

CHAPTER 2: ATOMIC STRUCTURE

1. What is the wavelength, λ of the fourth line in the Balmer's series? [Rydberg constant, $R_H = 1.0971 \times 10^7 \text{ m}^{-1}$]

A. 410nm C. 486nm
B. 432nm D. 654nm

2. Calculate the energy required to excite an electron from $n=2$ to $n=4$.

A. $4.09 \times 10^{-19} \text{ J}$ C. $2.05 \times 10^6 \text{ J}$
B. $5.45 \times 10^{-19} \text{ J}$ D. $2.74 \times 10^6 \text{ J}$

3. What is the frequency, in s^{-1} , of a radiation with energy of $3.37 \times 10^{-19} \text{ J}$ per photon?

A. $5.08 \times 10^{-54} \text{ s}^{-1}$ C. $5.08 \times 10^{-15} \text{ s}^{-1}$
B. $5.08 \times 10^{14} \text{ s}^{-1}$ D. $5.08 \times 10^{15} \text{ s}^{-1}$

4. Calculate the wavelength of the second line in Lyman series.

A. $1.30 \times 10^{-7} \text{ m}$ C. $2.45 \times 10^{-7} \text{ m}$
B. $1.23 \times 10^{-7} \text{ m}$ D. $1.03 \times 10^{-7} \text{ m}$

5. What is the minimum amount of ionization energy of hydrogen atom at ground state?

A. $1312.36 \text{ kJ mol}^{-1}$
B. $2.18 \times 10^{-18} \text{ J}$
C. $2.18 \times 10^{-18} \text{ J mol}^{-1}$
D. $1312.36 \text{ J mol}^{-1}$

6. Calculate the frequency of the second line in Lyman series.

A. $1.91 \times 10^{14} \text{ s}^{-1}$ C. $3.23 \times 10^{14} \text{ s}^{-1}$
B. $2.91 \times 10^{15} \text{ s}^{-1}$ D. $1.65 \times 10^{15} \text{ s}^{-1}$

7. Calculate the wavelength of the third line in the Balmer series.

A. 810 nm C. 434 nm
B. 343 nm D. 520 nm

8. FIGURE 1 shows the first four lines in the Brackett series of hydrogen emission spectrum.

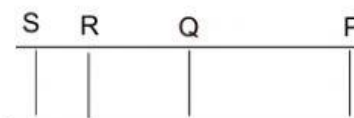


FIGURE 1

Calculate the wavelength of the radiation that produces the fourth line.

A. $5.56 \times 10^{-6} \text{ m}$ C. $1.94 \times 10^{-5} \text{ m}$
B. $2.34 \times 10^{-5} \text{ m}$ D. $1.94 \times 10^{-6} \text{ m}$

9. In the hydrogen atom, an electron transit from a higher to a lower energy level emits a photon with a wavelength of 1282 nm in Paschen series. Determine the energy level of the excited state for this transition.

A. $n = 3$ C. $n = 6$
B. $n = 4$ D. $n = 5$

10. A line with wavelength of 434 nm was observed in the Balmer series of the emission spectrum of hydrogen. Calculate its frequency.

A. $5.91 \times 10^{14} \text{ s}^{-1}$ C. $6.19 \times 10^{14} \text{ s}^{-1}$
B. $7.19 \times 10^{14} \text{ s}^{-1}$ D. $6.91 \times 10^{14} \text{ s}^{-1}$

11. Calculate the energy of the photon emitted to produced second line in the Paschen series.

A. $2.55 \times 10^{-19} \text{ J}$ C. $1.51 \times 10^{-19} \text{ J}$
B. $1.45 \times 10^{-19} \text{ J}$ D. $1.55 \times 10^{-19} \text{ J}$