Important Nuclear Physics and Transistors Formulas PDF

Formulas
Examples
with Units

List of 21
Important Nuclear Physics and Transistors Formulas

1) Nuclear Physics Formulas

1.1) Average Life Formula

Evaluate Formula

Formula

$$t_{avg} = \frac{1}{\lambda}$$

Example with Units

$$2.5\,\text{s} = \frac{1}{0.4\,\text{Hz}}$$

1.2) Binding Energy Formula

Evaluate Formula

Formula

$$E = \left(Z \cdot m_p + \left(A - Z \right) \cdot m_n - m_{atom} \right) \cdot [c]^2$$

Example with Units

$$7.2\text{E+16}\,\text{J} = \left(2 \cdot 1.2\,\text{kg} + \left(30 - 2 \right) \cdot 1.3\,\text{kg} - 38\,\text{kg} \right) \cdot 3\text{E+8}\,\text{m/s}^2$$

1.3) Change in Mass in Nuclear Reaction Formula

Evaluate Formula

Formula

$$\Delta m = m_{reactant} - m$$

Example with Units

$$0.8\,\text{kg} = 60\,\text{kg} - 59.2\,\text{kg}$$

1.4) Decay Rate Formula

Evaluate Formula

Formula

$$D = -\lambda \cdot N_{total}$$

Example with Units

$$-26 = -0.4\,\text{Hz} \cdot 65$$

1.5) Energy Released in Nuclear Reaction Formula

Evaluate Formula

Formula

$$E = \Delta m \cdot [c]^2$$

Example with Units

$$7.2\text{E+16}\,\text{J} = 0.8\,\text{kg} \cdot 3\text{E+8}\,\text{m/s}^2$$

1.6) Half Life for Nuclear Decay Formula

Evaluate Formula

Formula

$$t_{half} = \frac{0.693}{\lambda}$$

Example with Units

$$1.7325\,\text{s} = \frac{0.693}{0.4\,\text{Hz}}$$

1.7) Mass Defect Formula

Evaluate Formula

Formula

$$\Delta m = Z \cdot m_p + \left(A - Z \right) \cdot m_n - m_{atom}$$

Example with Units

$$0.8\,\text{kg} = 2 \cdot 1.2\,\text{kg} + \left(30 - 2 \right) \cdot 1.3\,\text{kg} - 38\,\text{kg}$$

1.8) Nuclear Radius Formula

Evaluate Formula

Formula

$$r = r_0 \cdot A^{\frac{1}{3}}$$

Example with Units

$$3.884\,\text{f} = 1.25\,\text{f} \cdot 30^{\frac{1}{3}}$$

1.9) Population after N Half Lives Formula

Evaluate Formula

Formula

$$N_t = \frac{N_o}{2^N}$$

Example

$$50.0653 = \frac{50.1}{2^{0.001}}$$

1.10) Population at Time Formula

Evaluate Formula

Formula

$$N_t = N_o \cdot e^{-\frac{\lambda \cdot t}{3.156 \cdot 10^7}}$$

Example with Units

$$50.1 = 50.1 \cdot e^{-\frac{0.4\,\text{Hz} \cdot 25\,\text{s}}{3.156 \cdot 10^7}}$$

