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Important formulae on 2D Formulas

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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

Open Calculator

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

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

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

Open Calculator

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

ex $$623.5847\text{g/mol} = \frac{[R] \cdot 30\text{K}}{(20\text{m/s})^2}$$

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

Open Calculator

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

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

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

Open Calculator

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

$$0.09632\mathrm{g/mol} = \frac{2 \cdot 0.215\mathrm{Pa} \cdot 22.4\mathrm{L}}{\left(10\mathrm{m/s}\right)^2}$$

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

Open Calculator

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

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

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

Open Calculator

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

ex $$0.330802\text{m/s} = \sqrt{\frac{0.215\text{Pa} \cdot 22.4\text{L}}{44.01\text{g/mol}}}$$

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

Open Calculator

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

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

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

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

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

Open Calculator

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

ex $$0.020372\text{Pa} = \frac{0.00128\text{kg/m}^3 \cdot 2 \cdot \left((5\text{m/s})^2 \right)}{\pi}$$

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

Open Calculator

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

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

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

Open Calculator

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

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

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

Open Calculator

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

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

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)*
- 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

- 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

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- Average velocity of gas and Acentric factor Formulas
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