Chapter 7 and 8 Review

Changed question

1. Determine the longest wavelength of light required to remove an electron from a sample of potassium metal, if the binding energy for an electron in K is 1.76 × 103 kJ/mol.

A) 147 nm
B) 68.0 nm
C) 113 nm
D) 885 nm
E) 387 nm

$f = \frac{c}{\lambda} \Rightarrow f = \frac{3.00\times10^{8}}{4.101\times10^{-7}} = 7.32\times10^{14}\ Hz$

$E = (6.626\times10^{-34})(7.32\times10^{14}) = 4.85\times10^{-19}\ J$

A

2. Calculate the wavelength of an electron (m = 9.11 × 10-28 g) moving at 3.66 × 106 m/s.

A) 1.99 × 10-10 m
B) 5.03 × 10-10 m
C) 1.81 × 10-10 m
D) 5.52 × 10-9 m
E) 2.76 × 10-9 m

$\lambda = \frac{h}{mv} = \frac{6.626\times10^{-34}}{(9.11\times10^{-31})(3.66\times10^{6})}$

$9.11\times10^{-28}\ g \times \frac{1\ Kg}{1000\ g} = 9.11\times10^{-31}$

3. Calculate the energy of the violet light emitted by a hydrogen atom with a wavelength of 410.1 nm.

A) 4.85 × 10-19 J
B) 2.06 × 10-19 J
C) 1.23 × 10-19 J
D) 8.13 × 10-19 J
E) 5.27 x 10-19 J

Changed question
B: violet

4. How many sublevels are contained in the ~~second~~ fourth shell (n = 4) of a given atom?

A) 1
B) 2
C) 9
D) 4
E) 16

↳ orbitals

4s - 1
4p - 3
4d - 5
4f - 7

5. What is the maximum number of d orbitals that are possible?

A) 1
B) 3
C) 7
D) 5
E) 9

6. Give the ground state electron configuration for Sr.

A) $[Kr]5s^2 4d^2$
B) $[Kr]5s^2 4d^{10} 5p^2$
C) $[Kr]5s^2$
D) $[Kr]5s^2 5d^{10} 5p^2$
E) $[Kr]5s^2 4d^{10}$

$[Kr]5s^2$

7. Place the following in order of decreasing radius.

Te^{2-}, O^{2-}, F^{1-}

F^-, O^{2-}, Te^{2-}
9+ 8+ 52+

A) $F^- > O^{2-} > Te^{2-}$

B) $F^- > Te^{2-} > O^{2-}$

C) $Te^{2-} > O^{2-} > F^-$

D) $Te^{2-} > F^- > O^{2-}$

E) $O^{2-} > F^- > Te^{2-}$

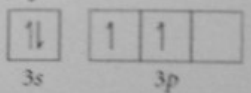
8. Give the ground state electron configuration for Se^{2-}.

[Ar] $4s^2 3d^{10} 4p^6$

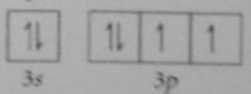
A) $[Ar]4s^2 3d^{10} 4p^4$
B) $[Ar]4s^2 3d^{10} 4p^2$
C) $[Ar]4s^2 4p^6$
D) $[Ar]4s^2 3d^{10} 4p^6$
E) $[Ar]4s^2 3d^8 4p^6$

9. Choose the valence orbital diagram that represents the ground state of $Se2^-$.

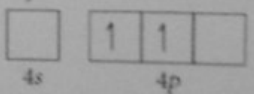
A)



B)

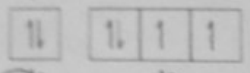


C)

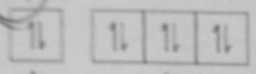


4s ↑↓ 4p ↑↓ ↑↓ ↑↓

D)



E)



$(-2.178 \times 10^{-18})(-.9375) = 2.04 \times 10^{-19}$

$E = -2.178 \times 10^{-18} J \left(\frac{1}{(4)^2} - \frac{1}{(1)^2}\right)$

10. Calculate the energy of an electron in hydrogen moving from the 1st energy level to the 4th energy leve

2.04×10^{-18} J released

11. In the above problem is energy absorbed or released.

Absorbed

xxxxxxxxxxxxxx

12. A photon of light have the wavelength of 4.56×10^{-7} m.

a. Calculate its energy

$\nu = \frac{3.00 \times 10^8}{4.56 \times 10^{-7}} = 6.58 \times 10^{14} Hz$

b. What is its frequency?

$E = (6.626 \times 10^{-34})(6.58 \times 10^{14})$

$E = 4.36 \times 10^{-19} J$