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EMF of Concentration Cell Formulas

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List of 10 EMF of Concentration Cell Formulas

EMF of Concentration Cell

1) EMF of Cell using Nerst Equation given Reaction Quotient at Any Temperature

Open Calculator

fx $$\text{EMF} = \text{E0}_{\text{cell}} - \left([\text{R}] \cdot \text{T} \cdot \frac{\ln(\text{Q})}{[\text{Faraday}] \cdot \text{z}}\right)$$

ex $$0.326355\text{V} = 0.34\text{V} - \left([\text{R}] \cdot 85\text{K} \cdot \frac{\ln(50)}{[\text{Faraday}] \cdot 2.1\text{C}}\right)$$

2) EMF of Cell using Nerst Equation given Reaction Quotient at Room Temperature

Open Calculator

fx $$\text{EMF} = \text{E0}_{\text{cell}} - \left(0.0591 \cdot \log 10 \frac{\text{Q}}{\text{z}}\right)$$

ex $$0.292186\text{V} = 0.34\text{V} - \left(0.0591 \cdot \log 10 \frac{50}{2.1\text{C}}\right)$$

3) EMF of Concentration Cell with Transference given Activities

Open Calculator

fx $$\text{EMF} = \text{t}_{-} \cdot \left(\frac{[\text{R}] \cdot \text{T}}{[\text{Faraday}]}\right) \cdot \ln\left(\frac{\text{a}_2}{\text{a}_1}\right)$$

ex $$0.210964\text{V} = 49 \cdot \left(\frac{[\text{R}] \cdot 85\text{K}}{[\text{Faraday}]}\right) \cdot \ln\left(\frac{0.36\text{mol/kg}}{0.2\text{mol/kg}}\right)$$

4) EMF of Concentration Cell with Transference given Transport Number of Anion

Open Calculator

$$EMF = 2 \cdot t_{-} \cdot \left(\frac{[R] \cdot T}{[Faraday]} \right) \cdot \left(\frac{\ln(m_2 \cdot \gamma_2)}{m_1 \cdot \gamma_1} \right)$$

ex $-1.416986V = 2 \cdot 49 \cdot \left(\frac{[R] \cdot 85K}{[Faraday]} \right) \cdot \left(\frac{\ln(0.13mol/kg \cdot 0.1)}{0.4mol/kg \cdot 5.5} \right)$

5) EMF of Concentration Cell with Transference in Terms of Valencies

Open Calculator

$$EMF = t_{-} \cdot \left(\frac{\nu}{Z\pm \cdot \nu\pm} \right) \cdot \left(\frac{[R] \cdot T}{[Faraday]} \right) \cdot \ln\left(\frac{a_2}{a_1} \right)$$

ex $0.200052V = 49 \cdot \left(\frac{110}{2 \cdot 58} \right) \cdot \left(\frac{[R] \cdot 85K}{[Faraday]} \right) \cdot \ln\left(\frac{0.36mol/kg}{0.2mol/kg} \right)$

6) EMF of Concentration Cell without Transference for Dilute Solution given Concentration

Open Calculator

$$EMF = 2 \cdot \left(\frac{[R] \cdot T}{[Faraday]} \right) \cdot \ln\left(\left(\frac{c_2}{c_1} \right) \right)$$

ex $0.020611V = 2 \cdot \left(\frac{[R] \cdot 85K}{[Faraday]} \right) \cdot \ln\left(\left(\frac{2.45mol/L}{0.6mol/L} \right) \right)$

7) EMF of Concentration Cell without Transference given Activities

Open Calculator

fx $$EMF = \left(\frac{[R] \cdot T}{[Faraday]}\right) \cdot \left(\ln\left(\frac{a_2}{a_1}\right)\right)$$

ex $$0.004305V = \left(\frac{[R] \cdot 85K}{[Faraday]}\right) \cdot \left(\ln\left(\frac{0.36mol/kg}{0.2mol/kg}\right)\right)$$

8) EMF of Concentration Cell without Transference given Concentration and Fugacity

Open Calculator

fx $$EMF = 2 \cdot \left(\frac{[R] \cdot T}{[Faraday]}\right) \cdot \ln\left(\frac{c_2 \cdot f_2}{c_1 \cdot f_1}\right)$$

ex $$0.042092V = 2 \cdot \left(\frac{[R] \cdot 85K}{[Faraday]}\right) \cdot \ln\left(\frac{2.45mol/L \cdot 52Pa}{0.6mol/L \cdot 12Pa}\right)$$

9) EMF of Concentration Cell without Transference given Molalities and Activity Coefficient

Open Calculator

fx $$EMF = 2 \cdot \left(\frac{[R] \cdot T}{[Faraday]}\right) \cdot \left(\ln\left(\frac{m_2 \cdot \gamma_2}{m_1 \cdot \gamma_1}\right)\right)$$

ex $$-0.07517V = 2 \cdot \left(\frac{[R] \cdot 85K}{[Faraday]}\right) \cdot \left(\ln\left(\frac{0.13mol/kg \cdot 0.1}{0.4mol/kg \cdot 5.5}\right)\right)$$

10) EMF of Due Cell

Open Calculator

fx $$EMF = E_{cathode} - E_{anode}$$

ex $$45V = 100V - 55V$$

Variables Used

- a_1 Anodic Ionic Activity *(Mole per Kilogram)*
- a_2 Cathodic Ionic Activity *(Mole per Kilogram)*
- c_1 Anodic Concentration *(Mole per Liter)*
- c_2 Cathodic Concentration *(Mole per Liter)*
- E_{anode} Standard Oxidation Potential of Anode *(Volt)*
- $E_{cathode}$ Standard Reduction Potential of Cathode *(Volt)*
- $E0_{cell}$ Standard Potential of Cell *(Volt)*
- **EMF** EMF of Cell *(Volt)*
- f_1 Anodic Fugacity *(Pascal)*
- f_2 Cathodic Fugacity *(Pascal)*
- m_1 Anodic Electrolyte Molality *(Mole per Kilogram)*
- m_2 Cathodic Electrolyte Molality *(Mole per Kilogram)*
- **Q** Reaction Quotient
- **T** Temperature *(Kelvin)*
- t_- Transport Number of Anion
- **z** Ionic Charge *(Coulomb)*
- $Z\pm$ Valencies of Positive and Negative Ions
- γ_1 Anodic Activity Coefficient
- γ_2 Cathodic Activity Coefficient
- **v** Total number of Ions
- $v\pm$ Number of Positive and Negative Ions

Constants, Functions, Measurements used

- Constant: **[Faraday]**, 96485.33212 Coulomb / Mole
  Faraday constant
- Constant: **[R]**, 8.31446261815324 Joule / Kelvin * Mole
  Universal gas constant
- Function: **ln**, ln(Number)
  Natural logarithm function (base e)
- Function: **log10**, log10(Number)
  Common logarithm function (base 10)
- Measurement: **Temperature** in Kelvin (K)
  Temperature Unit Conversion
- Measurement: **Pressure** in Pascal (Pa)
  Pressure Unit Conversion
- Measurement: **Electric Charge** in Coulomb (C)
  Electric Charge Unit Conversion
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion
- Measurement: **Molar Concentration** in Mole per Liter (mol/L)
  Molar Concentration Unit Conversion
- Measurement: **Molality** in Mole per Kilogram (mol/kg)
  Molality Unit Conversion

Check other formula lists

- Activity of Electrolytes Formulas
- 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
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- Ionic Strength Formulas
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- 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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