Periodic Table and Quantum Numbers KEY

1. List the complete electronic configuration of each of the following. You may use [ ] around an inert gas element symbol to indicate the electrons up to and including that element.

A. Ti$^{2+}$  __[Ar] 3d$^2$________________________

B. Co$^{3+}$  __[Ar] 3d$^6$________________________

C. Al$^{3+}$  __[Ne]________________________

D. Br$^{-}$  __[Ar] 3d$^{10}$4s$^2$ 4p$^6$________________________

E. As$^{3+}$  __[Ar] 3d$^{10}$4s$^2$________________________

2. List five species (ions or atoms) with the electronic configuration

1s$^2$ 2s$^2$ 2p$^6$ 3s$^2$ 3p$^6$ 3d$^{10}$ 4s$^2$ 4p$^6$4d$^{10}$5s$^2$5p$^6$

______________________________

Te$^{2-}$

______________________________

I$^-$

______________________________

Xe

______________________________

Cs$^{+1}$

______________________________

Ba$^{2+}$

3. What type of orbitals are being filled across the rare earth elements and the actinides?

__ f orbitals ________________________________

4. What type of orbital (s, p, d, or f) are being filled across the first, second, and third transition series? __ d orbitals ________________________________
5. Give a general description of the valance electrons for each of the indicated columns of the periodic table. See example. (Be sure to use a modern table - column designations have changed).

<table>
<thead>
<tr>
<th>Column</th>
<th>Valance configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX. Alkali Metals</td>
<td>ns(^1), n = 1 to 7</td>
</tr>
<tr>
<td>Column 3 (Sc on down)</td>
<td>nd(^1) (n+1)s(^2) n = 3-6</td>
</tr>
<tr>
<td>Column 14 (C on down)</td>
<td>ns(^2) np(^2), n=2-6</td>
</tr>
<tr>
<td>Column 16 (O on down)</td>
<td>ns(^2) np(^4), n=2-6</td>
</tr>
</tbody>
</table>

6. List the valence electrons of the following species.

A. Mg \[ 3s^2 \]
B. Ga \[ 4s^2 4p^1 \]
C. Sb \[ 5s^2 5p^3 \]
D. Cl \[ 3s^2 3p^5 \]
E. Mn \[ 3d^5 4s^2 \]

7. How many electrons can each of the following subshells hold?

A. 4p \[ 6 \]
B. 1s \[ 2 \]
C. 5f \[ 14 \]
D. 4d \[ 10 \]