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Important Calculator of Compressibility Formulas

Calculators! Examples! Conversions!

List of 14 Important Calculator of Compressibility Formulas

Important Calculator of Compressibility

1) Compressibility Factor given Molar Volume of Gases

Open Calculator

$$Z_{ktog} = \frac{V_m}{V_{m\,(ideal)}}$$

$$1.964286 = \frac{22L}{11.2L}$$

2) Molar Volume of Real Gas given Compressibility Factor

Open Calculator

$$V_{molar} = z \cdot V_{m\,(ideal)}$$

$$126.7812L = 11.31975 \cdot 11.2L$$

3) Relative Size of Fluctuations in Particle Density

Open Calculator

$$\Delta Nr^2 = K_T \cdot [BoltZ] \cdot T \cdot \left(\rho^2\right) \cdot V$$

$$2E\hat{}\text{-}15 = 75m^2/N \cdot [BoltZ] \cdot 85K \cdot \left((997kg/m^3)^2\right) \cdot 22.4L$$

4) Speed of Sound using Isentropic Compressibility

Open Calculator

fx $$v_{sound} = \sqrt{\frac{1}{K_S \cdot \rho_{sound}}}$$

ex $$388.7635\text{m/h} = \sqrt{\frac{1}{70\text{m}^2/\text{N} \cdot 1.225\text{kg/m}^3}}$$

5) Temperature given Coefficient of Thermal Expansion, Compressibility Factors and Cp

Open Calculator

fx $$T_{TE} = \frac{(K_T - K_S) \cdot \rho \cdot C_p}{\alpha^2}$$

ex $$973.072\text{K} = \frac{(75\text{m}^2/\text{N} - 70\text{m}^2/\text{N}) \cdot 997\text{kg/m}^3 \cdot 122\text{J/K*mol}}{(25\text{K}^{-1})^2}$$

6) Temperature given Coefficient of Thermal Expansion, Compressibility Factors and Cv

Open Calculator

fx $$T_{TE} = \frac{(K_T - K_S) \cdot \rho \cdot (C_v + [R])}{\alpha^2}$$

ex $$887.8442\text{K} = \frac{(75\text{m}^2/\text{N} - 70\text{m}^2/\text{N}) \cdot 997\text{kg/m}^3 \cdot (103\text{J/K*mol} + [R])}{(25\text{K}^{-1})^2}$$

7) Temperature given Relative Size of Fluctuations in Particle Density

Open Calculator

fx $$T_f = \frac{\left(\frac{\Delta N^2}{V}\right)}{[BoltZ] \cdot K_T \cdot \left(\rho^2\right)}$$

ex $$6.5E\hat{\ }17K = \frac{\left(\frac{15}{22.4L}\right)}{[BoltZ] \cdot 75m^2/N \cdot \left((997kg/m^3)^2\right)}$$

8) Temperature given Thermal Pressure Coefficient, Compressibility Factors and Cp

Open Calculator

fx $$T_{Cp} = \frac{\left(\left(\frac{1}{K_S}\right) - \left(\frac{1}{K_T}\right)\right) \cdot \rho \cdot (C_p - [R])}{\Lambda^2}$$

ex $$1.1E\hat{\ }6K = \frac{\left(\left(\frac{1}{70m^2/N}\right) - \left(\frac{1}{75m^2/N}\right)\right) \cdot 997kg/m^3 \cdot (122J/K{*}mol - [R])}{(0.01Pa/K)^2}$$

9) Temperature given Thermal Pressure Coefficient, Compressibility Factors and Cv

Open Calculator

fx $$T_{Cv} = \frac{\left(\left(\frac{1}{K_S}\right) - \left(\frac{1}{K_T}\right)\right) \cdot \rho \cdot C_v}{\Lambda^2}$$

ex $$978009.5K = \frac{\left(\left(\frac{1}{70m^2/N}\right) - \left(\frac{1}{75m^2/N}\right)\right) \cdot 997kg/m^3 \cdot 103J/K{*}mol}{(0.01Pa/K)^2}$$

10) Thermal Pressure Coefficient given Compressibility Factors and Cp

Open Calculator

fx $$\Lambda_{coeff} = \sqrt{\frac{\left(\left(\frac{1}{K_S}\right) - \left(\frac{1}{K_T}\right)\right) \cdot \rho \cdot (C_p - [R])}{T}}$$

ex $$1.126928\text{Pa/K} = \sqrt{\frac{\left(\left(\frac{1}{70\text{m}^2/\text{N}}\right) - \left(\frac{1}{75\text{m}^2/\text{N}}\right)\right) \cdot 997\text{kg/m}^3 \cdot (122\text{J/K*mol} - [R])}{85\text{K}}}$$

