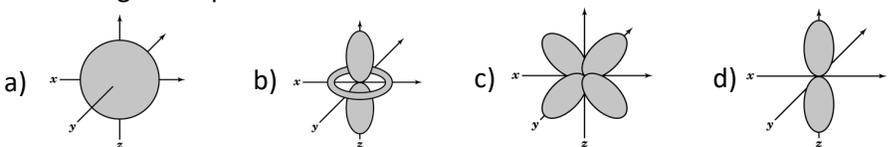


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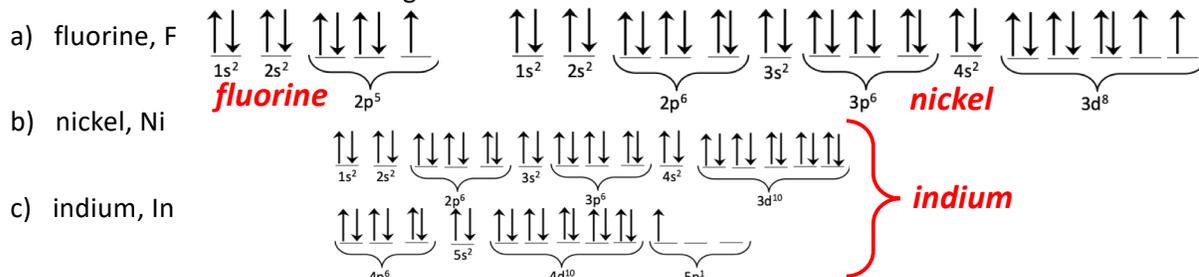
## I. Multiple Choice: Write the letter in the space provided that best answers the question.

- B** 1) How many valence electrons are present in the outer energy level of an element with 14 electrons and 14 protons in the neutral state?  
a) 2      b) 4      c) 8      d) 18
- A** 2) Which diagram represents a 4s orbital?  

- D** 3) What is the total number of electrons in **all p orbitals** of a neutral atom of phosphorus?  
a) 2      b) 4      c) 7      d) 9
- A** 4) The electron configuration for a neutral atom of calcium is  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ . How many valence electrons are in the atom?  
a) 2      b) 4      c) 10      d) 20
- D** 5) According to the Aufbau Principle, which atomic sublevel follows 4p?  
a) 4d      b) 4f      c) 5p      d) 5s
- C** 6) Boron has one electron in the 2p orbital. Which of the following orbitals is the electron likely to be found?  
a) sphere shaped      b) dumbbell shaped      c) doughnut shaped      d) none of these
- D** 7) How many electrons will completely fill a **f sublevel**?  
a) 2      b) 6      c) 10      d) 14
- C** 8) Barium loses two electrons to become a 2+ ion. What element is this  $Ba^{2+}$  ion isoelectronic with?  
a) Ar      b) Kr      c) Xe      d) Rn
- A** 9) Cobalt has the electron configuration of  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$ . How many valence electrons does a neutral atom of cobalt have?  
a) 2      b) 4      c) 6      d) 7
- B** 10) Which best represents the electron configuration for an atom of iron?  
a)  $1s^2 1p^6 2s^2 2p^6 3s^2 3p^6 4s^2$       c)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8$   
b)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$       d)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^6$
- C** 11) Which is the lowest energy level that can contain a d sublevel?  
a) 1      b) 2      c) 3      d) 4
- B** 12) Which noble gas configuration represents a strontium ion,  $Sr^{2+}$ ?  
a)  $[Kr]5s^2$       b)  $[Ar]4s^2 3d^{10} 4p^6$       c)  $[Kr]5s^1$       d)  $[Ar]4s^2 3d^{10} 4p^6 5s^2$
- D** 13) Which is the correct electron configuration for aluminum?  
a)  $1s^2 2s^2 2p^7$       b)  $1s^2 2s^2 2p^6 3s^3$       c)  $1s^2 2s^2 2p^6 3p^3$       d)  $1s^2 2s^2 2p^6 3s^2 3p^1$
- C** 14) Name the element represented by the configuration  $[Kr]5s^2 4d^{10} 5p^3$   
a) tin      b) lead      c) antimony      d) bismuth
- C** 15) How many electrons are needed to completely fill the 3<sup>rd</sup> energy level?  
a) 2      b) 8      c) 18      d) 32

**KEY**

- B** 16) What element is represented by the quantum numbers 5,3,+3,-1/2?  
 a) polonium, Po    b) lawrencium, Lr    c) curium, Cm    d) Bohrium, Bh
- D** 17) Which set of quantum numbers represents lead, Pb  
 a) 5,1,+1,+1/2.    b) 6,2,0,+1/2    c) 5,2,-1,-1/2    d) 6,1,0,+1/2
- B** 18) How many **orbitals** are present in an atom with a principle quantum number of 4 and  $l = 2$ ?  
 a) 3    b) 5    c) 7    d) 9
- B** 19) Which of the following noble gas configurations represents a neutral atom of uranium, U?  
 a)  $[\text{Xe}]7s^26d^15f^3$     b)  $[\text{Rn}]7s^26d^15f^3$     c)  $[\text{Xe}]7s^25f^3$     d)  $[\text{Rn}]7s^25f^3$

20) Write the orbital notation for the following elements.



21) Write the electron configuration for the following elements.

- a) titanium, Ti  $1s^22s^22p^63s^23p^64s^23d^2$
- b) tin, Sn  $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^{10}5p^2$
- c) barium, Ba  $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^{10}5p^66s^2$

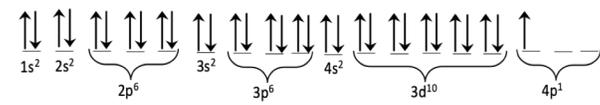
22) Write the noble gas configuration for the following elements.

- a) calcium, Ca  $[\text{Ar}]4s^2$
- b) bromine, Br  $[\text{Ar}]4s^23d^{10}4p^5$
- c) neptunium, Np  $[\text{Rn}]7s^26d^15f^3$

23) Write the electron configuration for the following ions.

- a) selenium,  $\text{Se}^{2-}$   $1s^22s^22p^63s^23p^64s^23d^{10}4p^6$
- b) beryllium,  $\text{Be}^{2+}$   $1s^2$

24) Identify the following atoms or ions based on their orbital notation, electron configuration, or noble gas configuration.

- a)  $1s^22s^22p^63s^23p^64s^23d^{10}4p^65s^24d^1$  **Yttrium, Y**
- b)  $[\text{Ar}]4s^23d^{10}4p^6$ , 2- charge **selenium -2 charge,  $\text{Se}^{2-}$**
- c)  **gallium**
- d)  $[\text{Ar}]4s^23d^{10}$  **zinc, Zn**

25) Write the quantum numbers for the last placed electron for the following neutral atoms.

- a) rutherfordium, Rf  $6,2,-1,+1/2$
- b) tellurium, Te  $5,1,-1,-1/2$
- c) hafnium, Hf  $5,2,-1,+1/2$