Electron Configuration

Name_____

1. Write the **entire** electron configuration for
   a. phosphorus ($_{15}$P) in its ground state.
   b. calcium ($_{20}$Ca) in its ground state.
   c. tin ($_{50}$Sn) in its ground state.
   d. uranium ($_{92}$U)in its ground state.

2. Name the element that is described by each of the following condensed version of electron configuration.
   a. [He] $2s^2 2p^1$
   b. [Ne] $3s^2 3p^5$
   c. [Ar] $4s^1$
   d. [Kr] $5s^2 4d^2$
   e. [Ar] $4s^2 3d^7$
   f. [Xe] $6s^2 4f^{14} 5d^{10} 6p^4$
   g. [Xe] $6s^2 4f^{14} 5d^9$
   h. [Rn] $7s^2 5f^7$

3. Write the condensed version of electron configuration
   a. carbon ($_6$C)
   b. sodium ($_{11}$Na)
   c. sulfur ($_{16}$S)
   d. germanium ($_{32}$Ge)
   e. silicon ($_{14}$Si)
   f. silver ($_{47}$Ag)
   g. technetium ($_{43}$Tc)
   h. iron ($_{26}$Fe)
   i. terbium ($_{65}$Tb)
   j. curium ($_{96}$Cm)
   k. borium ($_{107}$Bh)

4. Name the element that is described by the electron configuration of the highest energy orbital (the last orbital to fill) of the element in its ground state.
   a. $2p^5$
   b. $1s^1$
   c. $1s^2$
   d. $3s^2$
   e. $3p^6$
   f. $6p^3$
   g. $3p^1$
   h. $5p^2$
   i. $3d^4$
   j. $4f^7$
   k. $4d^9$
   l. $5f^2$
   m. $5d^4$
   n. $5p^8$
   o. $2d^2$
   p. $1p^3$

5. Write the single highest energy orbital (or subset of orbitals) that accurately describes the ground state of (Just write the last orbital that will fill.).:
   a. oxygen ($_8$O)
   b. bromine ($_{35}$Br)
   c. selenium ($_{34}$Se)
   d. uranium ($_{92}$U)
   e. aluminum ($_{13}$Al)
   f. cesium ($_{55}$Cs)
   g. gold ($_{79}$Au)
   h. lead ($_{82}$Pb)
   i. tungsten ($_{74}$W)
   j. sodium ($_{11}$Na)
   k. antimony ($_{51}$Sb)
   l. xenon ($_{54}$Xe)
   m. osmium ($_{76}$Os)
   n. bismuth ($_{83}$Bi)
   o. rutherfordium ($_{44}$Ru)
   p. berkelium ($_{97}$Bk)

ANSWERS

1 a P $1s^2 2s^2 2p^6 3s^2 3p^3$
b Ca $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
c Sn $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^2$
d U $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6 7s^2 5f^4$

2 a B
b Cl
c K
d Zr
e Co
f Po
g Au
h Am

3 a C [He] $2s^2 2p^2$
b Na [Ne] $3s^1$
c S [Ne] $3s^2 3p^4$
d Ge [Ar] $4s^2 3d^{10} 4p^2$
e Si [Ne] $3s^2 3p^2$
f Ag [Kr] $5s^2 4d^9$
g Tc [Kr] $5s^2 4d^5$
h Fe [Ar] $4s^2 3d^6$
i Tb [Xe] $6s^2 4f^9$
j Cm [Rn] $7s^2 5f^8$
k Bh [Rn] $7s^2 5f^{14} 6d^5$

4 a $_{9}F$
b $_{1}H$
c $_{2}He$
d $_{12}Mg$
e $_{18}Ar$
f $_{83}Bi$
g $_{13}Al$
h $_{50}Sn$
i $_{24}Cr$
j $_{63}Eu$
k $_{47}Ag$
l $_{90}Th$
m $_{74}W$
n does not exist – there are only 6 possible electrons in the p subset
o does not exist – no 2 d orbitals
p does not exist – no 1p orbitals

5 a $2p^4$
b $4p^5$
c $4p^4$
d $5f^4$
e $3p^1$
f $6s^1$
g $5d^9$
h $6p^2$
i $5d^4$
j $3s^1$
k $5p^3$
l $5p^6$
m $5d^6$
n $6p^3$
o $6d^2$
p $5f^9$