calculatoratoz.com

unitsconverters.com

Ideal Gas Law Formulas

Calculators! Examples! Conversions!

List of 25 Ideal Gas Law Formulas

Ideal Gas Law

1) Amount of Gas taken by Ideal Gas Law

Open Calculator

fx $$m_{gas} = \frac{M_{molar} \cdot P_{gas} \cdot V}{[R] \cdot T_{gas}}$$

ex $$44.00674\text{g} = \frac{44.01\text{g/mol} \cdot 101325\text{Pa} \cdot 22.4\text{L}}{[R] \cdot 273\text{K}}$$

2) Density of Gas by Ideal Gas law

Open Calculator

fx $$\rho_{gas} = \frac{P_{gas} \cdot M_{molar}}{[R] \cdot T_{gas}}$$

ex $$1.964586\text{g/L} = \frac{101325\text{Pa} \cdot 44.01\text{g/mol}}{[R] \cdot 273\text{K}}$$

3) Final Density of Gas by Ideal Gas Law

Open Calculator

fx $$d_f = \frac{\frac{P_{fin}}{T_2}}{\frac{P_i}{d_i \cdot T_1}}$$

ex $$0.701363\text{g/L} = \frac{\frac{13\text{Pa}}{313\text{K}}}{\frac{21\text{Pa}}{1.19\text{g/L} \cdot 298\text{K}}}$$

4) Final Pressure of Gas by Ideal Gas Law

Open Calculator

fx $$P_{fin} = \left(\frac{P_i \cdot V_i}{T_1}\right) \cdot \left(\frac{T_2}{V_2}\right)$$

ex $$13.00205\text{Pa} = \left(\frac{21\text{Pa} \cdot 11.2\text{L}}{298\text{K}}\right) \cdot \left(\frac{313\text{K}}{19\text{L}}\right)$$

5) Final Pressure of gas given Density

Open Calculator

fx $$P_{fin} = \left(\frac{P_i}{d_i \cdot T_1}\right) \cdot (d_f \cdot T_2)$$

ex $$13.0118\text{Pa} = \left(\frac{21\text{Pa}}{1.19\text{g/L} \cdot 298\text{K}}\right) \cdot (0.702\text{g/L} \cdot 313\text{K})$$

6) Final Temperature of Gas by Ideal Gas Law

Open Calculator

fx $$T_2 = \frac{P_{fin} \cdot V_2}{\frac{P_i \cdot V_i}{T_1}}$$

ex $$312.9507\text{K} = \frac{13\text{Pa} \cdot 19\text{L}}{\frac{21\text{Pa} \cdot 11.2\text{L}}{298\text{K}}}$$

7) Final Temperature of Gas given Density

Open Calculator

fx $$T_2 = \frac{\frac{P_{fin}}{d_f}}{\frac{P_i}{d_i \cdot T_1}}$$

ex $$312.716\text{K} = \frac{\frac{13\text{Pa}}{0.702\text{g/L}}}{\frac{21\text{Pa}}{1.19\text{g/L} \cdot 298\text{K}}}$$

8) Final Volume of Gas by Ideal Gas Law

Open Calculator

fx $$V_2 = \left(\frac{P_i \cdot V_i}{T_1}\right) \cdot \left(\frac{T_2}{P_{fin}}\right)$$

ex $$19.00299\text{L} = \left(\frac{21\text{Pa} \cdot 11.2\text{L}}{298\text{K}}\right) \cdot \left(\frac{313\text{K}}{13\text{Pa}}\right)$$

9) Initial Density of Gas by Ideal Gas Law

Open Calculator

fx $$d_i = \frac{\frac{P_i}{T_1}}{\frac{P_{fin}}{d_f \cdot T_2}}$$

ex $$1.191081\text{g/L} = \frac{\frac{21\text{Pa}}{298\text{K}}}{\frac{13\text{Pa}}{0.702\text{g/L} \cdot 313\text{K}}}$$

