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Mulliken's Electronegativity Formulas

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List of 9 Mulliken's Electronegativity Formulas

Mulliken's Electronegativity

1) Covalent Radius given Mulliken's Electronegativity

Open Calculator

fx $$r_{covalent} = \sqrt{\frac{0.359 \cdot Z}{(0.336 \cdot X_M) - 0.2 - 0.744}}$$

ex $$1.17979A = \sqrt{\frac{0.359 \cdot 25}{(0.336 \cdot 22J) - 0.2 - 0.744}}$$

2) Effective Nuclear Charge given Mulliken's Electronegativity

Open Calculator

fx $$Z = \frac{((0.336 \cdot X_M) - 0.2 - 0.744) \cdot (r_{covalent}^2)}{0.359}$$

ex $$25.0089 = \frac{((0.336 \cdot 22J) - 0.2 - 0.744) \cdot \left((1.18A)^2\right)}{0.359}$$

3) Electron Affinity of element using Mulliken's Electronegativity

Open Calculator

fx $$E.A = (2 \cdot X_M) - IE$$

ex $$16.8J = (2 \cdot 22J) - 27.2J$$

4) Ionization Energy of element using Mulliken's Electronegativity

Open Calculator

fx $$IE = (2 \cdot X_M) - E.A$$

ex $$26.9J = (2 \cdot 22J) - 17.1J$$

5) Mulliken's Electronegativity from Allred Rochow's Electronegativity

Open Calculator

fx $$X_M = \frac{X_{A.R} + 0.744 + 0.2}{0.336}$$

ex $$22.15476J = \frac{6.5J + 0.744 + 0.2}{0.336}$$

6) Mulliken's Electronegativity from Pauling's Electronegativity

Open Calculator

fx $$X_M = \frac{X_P + 0.2}{0.336}$$

ex $$22.14286J = \frac{7.24J + 0.2}{0.336}$$

7) Mulliken's Electronegativity given Bond Energies

Open Calculator

fx $$X_M = \frac{\sqrt{E_{(A\text{-}B)} - \sqrt{E_{A\text{-}A} \cdot E_{B\text{-}B}}} + 0.2}{0.336}$$

ex $$22.1047J = \frac{\sqrt{75.47J - \sqrt{20J \cdot 27J}} + 0.2}{0.336}$$

8) Mulliken's Electronegativity given Effective Nuclear Charge and Covalent Radius

Open Calculator

fx $$X_M = \frac{\left(\frac{0.359 \cdot Z}{r_{covalent}^2}\right) + 0.744 + 0.2}{0.336}$$

ex $$21.99317J = \frac{\left(\frac{0.359 \cdot 25}{(1.18A)^2}\right) + 0.744 + 0.2}{0.336}$$

9) Mulliken's Electronegativity of Element

Open Calculator

fx $$X_M = 0.5 \cdot (IE + E.A)$$

ex $$22.15J = 0.5 \cdot (27.2J + 17.1J)$$

Variables Used

- $E_{(A-B)}$ 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

- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Angstrom (A)
  Length Unit Conversion
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion

Check other formula lists

- **Allred Rochow's Electronegativity Formulas**
- **Mulliken's Electronegativity Formulas**
- **Pauling's Electronegativity Formulas**

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