1.11) Q-Value Formula

Evaluate Formula

Formula

$$Q = U_i - U_f$$

Example with Units

$$5\,\text{J} = 40\,\text{J} - 35\,\text{J}$$

2) Transistor Characteristics Formulas

2.1) Alpha Parameter of Transistor Formula

Evaluate Formula

Formula

$$\alpha = \frac{I_C}{I_e}$$

Example with Units

$$0.2999 = \frac{100\,\text{A}}{333.4\,\text{A}}$$

2.2) Alpha Parameter of Transistor given Beta Formula

Evaluate Formula

Formula

$$\alpha = \frac{B}{1 + B}$$

Example

$$0.3 = \frac{0.4286}{1 + 0.4286}$$

2.3) Base Current of Transistor given Beta Formula

Evaluate Formula

Formula

$$I_B = \frac{I_C}{B}$$

Example with Units

$$233.3178\,\text{A} = \frac{100\,\text{A}}{0.4286}$$

2.4) Beta Parameter of Transistor Formula

Evaluate Formula

Formula

$$B = \frac{\alpha}{1 - \alpha}$$

Example

$$0.4286 = \frac{0.3}{1 - 0.3}$$

2.5) Beta Parameter of Transistor given Base Current Formula

Evaluate Formula

Formula

$$B = \frac{I_C}{I_B}$$

Example with Units

$$0.4284 = \frac{100\,\text{A}}{233.4\,\text{A}}$$

2.6) Collector Current of Transistor using Alpha Formula

Evaluate Formula

Formula

$$I_C = \alpha \cdot I_e$$

Example with Units

$$100.02\,\text{A} = 0.3 \cdot 333.4\,\text{A}$$

2.7) Collector Current of Transistor using Beta Formula

Evaluate Formula

Formula

$$I_C = B \cdot I_B$$

Example with Units

$$100.0352\,\text{A} = 0.4286 \cdot 233.4\,\text{A}$$

2.8) Current in Transistor Formula

Evaluate Formula

Formula

$$I_e = I_B + I_C$$

Example with Units

$$333.4\,\text{A} = 233.4\,\text{A} + 100\,\text{A}$$

2.9) Emitter Current of Transistor using Alpha Formula

Evaluate Formula

Formula

$$I_e = \frac{I_C}{\alpha}$$

Example with Units

$$333.3333\,\text{A} = \frac{100\,\text{A}}{0.3}$$

2.10) Transconductance Formula

Evaluate Formula

Formula

$$g_m = \frac{\Delta I_C}{V_{bc}}$$

Example with Units

$$0.8571\,\text{S} = \frac{6\,\text{A}}{7\,\text{V}}$$

Variables used in list of Nuclear Physics and Transistors Formulas above

- Δm Mass Defect *(Kilogram)*
- **A** Mass Number
- **B** Beta
- **D** Decay Rate
- **E** Energy *(Joule)*
- g_m Transconductance *(Siemens)*
- I_B Base Current *(Ampere)*
- I_C Collector Current *(Ampere)*
- I_e Emitter Current *(Ampere)*
- **m** Mass Product *(Kilogram)*
- m_{atom} Mass of Atom *(Kilogram)*
- m_n Mass of Neutron *(Kilogram)*
- m_p Mass of Proton *(Kilogram)*
- $m_{reactant}$ Mass Reactant *(Kilogram)*
- **N** Number of Half Lives
- N_o Number of Particles in Sample Initially
- N_t Number of Particles at Time
- N_{total} Total Number of Particles in Sample
- **Q** Q Value *(Joule)*
- **r** Nuclear Radius *(Fermi)*
- r_0 Radius of Nucleon *(Fermi)*
- **t** Time *(Second)*
- t_{avg} Average Life *(Second)*
- t_{half} Half Life Period *(Second)*
- U_f Final Energy *(Joule)*
- U_i Initial Energy *(Joule)*
- V_{bc} Change in Base-Collector Voltage *(Volt)*
- **Z** Atomic Number
- **α** Alpha
- ΔI_C Change in Collector Current *(Ampere)*
- **λ** Decay Constant *(Hertz)*

Constants, Functions, Measurements used in list of Nuclear Physics and Transistors Formulas above

- constant(s): **[c]**, 299792458.0
  Light speed in vacuum
- constant(s): **e**, 2.71828182845904523536028747135266249
  Napier's constant
- Measurement: **Length** in Fermi (f)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Electric Current** in Ampere (A)
  Electric Current Unit Conversion
- Measurement: **Energy** in Joule (J)
  Energy Unit Conversion
- Measurement: **Frequency** in Hertz (Hz)
  Frequency Unit Conversion
- Measurement: **Electric Conductance** in Siemens (S)
  Electric Conductance Unit Conversion
- Measurement: **Electric Potential** in Volt (V)
  Electric Potential Unit Conversion

Download other Important Modern Physics PDFs

- Important Nuclear Physics and Transistors Formulas
- Important Photon and Atomic Physics Formulas

Try our Unique Visual Calculators

- Reverse percentage
- HCF calculator
- Simple fraction

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

English Spanish French German Russian Italian Portuguese Polish Dutch

9/18/2024 | 9:56:03 AM UTC