10) Initial Pressure of Gas by Ideal Gas Law

Open Calculator

fx $$P_i = \left(\frac{P_{fin} \cdot V_2}{T_2}\right) \cdot \left(\frac{T_1}{V_i}\right)$$

ex $$20.99669\text{Pa} = \left(\frac{13\text{Pa} \cdot 19\text{L}}{313\text{K}}\right) \cdot \left(\frac{298\text{K}}{11.2\text{L}}\right)$$

11) Initial Pressure of Gas given Density

Open Calculator

fx $$P_i = \left(\frac{P_{fin}}{d_f \cdot T_2}\right) \cdot (d_i \cdot T_1)$$

ex $$20.98095\text{Pa} = \left(\frac{13\text{Pa}}{0.702\text{g/L} \cdot 313\text{K}}\right) \cdot (1.19\text{g/L} \cdot 298\text{K})$$

12) Initial Temperature of Gas by Ideal Gas law

Open Calculator

fx $$T_1 = \frac{P_i \cdot V_i}{\frac{P_{fin} \cdot V_2}{T_2}}$$

ex $$298.047\text{K} = \frac{21\text{Pa} \cdot 11.2\text{L}}{\frac{13\text{Pa} \cdot 19\text{L}}{313\text{K}}}$$

13) Initial Temperature of Gas given Density

Open Calculator

fx $$T_1 = \frac{\frac{P_i}{d_i}}{\frac{P_{fin}}{d_f \cdot T_2}}$$

ex $$298.2706\text{K} = \frac{\frac{21\text{Pa}}{1.19\text{g/L}}}{\frac{13\text{Pa}}{0.702\text{g/L} \cdot 313\text{K}}}$$

14) Initial Volume of Gas by Ideal Gas Law

Open Calculator

fx $$V_i = \left(\frac{P_{fin} \cdot V_2}{T_2}\right) \cdot \left(\frac{T_1}{P_i}\right)$$

ex $$11.19824\text{L} = \left(\frac{13\text{Pa} \cdot 19\text{L}}{313\text{K}}\right) \cdot \left(\frac{298\text{K}}{21\text{Pa}}\right)$$

15) Molecular Weight of Gas by Ideal Gas Law

Open Calculator

fx $$M_{molar} = \frac{m_{gas} \cdot [R] \cdot T_{gas}}{P_{gas} \cdot V}$$

ex $$44.00326\text{g/mol} = \frac{44\text{g} \cdot [R] \cdot 273\text{K}}{101325\text{Pa} \cdot 22.4\text{L}}$$

16) Molecular Weight of Gas given Density by Ideal Gas Law

Open Calculator

fx $$M_{molar} = \frac{\rho_{gas} \cdot [R] \cdot T_{gas}}{P_{gas}}$$

ex $$43.90726\text{g/mol} = \frac{1.96\text{g/L} \cdot [R] \cdot 273\text{K}}{101325\text{Pa}}$$

17) Number of Moles of Gas by Ideal Gas Law

Open Calculator

fx $$N_{moles} = \frac{P_{gas} \cdot V}{[R] \cdot T_{gas}}$$

ex $$0.999926 = \frac{101325\text{Pa} \cdot 22.4\text{L}}{[R] \cdot 273\text{K}}$$

18) Pressure by Ideal Gas Law

Open Calculator

fx $$P_{gas} = \frac{N_{moles} \cdot [R] \cdot T_{gas}}{V}$$

ex $$100319.2\text{Pa} = \frac{0.99 \cdot [R] \cdot 273\text{K}}{22.4\text{L}}$$

19) Pressure of Gas given Density by Ideal Gas law

Open Calculator

fx $$P_{gas} = \frac{\rho_{gas} \cdot [R] \cdot T_{gas}}{M_{molar}}$$

ex $$101088.4\text{Pa} = \frac{1.96\text{g/L} \cdot [R] \cdot 273\text{K}}{44.01\text{g/mol}}$$

