

Choice the right answer:

1. ( ) Which of the following has a negative charge?  
A. nucleus      B. neutron      C. proton      **D. electron**      E. alpha particle
2. ( ) Which two subatomic particles have approximately the same mass?  
**A. protons and neutrons**      B. protons and electrons      C. electrons and nuclei  
D. neutrons and electrons      E. protons and alpha particles
3. ( ) The mass number of an atom is the number of \_\_\_\_ in the atom.  
A. Protons      B. neutrons      C. protons plus the number of electrons  
**D. protons plus the number of neutrons**      E. electrons plus the number of neutrons
4. ( ) Give the number of protons, neutrons, and electrons in an atom of the  $^{41}\text{K}$  isotope.  
A. 19 p, 22 n, 22 e      B. 41 p, 19 n, 41 e      **C. 19 p, 22 n, 19 e**  
D. 19 p, 16 n, 19 e      E. 15 p, 26 n, 15 e
5. ( ) Give the number of protons, neutrons, and electrons in the  $^{41}_{21}\text{Sc}^{3+}$  ion.  
A. 21 p, 20 n, 21 e      **B. 21 p, 20 n, 18 e**      C. 21 p, 20 n, 24 e  
D. 20 p, 21 n, 17 e      E. 21 p, 41 n, 18 e
6. ( ) The number of \_\_\_\_ can change without changing the element.  
A. protons only      B. neutrons only      C. electrons only  
D. all of the above      **E. neutrons and electrons only**
7. ( ) The atomic weight of rubidium is 85.4678 amu. Rubidium consists of two isotopes,  $^{85}\text{Rb}$  (72.15%) and  $^{87}\text{Rb}$  (27.85%). The mass of an atom of  $^{85}\text{Rb}$  is 84.9117 amu. What is the mass of an atom of  $^{87}\text{Rb}$ ?  
A. 86.7271 amu      B. 86.8013 amu      C. 86.8220 amu      D. 86.8621 amu      **E. 86.9085 amu**
8. ( ) Which of the following statements is false?  
A. A set of  $p$  orbitals in a given energy level are equal in energy.  
B. The  $5d$  and  $4f$  orbitals are very close in energy.  
C. The  $4s$  orbitals are lower in energy the  $3d$  orbitals.  
**D. An  $f$  set of orbitals is filled with 10 electrons.**  
E. The third energy level has 5  $d$  orbitals.
9. ( ) The third energy level or shell of an atom can hold a maximum of \_\_\_\_ electrons.  
A. 8      B. 2      C. 16      **D. 18**      E. 25
10. ( ) Which of the following is not a valid magnetic quantum number for the  $3d$  set of orbitals?  
A. 1      B. 2      C. 0      D. -2      **E. -3**
11. ( ) All orbitals of a given degenerate set must be singly occupied before pairing begins in that set is a statement of \_\_\_\_.  
A. the Heisenberg Uncertainty Principle      B. the Bohr Theory      C. the Aufbau Principle  
D. Planck's Theory      **E. Hund's Rule**

12. ( ) Which of the following is the electron configuration of P in its ground state?  
 A.  $1s^21p^62s^22p^6$       B.  $1s^22s^22p^33p^33d^4$       C.  $1s^22s^22p^33s^23p^2$   
 D.  $1s^22s^22p^63s^23p^3$       E.  $1s^22s^22p^43s^23p^4$
13. ( ) Which statement is false?  
 A. If an electron has quantum number  $n=3$ , the electron could be in a  $d$  sublevel.  
 B. If an electron has quantum number  $l = 2$ , the only possible values of  $m_l$  are 0 and 1.  
 C. If an electron has  $m_l = -1$ , it might be in a  $p$ ,  $d$ , or  $f$  sublevel but not in an  $s$  sublevel.  
 D. An electron that has  $n= 3$  cannot be in an  $f$  sublevel.  
 E. An electron that has  $n = 5$  could be in an  $s$ ,  $p$ ,  $d$ , or  $f$  sublevel.
14. ( ) Paramagnetism is characteristic of systems containing \_\_\_\_\_.  
 A. no unpaired electrons    B. only  $p$  electrons as valence electrons    C. one or more unpaired electrons  
 D. only  $d$  electrons as valence electrons    E. only  $s$  electrons as valence electrons
15. ( ) How many unpaired electrons are there in a neutral iodine atom (element 53)?  
 A. One      B. Two      C. Three      D. Four      E. Five
16. ( ) Which of the following atoms has the greatest number of unpaired electrons in its ground state?  
 A. N      B. Cl      C. S      D. Ti      E. Cu
17. ( ) An element has the outermost electron configuration  $ns2np4$ . The element could be \_\_\_\_\_.  
 A. Si      B. O      C. Br      D. Ar      E. Mn
18. ( ) An element has the following outer electron configuration in its ground state, where  $n$  represents the highest occupied energy level:  $(n-1)d^{10}ns^1$ . Which of the elements listed below could it be?  
 A. K      B. Ag      C. Ge      D. Ga      E. Cd