3. **Find the corresponding line in the emission spectrum.**
Examination of the diagram shows that the electron's jump from energy level E_4 to energy level E_2 corresponds to *Line 3* in the emission spectrum.

4. **Evaluate your answer.**
Line 3 is in the visible part of the electromagnetic spectrum and appears to be blue. The frequency $f = 6.15 \times 10^{14}$ Hz lies within the range of the visible spectrum and is toward the violet end, so it is reasonable that light of this frequency would be visible blue light.

PRACTICE C

Interpreting Energy-Level Diagrams

1. An electron in a hydrogen atom drops from energy level E_3 to E_2. What is the frequency of the emitted photon, and which line in the emission spectrum shown in Sample Problem C corresponds to this event?

2. An electron in a hydrogen atom drops from energy level E_6 to energy level E_3. What is the frequency of the emitted photon, and in which range of the electromagnetic spectrum is this photon? (See **Table 1** in the chapter "Light and Reflection" for ranges in the electromagnetic spectrum.)

3. The energy-level diagram in **Figure 16** shows the first five energy levels for mercury vapor. The energy of E_1 is defined as zero. What is the frequency of the photon emitted when an electron drops from energy level E_5 to E_1 in a mercury atom?

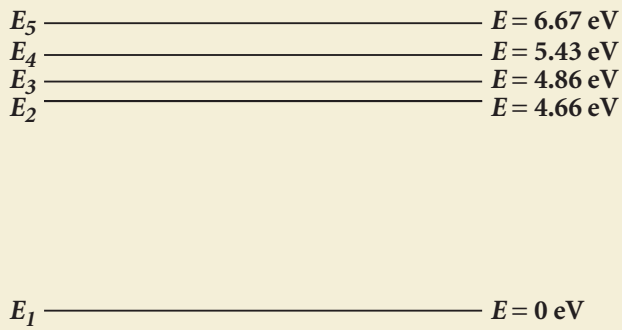

Figure 16

4. How many different spectral lines *could* be emitted if mercury vapor were excited by photons with 6.67 eV of energy? (Hint: An electron could move, for example, from energy level E_5 to E_3, then from E_3 to E_2, and then from E_2 to E_1.)

5. The emission spectrum of hydrogen has one emission line at a frequency of 7.29×10^{14} Hz. Calculate which two energy levels electrons must jump between to produce this line, and identify the line in the energy-level diagram in Sample Problem C. (Hint: First, find the energy of the photons, and then use the energy-level diagram.)