(20 ext{m/s}
 ight)^2}$
- 5) Molar Mass of Gas given Root Mean Square Speed and Pressure



Open Calculator

- $= 0.14448 \text{g/mol} = \frac{3 \cdot 0.215 \text{Pa} \cdot 22.4 \text{L}}{(10 \text{m/s})^2}$
- 6) Molar Mass of Gas given Root Mean Square Speed and Pressure in 2D
- $\mathbf{f}_{\mathbf{X}} egin{aligned} \mathbf{M}_{\mathrm{S_V}} &= rac{2 \cdot \mathrm{P_{\mathrm{gas}} \cdot V}}{\left(\mathrm{C_{\mathrm{RMS}}}
 ight)^2} \end{aligned}$

Open Calculator 🗗

 $oxed{ex} 0.09632 ext{g/mol} = rac{2 \cdot 0.215 ext{Pa} \cdot 22.4 ext{L}}{(10 ext{m/s})^2}$

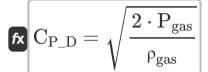




$$\mathbf{K} egin{aligned} \mathbf{M}_{\mathrm{AV_T}} &= rac{\pi \cdot [\mathrm{R}] \cdot \mathrm{T_g}}{2 \cdot \left(\mathrm{C_{av}}
ight)^2} \end{aligned}$$

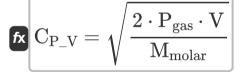
$$\mathbf{ex} \ 15672.39 \mathrm{g/mol} = \frac{\pi \cdot [\mathrm{R}] \cdot 30 \mathrm{K}}{2 \cdot \left(5 \mathrm{m/s}\right)^2}$$

8) Most Probable Velocity of Gas given Pressure and Density



ex
$$18.3286 \mathrm{m/s} = \sqrt{rac{2 \cdot 0.215 \mathrm{Pa}}{0.00128 \mathrm{kg/m^3}}}$$

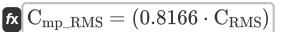
9) Most Probable Velocity of Gas given Pressure and Volume



$$oxed{ex} 0.467824 ext{m/s} = \sqrt{rac{2 \cdot 0.215 ext{Pa} \cdot 22.4 ext{L}}{44.01 ext{g/mol}}}$$



10) Most Probable Velocity of Gas given RMS Velocity

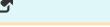


Open Calculator 🗗

Open Calculator

 $[8.166 \mathrm{m/s} = (0.8166 \cdot 10 \mathrm{m/s})]$

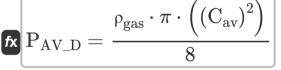
11) Most Probable Velocity of Gas given Temperature



 $\mathbf{K} \left[\mathrm{C_T} = \sqrt{rac{2 \cdot [\mathrm{R}] \cdot \mathrm{T_g}}{\mathrm{M_{molar}}}}
ight]$

 $ext{ex} \ 106.4675 ext{m/s} = \sqrt{rac{2 \cdot [ext{R}] \cdot 30 ext{K}}{44.01 ext{g/mol}}}$

12) Pressure of Gas given Average Velocity and Density



Open Calculator

$$extbf{ex} 0.012566 ext{Pa} = rac{0.00128 ext{kg/m}^3 \cdot \pi \cdot \left(\left(5 ext{m/s}
ight)^2
ight)}{8}$$



13) Pressure of Gas given Average Velocity and Volume

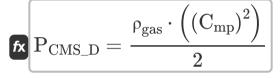
d Volume 🗹

extstyle ext

Open Calculator 🗗

 $\boxed{ 19.24575 \mathrm{Pa} = \frac{44.01 \mathrm{g/mol} \cdot \pi \cdot \left(\left(5 \mathrm{m/s} \right)^2 \right)}{8 \cdot 22.45 \mathrm{L}} }$

