Important Allred Rochow's Electronegativity Formulas PDF

Formulas

Examples

with Units

List of 9
Important Allred Rochow's Electronegativity Formulas

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1) Allred Rochow's Electronegativity from Mulliken's Electronegativity Formula

Evaluate Formula

Formula

$$X_{A.R} = \left(0.336 \cdot X_M \right) - 0.2 - 0.744$$

Example with Units

$$6.448_J = \left(0.336 \cdot 22_J \right) - 0.2 - 0.744$$

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2) Allred Rochow's Electronegativity from Pauling's Electronegativity Formula

Evaluate Formula

Formula

$$X_{A.R} = X_P - 0.744$$

Example with Units

$$6.496_J = 7.24_J - 0.744$$

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3) Allred Rochow's Electronegativity given IE and EA Formula

Evaluate Formula

Formula

$$X_{A.R} = \left(\left(0.336 \cdot 0.5 \right) \cdot \left(IE + E.A \right) \right) - 0.2 - 0.744$$

Example with Units

$$6.4984_J = \left(\left(0.336 \cdot 0.5 \right) \cdot \left(27.2_J + 17.1_J \right) \right) - 0.2 - 0.744$$

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4) Allred Rochow's Electronegativity of Element Formula

Evaluate Formula

Formula

$$X_{A.R} = \frac{0.359 \cdot Z}{r_{covalent}^2}$$

Example with Units

$$6.4457_J = \frac{0.359 \cdot 25}{1.18_A^2}$$

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5) Allred Rochow's Electronegativity using Bond Energies Formula

Evaluate Formula

Formula

$$X_{A.R} = \sqrt{E_{(A-B)} - \sqrt{E_{A-A} \cdot E_{B-B}}} - 0.744$$

Example with Units

$$6.4832_J = \sqrt{75.47_J - \sqrt{20_J \cdot 27_J}} - 0.744$$

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6) Covalent Radius from Allred Rochow's Electronegativity Formula

Formula

$$r_{covalent} = \sqrt{\dfrac{0.359 \cdot Z}{X_{A.R}}}$$

Example with Units

$$1.1751_A = \sqrt{\dfrac{0.359 \cdot 25}{6.5_J}}$$

7) Effective Nuclear Charge from Allred Rochow's Electronegativity Formula

Formula

$$Z = \dfrac{X_{A.R} \cdot r_{covalent} \cdot r_{covalent}}{0.359}$$

Example with Units

$$25.2106 = \dfrac{6.5_J \cdot 1.18_A \cdot 1.18_A}{0.359}$$

8) Electron Affinity of Element using Allred Rochow's Electronegativity Formula

Formula

$$E.A = \left(\left(X_{A.R} + 0.744 + 0.2 \right) \cdot \left(\dfrac{2}{0.336} \right) \right) - IE$$

Example with Units

$$17.1095_J = \left(\left(6.5_J + 0.744 + 0.2 \right) \cdot \left(\dfrac{2}{0.336} \right) \right) - 27.2_J$$

9) Ionization Energy using Allred Rochow's Electronegativity Formula

Formula

$$IE = \left(\left(X_{A.R} + 0.744 + 0.2 \right) \cdot \left(\dfrac{2}{0.336} \right) \right) - E.A$$

Example with Units

$$27.2095_J = \left(\left(6.5_J + 0.744 + 0.2 \right) \cdot \left(\dfrac{2}{0.336} \right) \right) - 17.1_J$$

Variables used in list of Allred Rochow's Electronegativity Formulas above

- $E_{(A-B)}$ Actual Bond Energy given Electronegativity *(Joule)*
- E_{A-A} Bond Energy of A_2 Molecule *(Joule)*
- E_{B-B} Bond Energy of B_2 Molecule *(Joule)*
- $E.A$ Electron Affinity *(Joule)*
- IE Ionization Energy *(Joule)*
- $r_{covalent}$ Covalent Radius *(Angstrom)*
- $X_{A.R}$ Allred-Rochow's Electronegativity *(Joule)*
- X_M Mulliken's Electronegativity *(Joule)*
- X_P Pauling's Electronegativity *(Joule)*
- Z Effective Nuclear Charge

Constants, Functions, Measurements used in list of Allred Rochow's Electronegativity Formulas above

- 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 Angstrom (A)
  Length Unit Conversion ↪
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion ↪

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