3. Atomic Theory: Electronic Structure

Solutions to further problems:

1. The products are Fe and CO_2. The equation is not balanced.
2. $n = 2 \rightarrow n = 1$ because the gap between successive shells decreases as the shell number increases.
3. (a) C = $1s^2 2s^2 2p^2$ or using the inert gas core configuration [He] $2s^2 2p^2$
   (b) P = $1s^2 2s^2 2p^6 3s^2 3p^3$ [Ne] $3s^2 3p^3$
   (c) Ca = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ [He] $4s^2$
   (d) Zn = $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$ [Ar] $3d^{10} 4s^2$
   (e) Cr = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$ or $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2$ (Some of you might know that the actual configuraiton is $4s^1 3d^5$ but for IB you don't need to know that!) [Ar] $3d^4 4s^2$
   (f) Br^- = $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$ [Ar] $3d^{10} 4s^2 4p^6$
   (g) Na^+ = $1s^2 2s^2 2p^6$ [Ne]
4. For an electron in 1s orbital, the electron density is the greatest close to the nucleus. It means that the mostly likelihood of the electron in 1s being found is close to the nucleus.
5. Energy level 3.
6. 3d orbital (of lower energy than 4 p orbital).
7. (a) period 4 d-block elements (though they do have electrons in 4s subshell, a subshell in energy level 4 (n = 4), which may appear to be at a higher energy level than subshells in 3, 4s is NOT at a higher energy than 3d.)
   (b) period 3 p-block elements.
   (c) period 6 s-block elements.