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Nuclear Physics and Transistors Formulas

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List of 21 Nuclear Physics and Transistors Formulas

Nuclear Physics and Transistors

Nuclear Physics

1) Average Life

Open Calculator

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

ex $$2.5s = \frac{1}{0.4Hz}$$

2) Binding Energy

Open Calculator

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

ex $$7.2E\hat{}16J = (2 \cdot 1.2kg + (30 - 2) \cdot 1.3kg - 38kg) \cdot [c]^2$$

3) Change in Mass in Nuclear Reaction

Open Calculator

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

ex $$0.8kg = 60kg - 59.2kg$$

4) Decay Rate

Open Calculator

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

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

5) Energy Released in Nuclear Reaction

Open Calculator

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

ex $7.2\text{E}\hat{}16\text{J} = 0.8\text{kg} \cdot [c]^2$

6) Half Life for Nuclear Decay

Open Calculator

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

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

7) Mass Defect

Open Calculator

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

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

8) Nuclear Radius

Open Calculator

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

ex $3.884041\text{f} = 1.25\text{f} \cdot (30)^{\frac{1}{3}}$

9) Population after N Half Lives

Open Calculator

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

ex $$50.06529 = \frac{50.1}{2^{0.001}}$$

10) Population at Time

Open Calculator

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

ex $$50.09998 = 50.1 \cdot e^{-\frac{0.4\text{Hz} \cdot 25\text{s}}{3.156 \cdot 10^7}}$$

11) Q-Value

Open Calculator

fx $$Q = U_i - U_f$$

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

Transistor Characteristics

12) Alpha Parameter of Transistor

Open Calculator

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

ex $$0.29994 = \frac{100\text{A}}{333.4\text{A}}$$

13) Alpha Parameter of Transistor given Beta

Open Calculator

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

ex $$0.300014 = \frac{0.4286}{1+0.4286}$$

14) Base Current of Transistor given Beta

Open Calculator

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

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

15) Beta Parameter of Transistor

Open Calculator

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

ex $$0.428571 = \frac{0.3}{1-0.3}$$

16) Beta Parameter of Transistor given Base Current

Open Calculator

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

ex $$0.428449 = \frac{100\text{A}}{233.4\text{A}}$$

17) Collector Current of Transistor using Alpha

Open Calculator

fx $I_C = \alpha \cdot I_e$

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

18) Collector Current of Transistor using Beta

Open Calculator

fx $I_C = B \cdot I_B$

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

19) Current in Transistor

Open Calculator

fx $I_e = I_B + I_C$

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

20) Emitter Current of Transistor using Alpha

Open Calculator

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

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

21) Transconductance

Open Calculator

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

ex $0.857143\text{S} = \frac{6\text{A}}{7\text{V}}$

Variables Used

- 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

- Constant: **[c]**, 299792458.0
  Light speed in vacuum
- Constant: **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

Check other formula lists

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

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