Important Formulae on 2D Formulas PDF

Formulas
Examples
with Units

List of 12
Important Formulae on 2D Formulas

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

Evaluate Formula

Formula

$$C_{RMS\_2D} = \frac{2 \cdot P_{gas} \cdot V}{N_{molecules} \cdot m}$$

Example with Units

$$0.9632\,\text{m/s} = \frac{2 \cdot 0.215\,\text{Pa} \cdot 22.4\,\text{L}}{100 \cdot 0.1\,\text{g}}$$

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

Evaluate Formula

Formula

$$M_{molar\_2D} = \frac{[R] \cdot T_g}{\left(C_{mp}\right)^2}$$

Example with Units

$$623.5847\,\text{g/mol} = \frac{8.3145 \cdot 30\,\text{K}}{\left(20\,\text{m/s}\right)^2}$$

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

Evaluate Formula

Formula

$$M_{m\_2D} = \frac{\pi \cdot P_{gas} \cdot V}{2 \cdot \left(\left(C_{av}\right)^2\right)}$$

Example with Units

$$0.3026\,\text{g/mol} = \frac{3.1416 \cdot 0.215\,\text{Pa} \cdot 22.4\,\text{L}}{2 \cdot \left(\left(5\,\text{m/s}\right)^2\right)}$$

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

Evaluate Formula

Formula

$$M_{S\_V} = \frac{2 \cdot P_{gas} \cdot V}{\left(C_{RMS}\right)^2}$$

Example with Units

$$0.0963\,\text{g/mol} = \frac{2 \cdot 0.215\,\text{Pa} \cdot 22.4\,\text{L}}{\left(10\,\text{m/s}\right)^2}$$

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

Evaluate Formula

Formula

$$C_{P\_D} = \sqrt{\frac{P_{gas}}{\rho_{gas}}}$$

Example with Units

$$12.9603\,\text{m/s} = \sqrt{\frac{0.215\,\text{Pa}}{0.00128\,\text{kg/m}^3}}$$

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

Evaluate Formula

Formula

$$C_{P\_V} = \sqrt{\frac{P_{gas} \cdot V}{M_{molar}}}$$

Example with Units

$$0.3308\,\text{m/s} = \sqrt{\frac{0.215\,\text{Pa} \cdot 22.4\,\text{L}}{44.01\,\text{g/mol}}}$$

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

Evaluate Formula

Formula

$$C_{mp\_RMS} = \left(0.7071 \cdot C_{RMS}\right)$$

Example with Units

$$7.071\,\text{m/s} = \left(0.7071 \cdot 10\,\text{m/s}\right)$$

8) Most Probable Velocity of Gas given Temperature in 2D Formula

Evaluate Formula

Formula

$$C_T = \sqrt{\frac{[R] \cdot T_g}{M_{molar}}}$$

Example with Units

$$75.2839\,\text{m/s} = \sqrt{\frac{8.3145 \cdot 30\,\text{K}}{44.01\,\text{g/mol}}}$$

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

Evaluate Formula

Formula

$$P_{AV\_D} = \frac{\rho_{gas} \cdot 2 \cdot \left(\left(C_{av}\right)^2\right)}{\pi}$$

Example with Units

$$0.0204\,\text{Pa} = \frac{0.00128\,\text{kg/m}^3 \cdot 2 \cdot \left(\left(5\,\text{m/s}\right)^2\right)}{3.1416}$$

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

Evaluate Formula

Formula

$$P_{AV\_V} = \frac{M_{molar} \cdot 2 \cdot \left(\left(C_{av}\right)^2\right)}{\pi \cdot V_g}$$

Example with Units

$$31.2\,\text{Pa} = \frac{44.01\,\text{g/mol} \cdot 2 \cdot \left(\left(5\,\text{m/s}\right)^2\right)}{3.1416 \cdot 22.45\,\text{L}}$$

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

Evaluate Formula

Formula

$$P_{CMS\_D} = \left(\rho_{gas} \cdot \left(\left(C_{mp}\right)^2\right)\right)$$

Example with Units

$$0.512\,\text{Pa} = \left(0.00128\,\text{kg/m}^3 \cdot \left(\left(20\,\text{m/s}\right)^2\right)\right)$$

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

Evaluate Formula

Formula

$$P_{CMS\_V\_2D} = \frac{M_{molar} \cdot \left(C_{mp}\right)^2}{V_g}$$

Example with Units

$$784.1425\,\text{Pa} = \frac{44.01\,\text{g/mol} \cdot \left(20\,\text{m/s}\right)^2}{22.45\,\text{L}}$$

Variables used in list of Important Formulae on 2D above

- 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)*
- C_{P_V} Most Probable Velocity given P and V *(Meter per Second)*
- C_{RMS} Root Mean Square Speed *(Meter per Second)*
- C_{RMS_2D} Root Mean Square Speed 2D *(Meter per Second)*
- C_T Most Probable Velocity given T *(Meter per Second)*
- m Mass of Each Molecule *(Gram)*
- M_{m_2D} Molar Mass 2D *(Gram Per Mole)*
- M_{molar} Molar Mass *(Gram Per Mole)*
- M_{molar_2D} Molar Mass in 2D *(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)*
- $P_{CMS\_V\_2D}$ Pressure of Gas given CMS and V in 2D *(Pascal)*
- P_{gas} Pressure of Gas *(Pascal)*
- T_g Temperature of Gas *(Kelvin)*
- V Volume of Gas *(Liter)*
- V_g Volume of Gas for 1D and 2D *(Liter)*
- ρ_{gas} Density of Gas *(Kilogram per Cubic Meter)*

Constants, Functions, Measurements used in list of Important Formulae on 2D above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- constant(s): **[R]**, 8.31446261815324 *Universal gas constant*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- 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*

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