

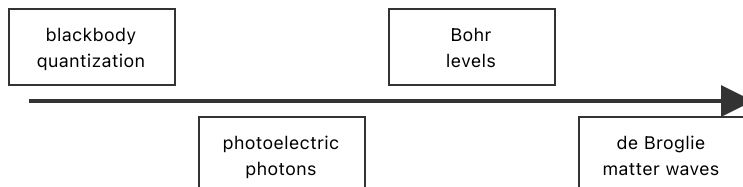
MODERN PHYSICS DAY 13: MODERN-PHYSICS SYNTHESIS AND DATA

CED 15.1–15.8 · Skill 3.C · FRQ: Mixed Data Interpretation

RETRIEVE

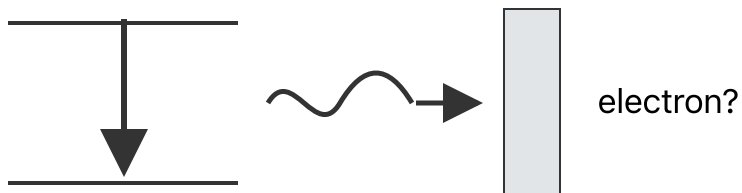
Which chronological order matches the development of the unit's central ideas?

- A. blackbody → photoelectric → Bohr → de Broglie B. Bohr → blackbody → de Broglie → photoelectric
C. de Broglie → Bohr → photoelectric → blackbody D. photoelectric → de Broglie → blackbody → Bohr

EVIDENCE TIMELINE

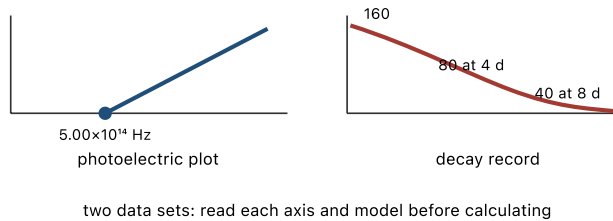
After choosing, write one idea that changed across the sequence and one idea that persisted.

NOTES / REASONING

A CROSS-TOPIC ENERGY CHAIN**OUTCOME WITHHELD UNTIL THE ENERGY COMPARISON**

WE DO A hydrogen electron drops from $n = 2$ to $n = 1$. The photon strikes a metal with $\phi = 3.40 \text{ eV}$. Calculate the photon energy, wavelength, and KE_{max} .

Use one energy unit through the chain before converting wavelength.

READ TWO DATA REPRESENTATIONS**THRESHOLD AND HALF-LIFE EVIDENCE**

1. A photoelectric graph has threshold $5.00 \times 10^{14} \text{ Hz}$. Find the work function using $h = 4.14 \times 10^{-15} \text{ eV} \cdot \text{s}$.

2. The decay record drops from 160 to 80 in 4.0 days and to 40 in 8.0 days. State the half-life and predict N at 12.0 days.

SYNTHESIS CHECK

1. Explain how the same 10.2 eV appears in the energy-level diagram and photon model but is partitioned at the metal.

2. If the metal work function were 11.0 eV, predict the photoelectric outcome without changing the atomic transition.

3. A nuclear reaction has $\Delta m = 0.0155 \text{ u}$. Find the released energy using 931.5 MeV/u .

4. State one feature shared by atomic transitions and radioactive decay and one important difference.