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Average velocity of gas and Acentric factor Formulas

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List of 11 Average velocity of gas and Acentric factor Formulas

Average velocity of gas and Acentric factor

1) Acentric Factor

Open Calculator

fx $$\omega_{vp} = -\log 10\left(\mathrm{Pr}^{saturated}\right) - 1$$

ex $$-1.70757 = -\log 10(5.1\mathrm{Pa}) - 1$$

2) Acentric Factor given Actual and Critical Saturation Vapor Pressure

Open Calculator

fx $$\omega_{vp} = -\log 10\left(\frac{\mathrm{P}^{saturated}}{\mathrm{Pc}^{saturation}}\right) - 1$$

ex $$-1.455932 = -\log 10\left(\frac{6\mathrm{Pa}}{2.1\mathrm{Pa}}\right) - 1$$

3) Average Velocity of Gas given Pressure and Density

Open Calculator

fx $$v_{avg\_P\_D} = \sqrt{\frac{8 \cdot P_{gas}}{\pi \cdot \rho_{gas}}}$$

ex $$20.68161\mathrm{m/s} = \sqrt{\frac{8 \cdot 0.215\mathrm{Pa}}{\pi \cdot 0.00128\mathrm{kg/m^3}}}$$

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

Open Calculator

fx $$v_{avg\_P\_D} = \sqrt{\frac{\pi \cdot P_{gas}}{2 \cdot \rho_{gas}}}$$

ex $$16.2433\text{m/s} = \sqrt{\frac{\pi \cdot 0.215\text{Pa}}{2 \cdot 0.00128\text{kg/m}^3}}$$

5) Average Velocity of Gas given Pressure and Volume

Open Calculator

fx $$v_{avg\_P\_V} = \sqrt{\frac{8 \cdot P_{gas} \cdot V}{\pi \cdot M_{molar}}}$$

ex $$0.527883\text{m/s} = \sqrt{\frac{8 \cdot 0.215\text{Pa} \cdot 22.4\text{L}}{\pi \cdot 44.01\text{g/mol}}}$$

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

Open Calculator

fx $$v_{avg\_P\_V} = \sqrt{\frac{\pi \cdot P_{gas} \cdot V}{2 \cdot M_{molar}}}$$

ex $$0.414598\text{m/s} = \sqrt{\frac{\pi \cdot 0.215\text{Pa} \cdot 22.4\text{L}}{2 \cdot 44.01\text{g/mol}}}$$

7) Average Velocity of Gas given Root Mean Square Speed

Open Calculator

fx $$v_{avg\_RMS} = (0.9213 \cdot C_{RMS\_speed})$$

ex $$9.67365\text{m/s} = (0.9213 \cdot 10.5\text{m/s})$$

8) Average Velocity of Gas given Root Mean Square Speed in 2D

Open Calculator

fx $$v_{avg\_RMS} = (0.8862 \cdot C_{RMS\_speed})$$

ex $$9.3051\text{m/s} = (0.8862 \cdot 10.5\text{m/s})$$

9) Average Velocity of Gas given Temperature

Open Calculator

fx $$C_{av} = \sqrt{\frac{8 \cdot [R] \cdot T_g}{\pi \cdot M_{molar}}}$$

ex $$120.1357\text{m/s} = \sqrt{\frac{8 \cdot [R] \cdot 30\text{K}}{\pi \cdot 44.01\text{g/mol}}}$$

10) Average Velocity of Gas given Temperature in 2D

Open Calculator

fx $$v_{avg\_T} = \sqrt{\frac{\pi \cdot [R] \cdot T_g}{2 \cdot M_{molar}}}$$

ex $$94.35436\text{m/s} = \sqrt{\frac{\pi \cdot [R] \cdot 30\text{K}}{2 \cdot 44.01\text{g/mol}}}$$

11) Terminal Velocity given Angular Velocity

Open Calculator

fx $$v_{ter} = \frac{m \cdot r_m \cdot (\omega)^2}{6 \cdot \pi \cdot \mu \cdot r_0}$$

ex $$0.000642\text{m/s} = \frac{1.1\text{kg} \cdot 2.2\text{m} \cdot (2\text{rad/s})^2}{6 \cdot \pi \cdot 80\text{N*s/m}^2 \cdot 10\text{m}}$$

Variables Used

- C_{av} Average Velocity of Gas *(Meter per Second)*
- C_{RMS_speed} Root Mean Square of Speed *(Meter per Second)*
- m Mass of Particle *(Kilogram)*
- M_{molar} Molar Mass *(Gram Per Mole)*
- P_{gas} Pressure of Gas *(Pascal)*
- $P^{saturated}$ Saturation Vapour Pressure *(Pascal)*
- $Pc^{saturation}$ Critical saturation vapour pressure *(Pascal)*
- $Pr^{saturated}$ Reduced saturation vapour pressure *(Pascal)*
- r_0 Radius of Spherical Particle *(Meter)*
- r_m Radius of molecule *(Meter)*
- T_g Temperature of Gas *(Kelvin)*
- V Volume of Gas *(Liter)*
- $v_{avg\_P\_D}$ Average Velocity given P and D *(Meter per Second)*
- $v_{avg\_P\_V}$ Average Velocity given P and V *(Meter per Second)*
- v_{avg_RMS} Average Velocity given RMS *(Meter per Second)*
- v_{avg_T} Average Velocity given Temperature *(Meter per Second)*
- v_{ter} Terminal Velocity given Angular Velocity *(Meter per Second)*
- μ Dynamic Viscosity *(Newton Second per Square Meter)*
- ρ_{gas} Density of Gas *(Kilogram per Cubic Meter)*
- ω Angular Velocity *(Radian per Second)*
- ω_{vp} Acentric Factor VP

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[R]**, 8.31446261815324 Joule / Kelvin * Mole
  Universal gas constant
- Function: **log10**, log10(Number)
  Common logarithm function (base 10)
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  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: **Dynamic Viscosity** in Newton Second per Square Meter (N*s/m²)
  Dynamic Viscosity Unit Conversion
- Measurement: **Angular Velocity** in Radian per Second (rad/s)
  Angular Velocity 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

- 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
- 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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