1. A The oxidizing agent is reduced, i.e. receives electrons. Remember that this doesn't necessarily mean complete electron transfer but rather transfer of electron control, where the more electronegative atom in a covalent bond is said to possess electron control and is assigned the electrons in redox terms.

2. C Chlorine, in sharing all of its seven electrons with the more electronegative oxygen, has lost them all.

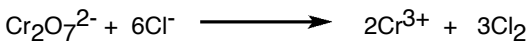
3. B Copper gains electron control through the reaction, its oxidation number decreases from +2 to 0, so "II" is correct.

4. A In most reactions with $O_2$ , the oxygen atoms wind up gaining electron control over electrons brought by less electronegative elements. In many reactions with $H_2$ hydrogen atoms lose electrron control to more electronegative atoms.

5. D Oxygen will leave off sharing electons with hydrogen to gain the more easy electrons of lithium, which is less electronegative than hydrogen.

6. B Manganese, which in $KMnO^4$, has an oxidation number of +7, will be reduced through the oxidation of another species.

7. A Balancing by oxidation number method begins by determining the change in oxidation states of all of the individual species in the reaction and then balancing the increase with the decrease. The oxidation number decrease (minus 6 total), in chromium, is balanced with the increase, in chlorine (+6), when the coefficients are as follows.



$$Cr_2O_7^{2-} + 6Cl^- \longrightarrow 2Cr^{3+} + 3Cl_2$$

8. C The nitrogen originally in ammonium will have been oxidized (-4 to 0 ), the nitrogen originally in nitrate will have been reduced (+4 to 0).

9. B Substances that are easily reduced are strong oxidizing agents.

10. A Oxidation always occurs at the anode, whether the cell is electrolytic or galvanic. The anode is positive in an electrolytic cell because an external voltage is being applied to draw the electrons out, which otherwise would not flow, the overall cell potential being negative.

11. C In a galvanic cell the electrons don't need to be pulled forcefully out from the anode and delivered to the cathode, as in the electrolytic cell. The electrons come on their own in the galvanic cell, so the anode is negative.

12. D In acqueous solution of sodium chloride under electrolysis, either chlorine or oxygen will be oxidized, losing its electrons to either sodium or hydrogen. Chlorine gives its electrons more readily than oxygen, and hydrogen receives electrons more readily than sodium. This process will produce sodium hydroxide solution.

13. B

14. D

15. A

16. A