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Important Formulas of Current Efficiency and Resistance

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List of 15 Important Formulas of Current Efficiency and Resistance

Important Formulas of Current Efficiency and Resistance

1) Cell Constant given Resistance and Resistivity

$$fx \quad b = \left(\frac{R}{\rho} \right)$$

Open Calculator 

$$ex \quad 5.941176/m = \left(\frac{0.000101\Omega}{0.000017\Omega \cdot m} \right)$$

2) Current Efficiency

$$fx \quad C.E = \left(\frac{A}{m_t} \right) \cdot 100$$

Open Calculator 

$$ex \quad 97.82609 = \left(\frac{45g}{46g} \right) \cdot 100$$

3) Distance between Electrode given Resistance and Resistivity

$$fx \quad l = \frac{R \cdot A}{\rho}$$

Open Calculator 

$$ex \quad 59.41176m = \frac{0.000101\Omega \cdot 10m^2}{0.000017\Omega \cdot m}$$



4) Electrode Cross-Section Area given Resistance and Resistivity

$$\text{fx } A = \frac{\rho \cdot l}{R}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 9.99802\text{m}^2 = \frac{0.000017\Omega \cdot \text{m} \cdot 59.4\text{m}}{0.000101\Omega}$$

5) Excess Pressure given Osmotic Coefficient

$$\text{fx } \pi = (\Phi - 1) \cdot \pi_0$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 200\text{at} = (5 - 1) \cdot 50\text{at}$$

6) Ideal Pressure given Osmotic Coefficient

$$\text{fx } \pi_0 = \frac{\pi}{\Phi - 1}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 50\text{at} = \frac{200\text{at}}{5 - 1}$$


7) Kohlrausch Law

$$\text{fx } \Lambda_m = \Lambda_0m - (K \cdot \sqrt{c})$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$\text{ex } 46.10263\text{S} \cdot \text{m}^2/\text{mol} = 48\text{S} \cdot \text{m}^2/\text{mol} - (60 \cdot \sqrt{0.001})$$




8) Mass of Metal to be Deposited 

$$fx \quad M_{\text{metal}} = \frac{MW \cdot i_p \cdot t}{nf \cdot [\text{Faraday}]}$$

Open Calculator 

$$ex \quad 4.377868g = \frac{120g \cdot 2.2A \cdot 4h}{9 \cdot [\text{Faraday}]}$$

9) Resistance given Cell Constant 

$$fx \quad R = (\rho \cdot b)$$

Open Calculator 


$$ex \quad 0.0001\Omega = (0.000017\Omega \cdot m \cdot 5.9/m)$$

10) Resistance given Conductance 

$$fx \quad R = \frac{1}{G}$$

Open Calculator 

$$ex \quad 0.000125\Omega = \frac{1}{8001.25\Omega}$$

11) Resistance given Distance between Electrode and Area of Cross-Section of Electrode 

$$fx \quad R = (\rho) \cdot \left(\frac{l}{A} \right)$$

Open Calculator 

$$ex \quad 0.000101\Omega = (0.000017\Omega \cdot m) \cdot \left(\frac{59.4m}{10m^2} \right)$$



12) Resistivity 

$$\text{fx } \rho = R \cdot \frac{A}{l}$$

Open Calculator 


$$\text{ex } 1.7\text{E}^{-5}\Omega \cdot \text{m} = 0.000101\Omega \cdot \frac{10\text{m}^2}{59.4\text{m}}$$

13) Resistivity given Specific Conductance 

$$\text{fx } \rho = \frac{1}{k_{\text{conductance}}}$$

Open Calculator 

$$\text{ex } 1.7\text{E}^{-5}\Omega \cdot \text{m} = \frac{1}{60000\text{S}/\text{m}}$$

14) Solubility 

$$\text{fx } S = k_{\text{conductance}} \cdot \frac{1000}{\Lambda_0\text{m}}$$

Open Calculator 

$$\text{ex } 1250\text{mol}/\text{L} = 60000\text{S}/\text{m} \cdot \frac{1000}{48\text{S} \cdot \text{m}^2/\text{mol}}$$

15) Solubility Product 

$$\text{fx } K_{\text{sp}} = m^2$$

Open Calculator 

$$\text{ex } 1.4\text{E}^8 = (12\text{mol}/\text{L})^2$$



Variables Used











- **A** Actual Mass Deposited (Gram)
- **A** Electrode Cross-sectional Area (Square Meter)
- **b** Cell Constant (1 per Meter)
- **c** Concentration of Electrolyte
- **C.E** Current Efficiency
- **G** Conductance (Mho)
- **i_p** Electric Current (Ampere)
- **K** Kohlrausch Coefficient
- **k_{conductance}** Specific Conductance (Siemens per Meter)
- **K_{sp}** Solubility Product
- **l** Distance between Electrodes (Meter)
- **m** Molar Solubility (Mole per Liter)
- **M_{metal}** Mass to be Deposited (Gram)
- **m_t** Theoretical Mass Deposited (Gram)
- **MW** Molecular Weight (Gram)
- **nf** N Factor
- **R** Resistance (Ohm)
- **S** Solubility (Mole per Liter)
- **t** Time (Hour)
- **Λ_m** Molar Conductivity (Siemens Square Meter per Mole)
- **Λ_{0m}** Limiting Molar Conductivity (Siemens Square Meter per Mole)
- **π** Excess Osmotic Pressure (Atmosphere Technical)
- **π₀** Ideal Pressure (Atmosphere Technical)






- ρ Resistivity (Ohm Meter)
- Φ Osmotic Coefficient



Constants, Functions, Measurements used

- **Constant:** [Faraday], 96485.33212
Faraday constant
- **Function:** sqrt, sqrt(Number)
A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- **Measurement:** Length in Meter (m)
Length Unit Conversion 
- **Measurement:** Weight in Gram (g)
Weight Unit Conversion 
- **Measurement:** Time in Hour (h)
Time Unit Conversion 
- **Measurement:** Electric Current in Ampere (A)
Electric Current Unit Conversion 
- **Measurement:** Area in Square Meter (m²)
Area Unit Conversion 
- **Measurement:** Pressure in Atmosphere Technical (at)
Pressure Unit Conversion 
- **Measurement:** Electric Resistance in Ohm (Ω)
Electric Resistance Unit Conversion 
- **Measurement:** Electric Conductance in Mho ($\bar{\Omega}$)
Electric Conductance Unit Conversion 
- **Measurement:** Electric Resistivity in Ohm Meter ($\Omega \cdot m$)
Electric Resistivity Unit Conversion 
- **Measurement:** Electric Conductivity in Siemens per Meter (S/m)
Electric Conductivity Unit Conversion 



- **Measurement: Molar Concentration** in Mole per Liter (mol/L)
Molar Concentration Unit Conversion 
- **Measurement: Wave Number** in 1 per Meter (1/m)
Wave Number Unit Conversion 
- **Measurement: Molar Conductivity** in Siemens Square Meter per Mole ($S \cdot m^2/mol$)
Molar Conductivity Unit Conversion 



Check other formula lists

- [Activity of Electrolytes Formulas](#) 
- [Concentration of Electrolyte Formulas](#) 
- [Conductance and Conductivity Formulas](#) 
- [Electrochemical Cell Formulas](#) 
- [Electrolytes & Ions Formulas](#) 
- [EMF of Concentration Cell Formulas](#) 
- [Equivalent Weight Formulas](#) 
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