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Important Formulas on Bohr's Atomic Model

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List of 12 Important Formulas on Bohr's Atomic Model

Important Formulas on Bohr's Atomic Model

1) Angular Momentum using Radius of Orbit

fx $L_{RO} = M \cdot v \cdot r_{orbit}$

Open Calculator

ex $3.4E\hat{}\text{-}31kg*m^2/s = 34Dalton \cdot 60m/s \cdot 100nm$

2) Atomic Mass

fx $M = m_p + m_n$

Open Calculator

ex $22Dalton = 6Dalton + 16Dalton$

3) Change in Wave Number of Moving Particle

fx $N_{wave} = 1.097 \cdot 10^7 \cdot \frac{(n_f)^2 - (n_i)^2}{(n_f^2) \cdot (n_i^2)}$

Open Calculator

ex $88445.45 = 1.097 \cdot 10^7 \cdot \frac{(9)^2 - (7)^2}{((9)^2) \cdot ((7)^2)}$

4) Energy of Electron in Final Orbit

Open Calculator

fx $$E_{orbit} = \left(-\left(\frac{[Rydberg]}{n_f^2}\right)\right)$$

ex $$-8.5E\hat{}23eV = \left(-\left(\frac{[Rydberg]}{(9)^2}\right)\right)$$

5) Energy of Electron in Initial Orbit

Open Calculator

fx $$E_{orbit} = \left(-\left(\frac{[Rydberg]}{n_{initial}^2}\right)\right)$$

ex $$-7.6E\hat{}24eV = \left(-\left(\frac{[Rydberg]}{(3)^2}\right)\right)$$

6) Internal Energy of Ideal Gas using Law of Equipartition Energy

Open Calculator

fx $$U_{EP} = \left(\frac{F}{2}\right) \cdot N_{moles} \cdot [R] \cdot T_g$$

ex $$3554.433J/mol = \left(\frac{5}{2}\right) \cdot 2 \cdot [R] \cdot 85.5K$$

7) Number of Electrons in nth Shell

Open Calculator

fx $$N_{Electron} = \left(2 \cdot \left(n_{quantum}^2\right)\right)$$

ex $$128 = \left(2 \cdot \left((8)^2\right)\right)$$

8) Number of Orbitals in nth Shell

Open Calculator

fx $$N = \left(n_{quantum}^2\right)$$

ex $$64 = \left((8)^2\right)$$

9) Orbital Frequency of Electron

Open Calculator

fx $$f_{orbital} = \frac{1}{T}$$

ex $$0.001143\text{Hz} = \frac{1}{875\text{s}}$$

10) Radius of Bohr's Orbit

Open Calculator

fx $$r_{orbit\_AN} = \frac{\left(n_{quantum}^2\right) \cdot \left(\left[hP\right]^2\right)}{4 \cdot (\pi^2) \cdot [\text{Mass-e}] \cdot [\text{Coulomb}] \cdot Z \cdot \left(\left[\text{Charge-e}\right]^2\right)}$$

ex $$0.19922\text{nm} = \frac{\left((8)^2\right) \cdot \left(\left[hP\right]^2\right)}{4 \cdot (\pi^2) \cdot [\text{Mass-e}] \cdot [\text{Coulomb}] \cdot 17 \cdot \left(\left[\text{Charge-e}\right]^2\right)}$$

11) Radius of Bohr's Orbit given Atomic Number

Open Calculator

fx $$r_{orbit\_AN} = \frac{\left(\frac{0.529}{10000000000}\right) \cdot \left(n_{quantum}^2\right)}{Z}$$

ex $$0.199153nm = \frac{\left(\frac{0.529}{10000000000}\right) \cdot \left((8)^2\right)}{17}$$

12) Velocity of Electron given Time Period of Electron

Open Calculator

fx $$v_{electron} = \frac{2 \cdot \pi \cdot r_{orbit}}{T}$$

ex $$7.2E\hat{}\text{-}10m/s = \frac{2 \cdot \pi \cdot 100nm}{875s}$$

Variables Used

- E_{orbit} Energy of Electron in Orbit *(Electron-Volt)*
- **F** Degree of Freedom
- $f_{orbital}$ Orbital Frequency *(Hertz)*
- L_{RO} Angular Momentum using Radius Orbit *(Kilogram Square Meter per Second)*
- **M** Atomic Mass *(Dalton)*
- m_n Total Mass of Neutron *(Dalton)*
- m_p Total Mass of Proton *(Dalton)*
- **N** Number of Orbitals in nth Shell
- $N_{Electron}$ Number of Electrons in nth Shell
- n_f Final Quantum Number
- n_i Initial Quantum Number
- $n_{initial}$ Initial Orbit
- N_{moles} Number of Moles
- $n_{quantum}$ Quantum Number
- N_{wave} Wave Number of moving Particle
- r_{orbit} Radius of Orbit *(Nanometer)*
- r_{orbit_AN} Radius of Orbit given AN *(Nanometer)*
- **T** Time Period of Electron *(Second)*
- T_g Temperature of Gas *(Kelvin)*
- U_{EP} Internal Molar Energy given EP *(Joule Per Mole)*
- **v** Velocity *(Meter per Second)*

- $v_{electron}$ Velocity of Electron given Time *(Meter per Second)*
- Z Atomic Number

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[Charge-e]**, 1.60217662E-19 Coulomb
  Charge of electron
- Constant: **[Coulomb]**, 8.9875517923E9 Newton * Meter ^2 / Coulomb ^2
  Coulomb constant
- Constant: **[Mass-e]**, 9.10938356E-31 Kilogram
  Mass of electron
- Constant: **[hP]**, 6.626070040E-34 Kilogram Meter² / Second
  Planck constant
- Constant: **[Rydberg]**, 10973731.6 / Meter
  Rydberg Constant
- Constant: **[R]**, 8.31446261815324 Joule / Kelvin * Mole
  Universal gas constant
- Measurement: **Length** in Nanometer (nm)
  Length Unit Conversion
- Measurement: **Weight** in Dalton (Dalton)
  Weight Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Temperature** in Kelvin (K)
  Temperature Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Energy** in Electron-Volt (eV)
  Energy Unit Conversion

- Measurement: **Frequency** in Hertz (Hz)
  Frequency Unit Conversion
- Measurement: **Angular Momentum** in Kilogram Square Meter per Second (kg*m²/s)
  Angular Momentum Unit Conversion
- Measurement: **Energy Per Mole** in Joule Per Mole (J/mol)
  Energy Per Mole Unit Conversion

Check other formula lists

- De Broglie Hypothesis Formulas
- Heisenberg's Uncertainty Principle Formulas
- Important Formulas on Bohr's Atomic Model
- Schrodinger Wave Equation Formulas
- Sommerfeld Model Formulas
- Structure of Atom Formulas

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