11) Thermal Pressure Coefficient given Compressibility Factors and Cv

Open Calculator

fx $$\Lambda_{coeff} = \sqrt{\frac{\left(\left(\frac{1}{K_S}\right) - \left(\frac{1}{K_T}\right)\right) \cdot \rho \cdot C_v}{T}}$$

ex $$1.07266\text{Pa/K} = \sqrt{\frac{\left(\left(\frac{1}{70\text{m}^2/\text{N}}\right) - \left(\frac{1}{75\text{m}^2/\text{N}}\right)\right) \cdot 997\text{kg/m}^3 \cdot 103\text{J/K*mol}}{85\text{K}}}$$

12) Volume given Relative Size of Fluctuations in Particle Density

Open Calculator

fx $$V_f = \frac{\Delta N^2}{K_T \cdot [BoltZ] \cdot T \cdot \left(\rho^2\right)}$$

ex $$1.7\text{E\^{}17L} = \frac{15}{75\text{m}^2/\text{N} \cdot [BoltZ] \cdot 85\text{K} \cdot \left((997\text{kg/m}^3)^2\right)}$$

13) Volumetric Coefficient of Thermal Expansion given Compressibility Factors and Cp

Open Calculator

fx $$\alpha_{comp} = \sqrt{\frac{(K_T - K_S) \cdot \rho \cdot C_p}{T}}$$

ex $$84.58689 K^{-1} = \sqrt{\frac{(75 m^2/N - 70 m^2/N) \cdot 997 kg/m^3 \cdot 122 J/K^*mol}{85K}}$$

14) Volumetric Coefficient of Thermal Expansion given Compressibility Factors and Cv

Open Calculator

fx $$\alpha_{comp} = \sqrt{\frac{(K_T - K_S) \cdot \rho \cdot (C_v + [R])}{T}}$$

ex $$80.79768 K^{-1} = \sqrt{\frac{(75 m^2/N - 70 m^2/N) \cdot 997 kg/m^3 \cdot (103 J/K^*mol + [R])}{85K}}$$

Variables Used

- C_p Molar Specific Heat Capacity at Constant Pressure *(Joule Per Kelvin Per Mole)*
- C_v Molar Specific Heat Capacity at Constant Volume *(Joule Per Kelvin Per Mole)*
- K_S Isentropic Compressibility *(Square Meter per Newton)*
- K_T Isothermal Compressibility *(Square Meter per Newton)*
- T Temperature *(Kelvin)*
- T_{Cp} Temperature given Cp *(Kelvin)*
- T_{Cv} Temperature given Cv *(Kelvin)*
- T_f Temperature given fluctuations *(Kelvin)*
- T_{TE} Temperature given Coefficient of Thermal Expansion *(Kelvin)*
- V Volume of Gas *(Liter)*
- V_f Volume of Gas given fluctuation size *(Liter)*
- $V_{m\ (ideal)}$ Molar Volume of Ideal Gas *(Liter)*
- V_m Molar Volume of Real Gas *(Liter)*
- V_{molar} Molar Volume of Gas *(Liter)*
- v_{sound} Speed of Sound given IC *(Meter per Hour)*
- z Compressibility Factor
- Z_{ktog} Compressibility Factor for KTOG
- α Volumetric Coefficient of Thermal Expansion *(1 Per Kelvin)*
- α_{comp} Volumetric Coefficient of Compressibility *(1 Per Kelvin)*
- ΔN^2 Relative Size of Fluctuations
- ΔNr^2 Relative Size of Fluctuation
- Λ Thermal Pressure Coefficient *(Pascal per Kelvin)*
- Λ_{coeff} Coefficient of Thermal Pressure *(Pascal per Kelvin)*
- ρ Density *(Kilogram per Cubic Meter)*

- ρ_{sound} Density of Propagating Medium *(Kilogram per Cubic Meter)*

Constants, Functions, Measurements used

- Constant: **[BoltZ]**, 1.38064852E-23 Joule/Kelvin
  Boltzmann constant
- Constant: **[R]**, 8.31446261815324 Joule / Kelvin * Mole
  Universal gas constant
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Temperature** in Kelvin (K)
  Temperature Unit Conversion
- Measurement: **Volume** in Liter (L)
  Volume Unit Conversion
- Measurement: **Speed** in Meter per Hour (m/h)
  Speed Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m^3)
  Density Unit Conversion
- Measurement: **Compressibility** in Square Meter per Newton (m^2/N)
  Compressibility Unit Conversion
- Measurement: **Slope of Coexistence Curve** in Pascal per Kelvin (Pa/K)
  Slope of Coexistence Curve Unit Conversion
- Measurement: **Thermal Expansion** in 1 Per Kelvin (K^{-1})
  Thermal Expansion Unit Conversion
- Measurement: **Molar Specific Heat Capacity at Constant Pressure** in Joule Per Kelvin Per Mole (J/K*mol)
  Molar Specific Heat Capacity at Constant Pressure Unit Conversion
- Measurement: **Molar Specific Heat Capacity at Constant Volume** in Joule Per Kelvin Per Mole (J/K*mol)
  Molar Specific Heat Capacity at Constant Volume Unit Conversion

Check other formula lists

- **Important Calculator of Compressibility Formulas**
- **Isentropic Compressibility Formulas**
- **Isothermal Compressibility Formulas**

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