



Important Formulas of Ionic Activity

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List of 13 Important Formulas of Ionic Activity

Important Formulas of Ionic Activity 🗗

1) Ionic Strength for Bi-Bivalent Electrolyte 🗗

$$I = \left(rac{1}{2}
ight)\cdot\left(\mathrm{m_+}\cdot\left((\mathrm{Z_+})^2
ight)+\mathrm{m_-}\cdot\left((\mathrm{Z_-})^2
ight)
ight)$$

$$\boxed{0.024 \mathrm{mol/kg} = \left(\frac{1}{2}\right) \cdot \left(0.01 \mathrm{mol/kg} \cdot \left((2)^2\right) + 0.002 \mathrm{mol/kg} \cdot \left((2)^2\right)\right) }$$

2) Ionic Strength for Uni-Univalent Electrolyte

$$\mathbf{fx} \mathbf{I} = \left(\frac{1}{2}\right) \cdot \left(\mathbf{m}_+ \cdot \left((\mathbf{Z}_+)^2\right) + \mathbf{m}_- \cdot \left((\mathbf{Z}_-)^2\right)\right)$$
 ex $0.024 \mathrm{mol/kg} = \left(\frac{1}{2}\right) \cdot \left(0.01 \mathrm{mol/kg} \cdot \left((2)^2\right) + 0.002 \mathrm{mol/kg} \cdot \left((2)^2\right)\right)$

$$\overline{\mathrm{I} = \left(rac{1}{2}
ight) \cdot \left(2 \cdot \mathrm{m}_{+} \cdot \left(\left(\mathrm{Z}_{+}
ight)^{2}
ight) + 3 \cdot \mathrm{m}_{ ext{-}} \cdot \left(\left(\mathrm{Z}_{ ext{-}}
ight)^{2}
ight)
ight)}$$

ex

$$0.052 ext{mol/kg} = \left(rac{1}{2}
ight) \cdot \left(2 \cdot 0.01 ext{mol/kg} \cdot \left((2)^2
ight) + 3 \cdot 0.002 ext{mol/kg} \cdot \left((2)^2
ight)
ight)$$



4) Ionic Strength of Uni-Bivalent Electrolyte

fx

$$I = \left(rac{1}{2}
ight) \cdot \left(\mathrm{m_+} \cdot \left((\mathrm{Z_+})^2
ight) + \left(2 \cdot \mathrm{m_-} \cdot \left((\mathrm{Z_-})^2
ight)
ight)
ight)$$

ex

$$\boxed{0.028 \mathrm{mol/kg} = \left(\frac{1}{2}\right) \cdot \left(0.01 \mathrm{mol/kg} \cdot \left(\left(2\right)^2\right) + \left(2 \cdot 0.002 \mathrm{mol/kg} \cdot \left(\left(2\right)^2\right)\right)\right)}$$

5) Ionic Strength using Debey-Huckel Limiting Law

 $ag{I} = \left(-rac{\ln(\gamma_\pm)}{\mathrm{A}\cdot(\mathrm{Z_i^2})}
ight)^2$

6) Mean Activity Coefficient for Uni-Bivalent Electrolyte

 $\gamma_{\pm}=rac{
m A_{\pm}}{\left(4^{rac{1}{3}}
ight)\cdot m}$

$$oxed{ex} 0.755953 = rac{0.06 \mathrm{mol/kg}}{\left(4^{rac{1}{3}}
ight) \cdot 0.05 \mathrm{mol/kg}}$$



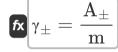
7) Mean Activity Coefficient for Uni-Trivalent Electrolyte

$$\gamma_{\pm} = rac{\mathrm{A}_{\pm}}{\left(27^{rac{1}{4}}
ight)\cdot\mathrm{m}}$$

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ex $0.52643 = \frac{0.06 \text{mol/kg}}{\left(27^{\frac{1}{4}}\right) \cdot 0.05 \text{mol/kg}}$

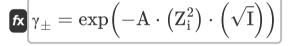
8) Mean Activity Coefficient for Uni-Univalent Electrolyte



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= 1.2 $= rac{0.06 ext{mol/kg}}{0.05 ext{mol/kg}}$

