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Important Formulas of Gaseous State

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List of 18 Important Formulas of Gaseous State

Important Formulas of Gaseous State

1) Concentration of Species in Aqueous Phase by Henry Solubility

Open Calculator

fx $c_a = H^{cp} \cdot P_{species}$

ex $0.1\text{M} = 10\text{mol/(m}^3\text{*Pa)} \cdot 10\text{Pa}$

2) Dimensionless Henry Solubility

Open Calculator

fx $H^{cc} = \frac{c_a}{c_g}$

ex $10 = \frac{0.1\text{M}}{0.01\text{M}}$

3) Final Number of Moles of Gas by Avogadro's Law

Open Calculator

fx $n_2 = \frac{V_f}{\frac{V_i}{n_1}}$

ex $0.982143\text{mol} = \frac{5.5\text{L}}{\frac{11.2\text{L}}{2\text{mol}}}$

4) Final Pressure by Gay Lussac's law

Open Calculator

$$P_{fin} = \frac{P_i \cdot T_{fin}}{T_i}$$

$$12.95131\text{Pa} = \frac{21\text{Pa} \cdot 247\text{K}}{400.5\text{K}}$$

5) Final Pressure of Gas by Boyle's Law

Open Calculator

$$P_f = \frac{P_i \cdot V_i}{V_f}$$

$$42.76364\text{Pa} = \frac{21\text{Pa} \cdot 11.2\text{L}}{5.5\text{L}}$$

6) Final Temperature by Charles's Law

Open Calculator

$$T_f = \frac{T_i \cdot V_f}{V_i}$$

$$196.6741\text{K} = \frac{400.5\text{K} \cdot 5.5\text{L}}{11.2\text{L}}$$

7) Final Temperature by Gay Lussac's law

Open Calculator

$$T_{fin} = \frac{T_i \cdot P_{fin}}{P_i}$$

$$247.9286\text{K} = \frac{400.5\text{K} \cdot 13\text{Pa}}{21\text{Pa}}$$

8) Final Volume of Gas by Avogadro's Law

Open Calculator

$$V_f = \left(\frac{V_i}{n_1}\right) \cdot n_2$$

$$5.04\text{L} = \left(\frac{11.2\text{L}}{2\text{mol}}\right) \cdot 0.9\text{mol}$$

9) Final Volume of Gas by Charles's law

Open Calculator

$$V_f = \left(\frac{V_i}{T_i}\right) \cdot T_f$$

$$5.500724\text{L} = \left(\frac{11.2\text{L}}{400.5\text{K}}\right) \cdot 196.7\text{K}$$

