CHEMBUDDY

CHAPTER 2: ATOMIC STRUCTURE

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

   A. 410nm C. 486nm

   B. 432nm D. 654nm

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

   A. 4.09×10^{-19} J

   B. 5.45×10^{-19} J

   C. 2.05×10^{6} J

   D. 2.74×10^{6} J

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

   A. $5.08 \times 10^{-54}\ s^{-1}$

   B. $5.08 \times 10^{14}\ s^{-1}$

   C. $5.08 \times 10^{-15}\ s^{-1}$

   D. $5.08 \times 10^{15}\ s^{-1}$

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

   A. 1.30×10^{-7} m

   B. 1.23×10^{-7} m

   C. 5.08×10^{-15} m

   D. 1.03×10^{-7} m

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

   A. 1312.36 kJ mol^{-1}

   B. 2.18×10^{-18} J

   C. 2.18×10^{-18}J mol^{-1}

   D. 1312.36 J mol^{-1}

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

   A. $1.91 \times 10^{14}\ s^{-1}$

   B. $2.91 \times 10^{15}\ s^{-1}$

   C. $3.23 \times 10^{14}\ s^{-1}$

   D. $1.65 \times 10^{15}\ s^{-1}$

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.

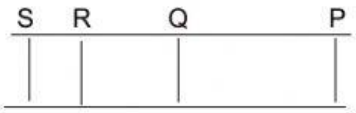


FIGURE 1

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

   A. 5.56×10^{-6} m

   B. 2.34×10^{-5} m

   C. 1.94×10^{-5} m

   D. 1.94×10^{-6} 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. $5.91 \times 10^{14}\ s^{-1}$

B. $7.19 \times 10^{14}\ s^{-1}$

C. $6.19 \times 10^{14}\ s^{-1}$

D. $6.91 \times 10^{14}\ s^{-1}$

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

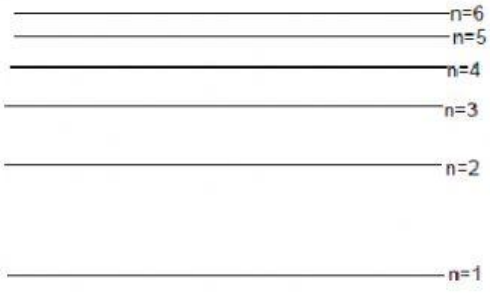
A. 2.55×10^{-19} J

B. 1.45×10^{-19} J

C. 1.51×10^{-19} J

D. 1.55×10^{-19} J

12. How many electronic transitions between the following energy levels would be expected for Lyman and Paschen



	Lyman Series	Paschen Series
A.	5	3
B.	5	2
C.	4	3
D.	5	4

13. Calculate the wavelength in nm of the second line in Lyman series.

A. 1.026×10^{-16} nm

B. 1.026×10^{2} nm

C. 9.75×10^{6} nm

D. 975×10^{-3} nm

14. Q is an element with proton number of
21. Write the electronic configuration of Q.

A. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$

B. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^1$

C. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$

D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^1$

15. Give a set of quantum numbers for the electrons that occupy the fourth shell in Scandium (Sc).

A. n= 3, l=1, m=0, s=+1

B. n= 3, l=1, m=1, s= - ½

C. n=4, l=0, m=1, s= +½

D. n=4, l=0, m=0, s= - ½

16. Given the set of quantum number for the highest energy electron in atom X.

n=4, l=1, m=0, s= +½

Write the electronic configuration of X.

A. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^2$

B. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4p^{21}$

C. $1s_2\ 2s_2\ 2p_6\ 3s_2\ 3p_6\ 4s_2\ 3d_{10}\ 4p_1$

D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 4p^1$

17. Give a set of quantum number of one valence electron in the *s* orbital of arsenic, As.

A. n=4, l =0, m= 1, s = -½

B. n=4, l=1, m=0, s= +1

C. n=4, l= 0, m= 0, s= -1

D. n=4, l=0, m=0, s= -½

18. The proton number of copper (Cu) is 29.
Write the valence electronic configuration of the copper atom.

A. $4s^2\ 3d^{10}$

B. $4s^1\ 3d^{10}$

C. $4s^2\ 3d^8$

D. $3d^{10}\ 4s^2$

19. Nickel has 28 protons. Give a set of possible quantum number for the electron with the highest energy in Ni^{2+} ion.

A. n=3 l =2 m= -1 s= -1/2
B. n=3 l =1 m=-1 s= +1/2
C. n=4 l =0 m=-1 s= +1/2
D. n=4 l =0 m=0 s= -1/2

20. Ion that have the similar electronic configuration with $_{10}Ne$ is;

A. O^{2+} C. N^{3-}
B. Mg^{2+} D. Cl^{-}

21. The charge of an ion P is 2-, in which it contains 2 inner electrons and eight outermost electrons. The electronic configuration of atom P is;

A. $1s^2\ 2s^2\ 2p^6$
B. $1s^2\ 2s^2\ 2p^4$
C. $1s^2\ 2s^2\ 2p^6\ 3s^2$
D. $1s^2\ 2s^2\ 2p^6\ 3s^2$

22. Which of the following electronic configuration represent an element that form ion with a charge of 2-.

A. $1s^2\ 2s^2\ 2p^6\ 3s^2$
B. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$
C. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$
D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$

23. Choose the most suitable reason of the anomality in electronic configuration of Chromium with the proton number of 24.

A. Stability of fully filled 3d orbital.
B. Stability of half-filled orbital.
C. Stability of half-filled 4s orbital.
D. Stability of half-filled 3d orbital.

24. Determine the electronic configuration of the most stable ion of element X-25.;

A. $1s_2\ 2s_2\ 2p_6\ 3s_2\ 3p_6\ 4s_2\ 3d_5$

B. $1s_2\ 2s_2\ 2p_6\ 3s_2\ 3p_6\ 4s_2\ 3d_6$

C. $1s_2\ 2s_2\ 2p_6\ 3s_2\ 3p_6\ 3d_5$

D. $1s_2\ 2s_2\ 2p_6\ 3s_2\ 3p_6\ 4s_2\ 3d_{10}$

25. Shown below are a set of quantum number of the highest energy electron in P^+ ion. Determine the electronic configuration of P atom.

n=4, l=0, m=0, s= +½

A. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$

B. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$

C. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

D. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^1$