



Important Calculator of Compressibility Formulas

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Conversions!

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List of 14 Important Calculator of Compressibility Formulas

Important Calculator of Compressibility

1) Compressibility Factor given Molar Volume of Gases

$$\mathbf{z}_{\mathrm{ktog}} = rac{V_{\mathrm{m}}}{V_{\mathrm{m \, (ideal)}}}$$

Open Calculator

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

2) Molar Volume of Real Gas given Compressibility Factor

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

Open Calculator 🛂

$$\texttt{ex} \ 126.7812 L = 11.31975 \cdot 11.2 L$$

3) Relative Size of Fluctuations in Particle Density

$$\Delta \mathrm{Nr}^2 = \mathrm{K_T} \cdot [\mathrm{BoltZ}] \cdot \mathrm{T} \cdot \left(
ho^2
ight) \cdot \mathrm{V}$$

Open Calculator 🚰



4) Speed of Sound using Isentropic Compressibility

 $v_{
m sound} = \sqrt{rac{1}{K_S \cdot
ho_{
m sound}}}$

Open Calculator 🗗

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

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

 $ext{T}_{ ext{TE}} = rac{(ext{K}_{ ext{T}} - ext{K}_{ ext{S}}) \cdot
ho \cdot ext{C}_{ ext{p}}}{lpha^2}$

Open Calculator

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

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

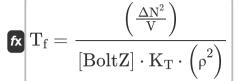
 $ext{T}_{ ext{TE}} = rac{(ext{K}_{ ext{T}} - ext{K}_{ ext{S}}) \cdot
ho \cdot (ext{C}_{ ext{v}} + [ext{R}])}{lpha^2}$

Open Calculator 🚰

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



7) Temperature given Relative Size of Fluctuations in Particle Density



Open Calculator 🗗

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

$$ag{T_{Cp}} = rac{\left(\left(rac{1}{K_S}
ight) - \left(rac{1}{K_T}
ight)
ight) \cdot
ho \cdot \left(C_p - [R]
ight)}{\Lambda^2}$$

Open Calculator

- $\boxed{1.1 \text{E}^6 \text{K} = \frac{\left(\left(\frac{1}{70 \text{m}^2/\text{N}}\right) \left(\frac{1}{75 \text{m}^2/\text{N}}\right)\right) \cdot 997 \text{kg/m}^3 \cdot \left(122 \text{J/K*mol} [\text{R}]\right)}{\left(0.01 \text{Pa/K}\right)^2} }$
- 9) Temperature given Thermal Pressure Coefficient, Compressibility Factors and Cv

$$ag{T_{\mathrm{Cv}}} = rac{\left(\left(rac{1}{\mathrm{K_{\mathrm{S}}}}
ight) - \left(rac{1}{\mathrm{K_{\mathrm{T}}}}
ight)
ight) \cdot
ho \cdot \mathrm{C_{v}}}{\Lambda^{2}}$$

Open Calculator 🗗



10) Thermal Pressure Coefficient given Compressibility Factors and Cp

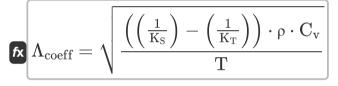
 $\Lambda_{
m coeff} = \sqrt{rac{\left(\left(rac{1}{K_{
m S}}
ight) - \left(rac{1}{K_{
m T}}
ight)
ight) \cdot
ho \cdot \left(C_{
m p} - [R]
ight)}{T}}$

Open Calculator 🗗

ex

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

11) Thermal Pressure Coefficient given Compressibility Factors and Cv



Open Calculator

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

12) Volume given Relative Size of Fluctuations in Particle Density



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



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

$$lpha_{
m comp} = \sqrt{rac{({
m K_T} - {
m K_S}) \cdot
ho \cdot {
m C_p}}{{
m T}}}$$

Open Calculator 2

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

$$lpha_{
m comp} = \sqrt{rac{(K_T - K_S) \cdot
ho \cdot (C_v + [R])}{T}}$$

Open Calculator G

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



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)
- Ks 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)
- ΔN² Relative Size of Fluctuations
- ΔNr² Relative Size of Fluctuation
- ↑ Thermal Pressure Coefficient (Pascal per Kelvin)
- Λ_{coeff} Coefficient of Thermal Pressure (Pascal per Kelvin)
- p Density (Kilogram per Cubic Meter)



• **P**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/m³)
 Density Unit Conversion
- Measurement: Compressibility in Square Meter per Newton (m²/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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