Important Formulas of Current Efficiency and Resistance PDF

Formulas
Examples
with Units

List of 15
Important Formulas of Current Efficiency and Resistance

1) Cell Constant given Resistance and Resistivity Formula

Evaluate Formula

Formula

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

Example with Units

$$5.9412\,1/m = \left(\frac{0.000101\,\Omega}{0.000017\,\Omega*m}\right)$$

2) Current Efficiency Formula

Evaluate Formula

Formula

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

Example with Units

$$97.8261 = \left(\frac{45\,g}{46\,g}\right) \cdot 100$$

3) Distance between Electrode given Resistance and Resistivity Formula

Evaluate Formula

Formula

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

Example with Units

$$59.4118\,m = \frac{0.000101\,\Omega \cdot 10\,m^2}{0.000017\,\Omega*m}$$

4) Electrode Cross-Section Area given Resistance and Resistivity Formula

Evaluate Formula

Formula

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

Example with Units

$$9.998\,m^2 = \frac{0.000017\,\Omega*m \cdot 59.4\,m}{0.000101\,\Omega}$$

5) Excess Pressure given Osmotic Coefficient Formula

Evaluate Formula

Formula

$$\pi = (\Phi - 1) \cdot \pi_0$$

Example with Units

$$200\,at = (5 - 1) \cdot 50\,at$$

6) Ideal Pressure given Osmotic Coefficient Formula

Evaluate Formula

Formula

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

Example with Units

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

7) Kohlrausch Law Formula

Evaluate Formula

Formula

$$\Lambda_m = \Lambda 0m - \left(K \cdot \sqrt{c} \right)$$

Example with Units

$$46.1026\,\text{S*m}^2\text{/mol} = 48\,\text{S*m}^2\text{/mol} - \left(60 \cdot \sqrt{0.001} \right)$$

8) Mass of Metal to be Deposited Formula

Evaluate Formula

Formula

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

Example with Units

$$4.3779\,\text{g} = \frac{120\,\text{g} \cdot 2.2\,\text{A} \cdot 4\,\text{h}}{9 \cdot 96485.3321}$$

9) Resistance given Cell Constant Formula

Evaluate Formula

Formula

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

Example with Units

$$0.0001\,\Omega = (0.000017\,\Omega\text{*m} \cdot 5.9\,1/\text{m})$$

10) Resistance given Conductance Formula

Evaluate Formula

Formula

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

Example with Units

$$0.0001\,\Omega = \frac{1}{8001.25\,\text{℧}}$$

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

Evaluate Formula

Formula

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

Example with Units

$$0.0001\,\Omega = (0.000017\,\Omega\text{*m}) \cdot \left(\frac{59.4\,\text{m}}{10\,\text{m}^2} \right)$$

12) Resistivity Formula

Evaluate Formula

Formula

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

Example with Units

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

13) Resistivity given Specific Conductance Formula

Evaluate Formula

Formula

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

Example with Units

$$1.7\text{E-}5\,\Omega\text{*m} = \frac{1}{60000\,\text{S/m}}$$

14) Solubility Formula

Evaluate Formula

Formula

$$S = k_{conductance} \cdot \frac{1000}{\Lambda 0m}$$

Example with Units

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

15) Solubility Product Formula

Evaluate Formula

Formula	Example with Units
$K_{sp} = m^2$	$1.4E+8 = 12\,mol/L^2$

Variables used in list of Important Formulas of Current Efficiency and Resistance above

- **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)*
- **Λ0m** Limiting Molar Conductivity *(Siemens Square Meter per Mole)*
- **π** Excess Osmotic Pressure *(Atmosphere Technical)*
- π_0 Ideal Pressure *(Atmosphere Technical)*
- **ρ** Resistivity *(Ohm Meter)*
- **Φ** Osmotic Coefficient

Constants, Functions, Measurements used in list of Important Formulas of Current Efficiency and Resistance above

- constant(s): **[Faraday]**, 96485.33212
  Faraday constant
- Functions: **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 (℧)
  Electric Conductance Unit Conversion
- Measurement: **Electric Resistivity** in Ohm Meter (Ω*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*m²/mol)
  Molar Conductivity Unit Conversion

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