10) Final Volume of Gas from Boyle's Law

Open Calculator

$$V_f = \frac{P_i \cdot V_i}{P_f}$$

$$5.508197\text{L} = \frac{21\text{Pa} \cdot 11.2\text{L}}{42.7\text{Pa}}$$

11) Mass of Atom of Element using Avogadro's Number

Open Calculator

$$M_{atom} = \frac{\text{GAM}}{[\text{Avaga-no}]}$$

$$2\text{E}\hat{}\text{-}23\text{g} = \frac{12\text{g}}{[\text{Avaga-no}]}$$

12) Mass of Molecule of Substance using Avogadro's Number

Open Calculator

fx $$M_{molecule} = \frac{M_{molar}}{[Avaga\text{-}no]}$$

ex $$7.3E\hat{}\text{-}23g = \frac{44.01g/mol}{[Avaga\text{-}no]}$$

13) Molar Mixing Ratio in Aqueous Phase by Henry Solubility

Open Calculator

fx $$x = H^{xp} \cdot P_{species}$$

ex $$100 = 10Pa^{-1} \cdot 10Pa$$

14) Mole Fraction of Gas by Dalton's law

Open Calculator

fx $$X = \left(\frac{p_{partial}}{P}\right)$$

ex $$0.752381 = \left(\frac{7.9Pa}{10.5Pa}\right)$$

15) Partial Pressure of Gas by Dalton's law

Open Calculator

fx $$p_{partial} = (P \cdot X)$$

ex $$7.875Pa = (10.5Pa \cdot 0.75)$$

16) Partial Pressure of Species in Gas Phase by Henry Solubility

Open Calculator

fx $$P_{species} = \frac{c_a}{H^{cp}}$$

ex $$10Pa = \frac{0.1M}{10mol/(m^3*Pa)}$$

17) Total Gas Pressure by Dalton's law

Open Calculator

fx $$P = \left(\frac{p_{partial}}{X}\right)$$

ex $$10.53333Pa = \left(\frac{7.9Pa}{0.75}\right)$$

18) Volume at Temperature t Degree Celsius by Charles's law

Open Calculator

fx $$V_t = V_0 \cdot \left(\frac{273 + t}{273}\right)$$

ex $$15.58229L = 7.1L \cdot \left(\frac{273 + 53^\circ C}{273}\right)$$

Variables Used

- c_a Concentration of Species in Aqueous Phase *(Molar(M))*
- c_g Concentration of Species in Gaseous Phase *(Molar(M))*
- **GAM** Gram Atomic Mass *(Gram)*
- H^{cc} Dimensionless Henry Solubility
- H^{cp} Henry Solubility *(Mole per Cubic Meter per Pascal)*
- H^{xp} Henry Solubility via Aqueous-Phase Mixing Ratio *(Per Pascal)*
- M_{atom} Mass of 1 Atom of Element *(Gram)*
- M_{molar} Molar Mass *(Gram Per Mole)*
- $M_{molecule}$ Mass of 1 Molecule of Substance *(Gram)*
- n_1 Initial Moles of Gas *(Mole)*
- n_2 Final Moles of Gas *(Mole)*
- **P** Total Pressure *(Pascal)*
- P_f Final Pressure of Gas for Boyle's law *(Pascal)*
- P_{fin} Final Pressure of Gas *(Pascal)*
- P_i Initial Pressure of Gas *(Pascal)*
- $p_{partial}$ Partial Pressure *(Pascal)*
- $P_{species}$ Partial Pressure of that Species in Gas Phase *(Pascal)*
- **t** Temperature in Degree Celsius *(Celsius)*
- T_f Final Temperature of Gas for Charles's law *(Kelvin)*
- T_{fin} Final Temperature of Gas *(Kelvin)*
- T_i Initial Temperature of Gas *(Kelvin)*

- V_0 Volume at Zero Degree Celsius *(Liter)*
- V_f Final Volume of Gas *(Liter)*
- V_i Initial Volume of Gas *(Liter)*
- V_t Volume at given Temperature *(Liter)*
- x Molar Mixing Ratio in Aqueous Phase
- X Mole Fraction

Constants, Functions, Measurements used

- Constant: **[Avaga-no]**, 6.02214076E23
  Avogadro's number
- Measurement: **Weight** in Gram (g)
  Weight Unit Conversion
- Measurement: **Temperature** in Kelvin (K), Celsius (°C)
  Temperature Unit Conversion
- Measurement: **Amount of Substance** in Mole (mol)
  Amount of Substance Unit Conversion
- Measurement: **Volume** in Liter (L)
  Volume Unit Conversion
- Measurement: **Pressure** in Pascal (Pa)
  Pressure Unit Conversion
- Measurement: **Molar Concentration** in Molar(M) (M)
  Molar Concentration Unit Conversion
- Measurement: **Molar Mass** in Gram Per Mole (g/mol)
  Molar Mass Unit Conversion
- Measurement: **Henry's Law Solubility Constant** in Mole per Cubic Meter per Pascal (mol/(m³*Pa))
  Henry's Law Solubility Constant Unit Conversion
- Measurement: **Henry's Law Constant for Aqueous-Phase** in Per Pascal (Pa^{-1})
  Henry's Law Constant for Aqueous-Phase 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

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