20) Pressure of Gas given Molecular Weight of Gas by Ideal Gas law

Open Calculator

fx $$P_{gas} = \frac{\left(\frac{m_{gas}}{M_{molar}}\right) \cdot [R] \cdot T_{gas}}{V}$$

ex $$101309.5\text{Pa} = \frac{\left(\frac{44\text{g}}{44.01\text{g/mol}}\right) \cdot [R] \cdot 273\text{K}}{22.4\text{L}}$$

21) Temperature of Gas by Ideal Gas Law

Open Calculator

fx $$T_{gas} = \frac{P_{gas} \cdot V}{N_{moles} \cdot [R]}$$

ex $$275.7371\text{K} = \frac{101325\text{Pa} \cdot 22.4\text{L}}{0.99 \cdot [R]}$$

22) Temperature of Gas given Density by Ideal Gas Law

Open Calculator

fx $$T_{gas} = \frac{P_{gas} \cdot M_{molar}}{[R] \cdot \rho_{gas}}$$

ex $$273.6388\text{K} = \frac{101325\text{Pa} \cdot 44.01\text{g/mol}}{[R] \cdot 1.96\text{g/L}}$$

23) Temperature of Gas given Molecular Weight of Gas by Ideal Gas law

Open Calculator

fx $$T_{gas} = \frac{P_{gas} \cdot V}{\left(\frac{m_{gas}}{M_{molar}}\right) \cdot [R]}$$

ex $$273.0418\text{K} = \frac{101325\text{Pa} \cdot 22.4\text{L}}{\left(\frac{44\text{g}}{44.01\text{g/mol}}\right) \cdot [R]}$$

24) Volume of Gas from Ideal Gas Law

Open Calculator

fx $$V = \frac{N_{moles} \cdot [R] \cdot T_{gas}}{P_{gas}}$$

ex $$22.17764\text{L} = \frac{0.99 \cdot [R] \cdot 273\text{K}}{101325\text{Pa}}$$

25) Volume of Gas given Molecular Weight of Gas by Ideal Gas Law

Open Calculator

fx $$V = \frac{\left(\frac{m_{gas}}{M_{molar}}\right) \cdot [R] \cdot T_{gas}}{P_{gas}}$$

ex $$22.39657\text{L} = \frac{\left(\frac{44\text{g}}{44.01\text{g/mol}}\right) \cdot [R] \cdot 273\text{K}}{101325\text{Pa}}$$

Variables Used

- d_f Final Density of Gas *(Gram per Liter)*
- d_i Initial Density of Gas *(Gram per Liter)*
- m_{gas} Mass of Gas *(Gram)*
- M_{molar} Molar Mass *(Gram Per Mole)*
- N_{moles} Number of Moles
- P_{fin} Final Pressure of Gas *(Pascal)*
- P_{gas} Pressure of Gas *(Pascal)*
- P_i Initial Pressure of Gas *(Pascal)*
- T_1 Initial Temperature of Gas for Ideal Gas *(Kelvin)*
- T_2 Final Temperature of Gas for Ideal Gas *(Kelvin)*
- T_{gas} Temperature of Gas *(Kelvin)*
- V Volume of Gas *(Liter)*
- V_2 Final Volume of Gas for Ideal Gas *(Liter)*
- V_i Initial Volume of Gas *(Liter)*
- ρ_{gas} Density of Gas *(Gram per Liter)*

Constants, Functions, Measurements used

- Constant: **[R]**, 8.31446261815324 Joule / Kelvin * Mole
  Universal gas constant
- 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: **Density** in Gram per Liter (g/L)
  Density Unit Conversion
- Measurement: **Molar Mass** in Gram Per Mole (g/mol)
  Molar Mass Unit Conversion

Check other formula lists

- Avogadro's Law Formulas
- Boyle's Law Formulas
- Charle's Law Formulas
- Dalton's Law Formulas
- Gay Lussac's law Formulas
- Graham's Law Formulas
- Ideal Gas Law Formulas
- Important Formulas of Gaseous State

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

11/6/2023 | 4:44:43 AM UTC *Please leave your feedback here...*