



# Important formulae on 2D Formulas

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Examples!

Conversions!

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### List of 12 Important formulae on 2D Formulas

## Important formulae on 2D 🗗

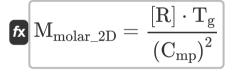
1) Mean Square Speed of Gas Molecule given Pressure and Volume of Gas in 2D

$$ag{C}_{
m RMS\_2D} = rac{2 \cdot P_{
m gas} \cdot V}{N_{
m molecules} \cdot m}$$

Open Calculator

$$0.9632 ext{m/s} = rac{2 \cdot 0.215 ext{Pa} \cdot 22.4 ext{L}}{100 \cdot 0.1 ext{g}}$$

2) Molar Mass given Most Probable Speed and Temperature in 2D 🗲



Open Calculator

$$ext{ex} \ 623.5847 ext{g/mol} = rac{[ ext{R}] \cdot 30 ext{K}}{\left(20 ext{m/s}
ight)^2}$$



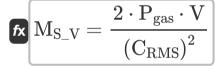
#### 3) Molar Mass of Gas given Average Velocity, Pressure, and Volume in 2D

Open Calculator 2

$$ext{M}_{ ext{m\_2D}} = rac{\pi \cdot ext{P}_{ ext{gas}} \cdot ext{V}}{2 \cdot \left( \left( ext{C}_{ ext{av}} 
ight)^2 
ight)}$$

$$\mathbf{ex} \left[ 0.302598 \mathrm{g/mol} = \frac{\pi \cdot 0.215 \mathrm{Pa} \cdot 22.4 \mathrm{L}}{2 \cdot \left( \left( 5 \mathrm{m/s} \right)^2 \right)} \right]$$

# 4) Molar Mass of Gas given Root Mean Square Speed and Pressure in 2D



Open Calculator 2

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

#### 5) Most Probable Velocity of Gas given Pressure and Density in 2D



Open Calculator G

ex 
$$12.96028 \mathrm{m/s} = \sqrt{rac{0.215 \mathrm{Pa}}{0.00128 \mathrm{kg/m^3}}}$$





#### 6) Most Probable Velocity of Gas given Pressure and Volume in 2D

fx  $C_{P_-V} = \sqrt{rac{P_{
m gas} \cdot V}{M_{
m molar}}}$ 

Open Calculator 🚰

 $oxed{ex} 0.330802 \mathrm{m/s} = \sqrt{rac{0.215 \mathrm{Pa} \cdot 22.4 \mathrm{L}}{44.01 \mathrm{g/mol}}}$ 

#### 7) Most Probable Velocity of Gas given RMS Velocity in 2D

fx  $\mathrm{C_{mp\_RMS}} = (0.7071 \cdot \mathrm{C_{RMS}})$ 

Open Calculator

- $\texttt{ex} \ 7.071 \text{m/s} = (0.7071 \cdot 10 \text{m/s})$
- 8) Most Probable Velocity of Gas given Temperature in 2D



Open Calculator 🗗

ex 
$$75.28389 \text{m/s} = \sqrt{\frac{[\text{R}] \cdot 30 \text{K}}{44.01 \text{g/mol}}}$$



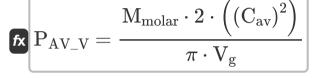
#### 9) Pressure of Gas given Average Velocity and Density in 2D

 $ag{P_{
m AV\_D}} = rac{
ho_{
m gas} \cdot 2 \cdot \left( ({
m C}_{
m av})^2 
ight)}{\pi}$ 

Open Calculator 🗗

 $oxed{ex} 0.020372 ext{Pa} = rac{0.00128 ext{kg/m}^3 \cdot 2 \cdot \left( \left(5 ext{m/s} 
ight)^2 
ight)}{\pi}$ 

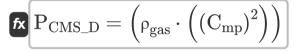
#### 10) Pressure of Gas given Average Velocity and Volume in 2D



Open Calculator 🚰

 $= \frac{31.20004 \text{Pa} = \frac{44.01 \text{g/mol} \cdot 2 \cdot \left( (5 \text{m/s})^2 \right)}{\pi \cdot 22.45 \text{L}} }$ 

#### 11) Pressure of Gas given most probable Speed and Density in 2D



 $oxed{ex} \left[ 0.512 \mathrm{Pa} = \left( 0.00128 \mathrm{kg/m^3} \cdot \left( (20 \mathrm{m/s})^2 
ight) 
ight)$ 



#### 12) Pressure of Gas given Most Probable Speed and Volume in 2D 🗗



 $extstyle{ P_{ ext{CMS\_V\_2D}} = rac{ ext{M}_{ ext{molar}} \cdot \left( ext{C}_{ ext{mp}}
ight)^2}{ ext{V}_{ ext{g}}}}$ 

Open Calculator

$$784.1425 ext{Pa} = rac{44.01 ext{g/mol} \cdot (20 ext{m/s})^2}{22.45 ext{L}}$$



#### Variables Used

- C<sub>av</sub> Average Velocity of Gas (Meter per Second)
- C<sub>mp</sub> Most Probable Velocity (Meter per Second)
- C<sub>mp</sub> RMS Most Probable Velocity given RMS (Meter per Second)
- C<sub>P D</sub> Most Probable Velocity given P and D (Meter per Second)
- C<sub>P</sub> V Most Probable Velocity given P and V (Meter per Second)
- C<sub>RMS</sub> Root Mean Square Speed (Meter per Second)
- C<sub>RMS 2D</sub> Root Mean Square Speed 2D (Meter per Second)
- C<sub>T</sub> Most Probable Velocity given T (Meter per Second)
- m Mass of Each Molecule (Gram)
- M<sub>m 2D</sub> Molar Mass 2D (Gram Per Mole)
- M<sub>molar</sub> Molar Mass (Gram Per Mole)
- M<sub>molar 2D</sub> Molar Mass in 2D (Gram Per Mole)
- M<sub>S V</sub> Molar Mass given S and V (Gram Per Mole)
- N<sub>molecules</sub> Number of Molecules
- P<sub>AV D</sub> Pressure of Gas given AV and D (Pascal)
- P<sub>AV V</sub> Pressure of Gas given AV and V (Pascal)
- P<sub>CMS D</sub> Pressure of Gas given CMS and D (Pascal)
- P<sub>CMS</sub> v <sub>2D</sub> Pressure of Gas given CMS and V in 2D (Pascal)
- Pgas Pressure of Gas (Pascal)
- T<sub>g</sub> Temperature of Gas (Kelvin)
- **V** Volume of Gas (*Liter*)



- ullet V<sub>g</sub> Volume of Gas for 1D and 2D (Liter)
- $\rho_{gas}$  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
- 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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