Quiz (8.3–8.7)

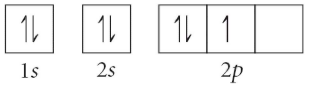
Name_____, Show your work.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

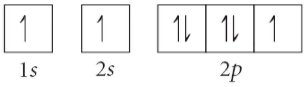
1) What is the maximum number of f orbitals that are possible?
   A) 5
   B) 9
   C) 1
   D) 3
   E) 7

2) When filling degenerate orbitals, electrons fill them singly first, with parallel spins is known as
   A) Pauli exclusion principle
   B) Aufbau principle
   C) Heisenberg uncertainty principle
   D) Hund's rule

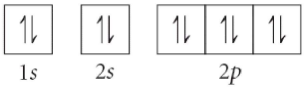
3) Choose the orbital diagram that represents the ground state (neutral) of N.
   A)



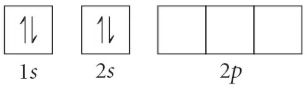
   B)



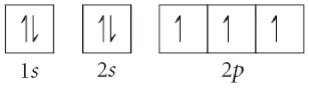
   C)



   D)



   E)



4) Give the ground state electron configuration for Se.
   A) $[Ar]4s^2 3d^{10} 4p^6$
   B) $[Ar]4s^2 3d^{10}$
   C) $[Ar]4s^2 4d^{10} 4p^4$
   D) $[Ar]4s^2 3d^{10} 4p^4$
   E) $[Ar]3d^{10} 4p^4$

5) The element that corresponds to the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$ is _____.
   A) manganese
   B) cobalt
   C) scandium
   D) vanadium
   E) iron

6) The condensed electron configuration of krypton, element 36, is _____.
   A) $[Ar]4s^4 3d^4$
   B) $[Ar]4s^4$
   C) $[Kr]4s^4 3d^8$
   D) $[Ar]3d^{10} 4s^2 4p^6$
   E) $[Kr]4s^2 3d^8$

7) Which element has the ground–state electron configuration $[Xe]6s^2\ 4f^7$?
   A) Gd
   B) Re
   C) Eu
   D) Ir

8) Give the number of core electrons for Se.
   A) 26
   B) 30
   C) 28
   D) 34
   E) 32

9) How many unpaired electrons are present in the ground state As atom?
   A) 2
   B) 0
   C) 3
   D) 1
   E) 4

10) Which of the following have their valence electrons in the same shell?

A) He, Ne, F B) Li, N, F
C) N, As, Bi D) B, Si, As

11) Place the following elements in order of decreasing atomic radius.

Xe Rb Ar

A) Rb > Xe > Ar
B) Xe > Rb > Ar
C) Rb > Ar > Xe
D) Ar > Rb > Xe
E) Ar > Xe > Rb

12) Which atom in each group (I and II) has the smallest atomic radius?

(I) Ba, Hf, At (II) As, Sb, Bi

A) At; As B) At; Bi
C) Ba; Bi D) Ba; As

13) How many of the following species are paramagnetic?

Sc^{3+} Cl^{-} Ba^{2+}
Se

A) 2
B) 3
C) 1
D) 4
E) 0

14) How many of the following species are diamagnetic?

Fr Zr^{2+} Al^{3+}
Hg^{2+}

A) 1
B) 3
C) 4
D) 0
E) 2

15) Which ion does **not** have a noble gas configuration in its ground state?

A) Al^{3+} B) Sc^{3+}
C) As^{3-} D) Ga^{3+}

16) Place the following in order of increasing atomic radius.

As O Br

A) As < Br < O
B) O < Br < As
C) As < O < Br
D) O < As < Br
E) Br < As < O

17) Place the following in order of decreasing radius.

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

A) $Te^{2-} > F^{-} > O^{2-}$
B) $F^{-} > Te^{2-} > O^{2-}$
C) $F^{-} > O^{2-} > Te^{2-}$
D) $O^{2-} > F^{-} > Te^{2-}$
E) $Te^{2-} > O^{2-} > F^{-}$

18) Choose the statement that is TRUE.

A) Core electrons are the easiest of all electrons to remove.
B) Valence electrons are most difficult of all electrons to remove.
C) Core electrons effectively shield outer electrons from nuclear charge.
D) Outer electrons efficiently shield one another from nuclear charge.
E) All of the above are true.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

19) Sketch one of the 3p orbitals below. How are they different from the 2p orbitals?

20) Why does the size of the transition elements stay roughly the same across a period?

21) Why do Li, Na, and K have similar chemical properties?

1) E
2) D
3) E
4) D
5) D
6) D
7) C
8) C
9) C
10) B
11) A
12) A
13) C
14) E
15) D
16) B
17) E
18) C
19) They are larger in size and contain additional nodes.
20) The electrons added as the transition element increase in atomic number are NOT being added to the outermost shell. They are being added to an inner shell where they shield the outer electrons from nuclear charge. The number of outermost electrons are constant. For each electron added across the period, an additional proton is also added. This keeps the effective nuclear charge roughly constant as the transition elements increase in atomic number within a given period. Therefore, the size of the transition elements within a period stays roughly constant.
21) They are in the same group (family) and all have the same number of valence electrons.