9) Mean Activity Coefficient using Debey-Huckel Limiting Law

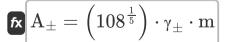


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ex

$$\boxed{0.749811 = \exp\biggl(-0.509 \mathrm{kg}\,\widehat{}\,(1/2)/\mathrm{mol}\,\widehat{}\,(1/2)\cdot \biggl((2)^2\biggr)\cdot \biggl(\sqrt{0.02 \mathrm{mol/kg}}\biggr)\biggr)}$$

10) Mean Ionic Activity for Bi-Trivalent Electrolyte



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 $extbf{ex} 0.08928 ext{mol/kg} = \left(108^{rac{1}{5}}
ight) \cdot 0.7 \cdot 0.05 ext{mol/kg}$



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11) Mean Ionic Activity for Uni-Bivalent Electrolyte

 $\mathbf{K} oxed{ \mathbf{A}_{\pm} = \left((4)^{rac{1}{3}}
ight) \cdot (\mathbf{m}) \cdot (\mathbf{\gamma}_{\pm}) }$

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- $oxed{ex} 0.055559 \mathrm{mol/kg} = \left((4)^{rac{1}{3}}
 ight) \cdot \left(0.05 \mathrm{mol/kg}
 ight) \cdot \left(0.7
 ight)$
- 12) Mean Ionic Activity for Uni-Trivalent Electrolyte
- fx $A_{\pm} = \left(27^{rac{1}{4}}
 ight) \cdot \mathrm{m} \cdot \mathrm{\gamma}_{\pm}$
- $oxed{ex} \left[0.079783 \mathrm{mol/kg} = \left(27^{rac{1}{4}}
 ight) \cdot 0.05 \mathrm{mol/kg} \cdot 0.7
 ight]$
- 13) Mean Ionic Activity for Uni-Univalent Electrolyte
- fx $A_{\pm}=(\mathrm{m})\cdot(\gamma_{\pm})$
- $oxed{ex} \left[0.035 \mathrm{mol/kg} = \left(0.05 \mathrm{mol/kg}
 ight) \cdot \left(0.7
 ight)
 ight]$



Variables Used

- A Debye Huckel limiting Law Constant (sqrt(Kilogram) per sqrt(Mole))
- A_± Mean Ionic Activity (Mole per Kilogram)
- I lonic Strength (Mole per Kilogram)
- **m** Molality (Mole per Kilogram)
- m_ Molality of Anion (Mole per Kilogram)
- **m**₊ Molality of Cation (Mole per Kilogram)
- Z₋ Valencies of Anion
- Z₊ Valencies of Cation
- Zi Charge Number of Ion Species
- Y+ Mean Activity Coefficient





Constants, Functions, Measurements used

- Function: exp, exp(Number)
 Exponential function
- Function: In, In(Number)
 Natural logarithm function (base e)
- Function: sqrt, sqrt(Number)
 Square root function
- Measurement: Molality in Mole per Kilogram (mol/kg)
 Molality Unit Conversion
- Measurement: Debye-Hückel limiting law constant in sqrt(Kilogram) per sqrt(Mole) (kg^(1/2)/mol^(1/2))
 Debye-Hückel limiting law constant Unit Conversion





Check other formula lists

- Concentration of Electrolyte Formulas
- Conductance and Conductivity Formulas
- Debey Huckel Limiting Law Formulas
- Degree of Dissociation Formulas
- Dissociation Constant Formulas
- Electrochemical Cell Formulas
- Electrolytes & Ions Formulas
- EMF of Concentration Cell Formulas [
- Equivalent Weight Formulas
- Gibbs Free Energy Formulas
- Gibbs Free Entropy Formulas
- Helmholtz Free Energy Formulas
- Helmholtz Free Entropy Formulas
- Important Formulas of Activity and Concentration of Electrolytes

- Activity of Electrolytes Formulas Important Formulas of Conductance
 - Important Formulas of Current Efficiency and Resistance
 - Important Formulas of Gibbs Free **Energy and Entropy and Helmholtz** Free Energy and Entropy
 - **Important Formulas of Ionic** Activity 🛂
 - Ionic Strength Formulas
 - Mean Activity Coefficient Formulas (
 - Mean Ionic Activity Formulas
 - Normality of Solution Formulas
 - Osmotic Coefficient & Current Efficiency Formulas
 - **Resistance and Resistivity** Formulas
 - Tafel Slope Formulas
 - **Temperature of Concentration Cell** Formulas
 - Transport Number Formulas

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