14) Pressure of Gas given most probable Speed and Density



Open Calculator

 $egin{aligned} \mathbf{ex} \ 0.256 \mathrm{Pa} = rac{0.00128 \mathrm{kg/m^3} \cdot \left(\left(20 \mathrm{m/s}
ight)^2
ight)}{2} \end{aligned}$

15) Pressure of Gas given most probable Speed and Volume

$$ext{P}_{ ext{CMS_V}} = rac{ ext{M}_{ ext{molar}} \cdot \left(ext{C}_{ ext{mp}}
ight)^2}{2 \cdot ext{V}_{ ext{g}}}$$

Open Calculator 🗗

 $oxed{ ext{ex}} 392.0713 ext{Pa} = rac{44.01 ext{g/mol} \cdot \left(20 ext{m/s}
ight)^2}{2 \cdot 22.45 ext{L}}$



Variables Used

- C_{av} Average Velocity of Gas (Meter per Second)
- C_{mp} Most Probable Velocity (Meter per Second)
- C_{mp} RMS Most Probable Velocity given RMS (Meter per Second)
- C_{P D} Most Probable Velocity given P and D (Meter per Second)
- Cp v Most Probable Velocity given P and V (Meter per Second)
- C_{RMS} Root Mean Square Speed (Meter per Second)
- C_T Most Probable Velocity given T (Meter per Second)
- m Mass of Each Molecule (Gram)
- MAV P Molar Mass given AV and P (Gram Per Mole)
- M_{AV} _T Molar Mass given AV and T (Gram Per Mole)
- M_{molar} Molar Mass (Gram Per Mole)
- Mp v Molar Mass given V and P (Gram Per Mole)
- M_{S P} Molar Mass given S and P (Gram Per Mole)
- M_S v Molar Mass given S and V (Gram Per Mole)
- N_{molecules} Number of Molecules
- P_{AV D} Pressure of Gas given AV and D (Pascal)
- P_{AV V} Pressure of Gas given AV and V (Pascal)
- P_{CMS D} Pressure of Gas given CMS and D (Pascal)
- P_{CMS} v Pressure of Gas given CMS and V (Pascal)
- Pgas Pressure of Gas (Pascal)





- Tq Temperature of Gas (Kelvin)
- **V** Volume of Gas (*Liter*)
- V_g Volume of Gas for 1D and 2D (Liter)
- V_{RMS} Root Mean Square of Speed (Meter per Second)
- ρ_{qas} Density of Gas (Kilogram per Cubic Meter)





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Constant: [R], 8.31446261815324 Joule / Kelvin * Mole Universal gas constant
- Function: sqrt, sqrt(Number) Square root function
- Measurement: Weight in Gram (g)
 Weight Unit Conversion
- Measurement: **Temperature** in Kelvin (K) *Temperature Unit Conversion*
- Measurement: Volume in Liter (L)
 Volume Unit Conversion
- Measurement: Pressure in Pascal (Pa)
 Pressure Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Density in Kilogram per Cubic Meter (kg/m³)
 Density Unit Conversion
- Measurement: Molar Mass in Gram Per Mole (g/mol)
 Molar Mass Unit Conversion





Check other formula lists

- Acentric Factor Formulas
- Average Velocity of Gas
 Formulas
- Average velocity of gas and Acentric factor Formulas
- Compressibility Formulas
- Density of Gas Formulas
- Equipartition Principle and Heat Capacity Formulas
- Important formulae on 1D Formulas
- Important formulae on 2D Formulas
- Important formulae on Equipartition Principle and Heat Capacity Formulas

- Inversion Temperature
 Formulas
- Kinetic Energy of Gas
- Mean Square Speed of Gas Formulas
- Molar Mass of Gas Formulas
- Most Probable Velocity of Gas Formulas
- PIB Formulas
- Pressure of Gas Formulas
- RMS Velocity Formulas
- Temperature of Gas Formulas
- Van der Waals Constant Formulas
- Volume of Gas Formulas

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