ANSWERS TO PROBLEM SET ON PERIODIC PROPERTIES

1. (a) Bi (b) Sn (c) Ga (d) As (e) Cs (f) Mn (g) Ca (h) Sb

2. (a) Ar (b) Ar (c) Sr (d) Ba (e) Cl (f) Cl (g) Mg (h) Rb

3. The first ionization energy of non-metals is **greater** than for metals.
Atomic radii of metals is **larger** than for non-metals.

4. The extra electron repulsion in the doubly occupied 2*p* orbital of the oxygen atom lowers the first ionization energy.

5. See your textbook.

6. (a) Na (b) Ar (c) Na (d) Cl (e) Ar (f) 3 (Na,Mg,Al) (g) ***s***-block (Na, Mg) and ***p***-block (Al to Ar)

7. (Smallest) Be^{2+}, Mg^{2+}, Na^{+}, F^{-}, Cl^{-}, S^{2-} (Largest)

8. $Mg^{2+}(1s^22s^22p^6)$ $Cr^{2+}(1s^22s^22p^63s^23p^63d^4)$ $Co^{2+}(1s^22s^22p^63s^23p^63d^7)$
$Ag^{+}(1s^22s^22p^63s^23p^63d^{10}4s^24p^64d^{10})$ $I^{-}(1s^22s^22p^63s^23p^63d^{10}4s^24p^64d^{10}5s^25p^6)$

9. Mg^{2+} (0 unpaired) and diamagnetic
Cr^{2+} (4 unpaired) and paramagnetic
Co^{2+} (3 unpaired) and paramagnetic
Ag^{+} (0 unpaired) and diamagnetic
I^{-} (0 unpaired) and diamagentic

10. (a) Br^{-} and Rb^{+} (b) Ga^{+} and Ge^{2+} (c) Cu^{+} and Ga^{3+} (d) Na^{+} and F^{-} (e) K^{+} and Cl^{-}

11. s^2 ions (Li^{+} and H^{-}); s^2p^6 ions (Na^{+}, Mg^{2+}, F^{-}, O^{2-}, N^{3-}); d^{10} ions (Cu^{+}, Zn^{2+}, Ag^{+}, Cd^{2+}); $d^{10}s^2$ ions (In^{+}, Sn^{2+}, As^{3+}, Pb^{2+}, Tl^{+})

12. (a) Cs^{+} (b) S^{2-} (c) S^{2-} (d) Cr^{2+} (e) Ag^{+} (f) Br^{-} (g) O^{2-} (h) Cs (i) In^{+}

13. Na_2O, NaCl, Na_3PO_4, Na_2SO_4, $Na_2Cr_2O_7$
MgO, $MgCl_2$, $Mg_3(PO_4)_2$, $MgSO_4$, $MgCr_2O_7$
Al_2O_3, $AlCl_3$, $AlPO_4$, $Al_2(SO_4)_3$, $Al_2(Cr_2O_7)_3$