

ELECTRONIC CONFIGURATION PROBLEM SET

1. Give the values for all four quantum numbers for each electron in the ground state of the aluminum atom.
2. Give the orbital diagram and the electronic notation for an atom of iron.
3. Identify the atoms that have the following *ground-state* electronic configurations in their **outer** shell(s).
(a) $3s^23p^63d^34s^2$ (b) $4s^24p^3$ (c) $5s^25p^6$
(d) $4s^24p^64d^{10}4f^35s^25p^66s^2$ (e) $4s^24p^65s^2$
4. Write the electronic notations for the ground-state configurations of the following atoms.
(a) Cd (b) Sn (c) Cu (d) Kr
5. State the number of unpaired electrons in each of the atoms in question 4.
6. Write the electronic notations for the ground-state configurations of the following ions.
(a) Ca^{2+} (b) Mn^{2+} (c) Cl^- (d) Fe^{3+}
7. Which of the ions in question 6 would you predict to be **diamagnetic** and which **paramagnetic**?
8. What would you predict to be the atomic number of the noble gas of the **seventh** period (as yet unknown)?
9. Classify each of the following elements as a **noble gas**, a **representative element**, a **transition element**, or an **inner transition element**.
(a) Ca (b) Co (c) Cl (d) Ce (e) Xe
10. Which of these represent the electronic configuration of an excited atom?
(a) $1s^22s^22p^6$ (b) $1s^22s^13s^1$ (c) $1s^22s^22p^23s^1$ (d) $1s^22s^14d^1$
11. Given the following sets of electron quantum numbers, indicate those which could not occur and explain your answer.
(a) $2,2,1,+\frac{1}{2}$ (b) $3,3,2,+\frac{1}{2}$ (c) $4,0,2,+\frac{1}{2}$ (d) $3,2,0,-\frac{1}{2}$ (e) $1,0,0,1$
12. Which of the following represent atoms in ground states, excited states, or are impossible?
(a) $1s^22s^2$ (b) $1s^22s^23s^1$ (c) $[\text{Ne}]3s^23p^84s^1$ (d) $[\text{He}]2s^22p^62d^2$ (e) $[\text{Ar}]4s^23d^3$ (f) $[\text{Ne}]3s^23p^54s^1$