Important Pauling's Electronegativity Formulas PDF

Formulas
Examples
with Units

List of 11
Important Pauling's Electronegativity Formulas

1) Covalent Ionic Resonance Energy using Pauling's Electronegativity Formula

Evaluate Formula

Formula

$$\Delta_p = X_P^2$$

Example with Units

$$52.4176\text{ J} = 7.24\text{ J}^2$$

2) Covalent Radius given Pauling's Electronegativity Formula

Evaluate Formula

Formula

$$r_{covalent} = \sqrt{\frac{0.359 \cdot Z}{X_P - 0.744}}$$

Example with Units

$$1.1754\text{ A} = \sqrt{\frac{0.359 \cdot 25}{7.24\text{ J} - 0.744}}$$

3) Effective Nuclear Charge given Pauling's Electronegativity Formula

Evaluate Formula

Formula

$$Z = \frac{\left(X_P - 0.744\right) \cdot \left(r_{covalent}^2\right)}{0.359}$$

Example with Units

$$25.1951 = \frac{\left(7.24\text{ J} - 0.744\right) \cdot \left(1.18\text{ A}^2\right)}{0.359}$$

4) Electron Affinity of element using Pauling's Electronegativity Formula

Evaluate Formula

Formula

$$E.A = \left(\left(X_P + 0.2\right) \cdot \left(\frac{2}{0.336}\right)\right) - IE$$

Example with Units

$$17.0857\text{ J} = \left(\left(7.24\text{ J} + 0.2\right) \cdot \left(\frac{2}{0.336}\right)\right) - 27.2\text{ J}$$

5) Ionization Energy of Element using Pauling's Electronegativity Formula

Evaluate Formula

Formula

$$IE = \left(\left(X_P + 0.2\right) \cdot \left(\frac{2}{0.336}\right)\right) - E.A$$

Example with Units

$$27.1857\text{ J} = \left(\left(7.24\text{ J} + 0.2\right) \cdot \left(\frac{2}{0.336}\right)\right) - 17.1\text{ J}$$

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

Evaluate Formula

Formula

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

Example with Units

$$7.244_{J} = 6.5_{J} + 0.744$$

7) Pauling's Electronegativity from Mulliken's Electronegativity Formula

Evaluate Formula

Formula

$$X_P = \left(0.336 \cdot X_M\right) - 0.2$$

Example with Units

$$7.192_{J} = \left(0.336 \cdot 22_{J}\right) - 0.2$$

8) Pauling's Electronegativity given Bond Energies Formula

Evaluate Formula

Formula

$$X_P = \sqrt{E_{(A\text{-}B)} - \left(\sqrt{E_{A\text{-}A} \cdot E_{B\text{-}B}}\right)}$$

Example with Units

$$7.2272_{J} = \sqrt{75.47_{J} - \left(\sqrt{20_{J} \cdot 27_{J}}\right)}$$

9) Pauling's Electronegativity given Effective Nuclear Charge and Covalent Radius Formula

Evaluate Formula

Formula

$$X_P = \left(\frac{0.359 \cdot Z}{r_{covalent}^{2}}\right) + 0.744$$

Example with Units

$$7.1897_{J} = \left(\frac{0.359 \cdot 25}{1.18_{A}^{2}}\right) + 0.744$$

10) Pauling's Electronegativity given IE and EA Formula

Evaluate Formula

Formula

$$X_p = \left(\left(\frac{0.336}{0.5}\right) \cdot \left(IE + E.A\right)\right) - 0.2$$

Example with Units

$$29.5696_{J} = \left(\left(\frac{0.336}{0.5}\right) \cdot \left(27.2_{J} + 17.1_{J}\right)\right) - 0.2$$

11) Pauling's Electronegativity given Individual Electronegativities Formula

Evaluate Formula

Formula

$$X = \left|X_A - X_B\right|$$

Example with Units

$$0.2_{J} = \left|3.6_{J} - 3.8_{J}\right|$$

Variables used in list of Pauling'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** X_p given Individual Electronegativities *(Joule)*
- X_A Electronegativity of Element A *(Joule)*
- $X_{A.R}$ Allred-Rochow's Electronegativity *(Joule)*
- X_B Electronegativity of Element B *(Joule)*
- X_M Mulliken's Electronegativity *(Joule)*
- X_p Pauling's Electronegativity given I.E and E.A *(Joule)*
- X_P Pauling's Electronegativity *(Joule)*
- **Z** Effective Nuclear Charge
- Δ_p Covalent Ionic Resonance Energy for X_p *(Joule)*

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

- Functions: **abs**, abs(Number)
  The absolute value of a number is its distance from zero on the number line. It's always a positive value, as it represents the magnitude of a number without considering its direction.
- 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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