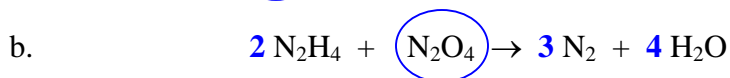
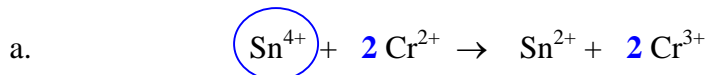


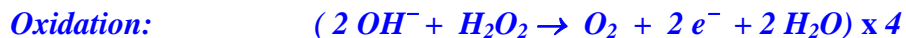
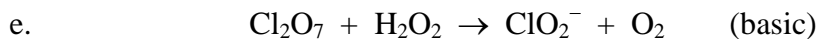
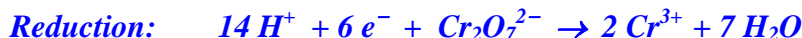
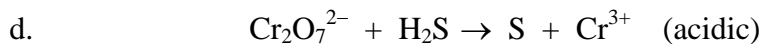
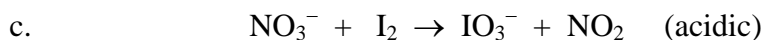
Chem 151 Help Session Handouts II (Fall 2009)
Balancing of Redox Reactions
(Answers)

1. Simple redox reactions can be balanced by inspection.

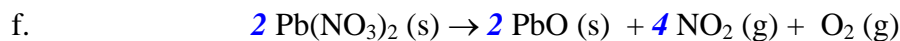
For the skeletal unbalanced reactions below, circle the oxidizing agents and balance the equation by inspection.



2. More complicated redox reactions occurring in an aqueous solution can be balanced using the systematic method outlined inside the box. Use the systematic method to balance the skeletal redox reactions (listed on the next two pages) occurring in aqueous medium as specified:



3. For redox reactions that do not occur in aqueous solution, one may **NOT** add H^+ , OH^- , or H_2O . In some situations, it is easier to balance the whole equation instead of splitting it into two half reactions.



- i. Use the changes of O.N. to identify the species that are oxidized and that are reduced.
- ii. Whether you balance the entire equation or split it into half-equations, always remember that the electrons lost (by oxygen in this case) must equal the electrons gained (by nitrogen).
- iii. How many electrons have been lost by oxygen when two oxygen atoms changes from NO_3^- to O_2 ?
- iv. How many nitrogen atoms must change from NO_3^- to NO_2 in order to balance the electrons lost by oxygen?

4. **Predicting products of a redox reaction needs knowledge of the chemical properties of the reactants.**

For the reaction described below,

- i. write a skeletal reaction equation
- ii. identify the oxidizing agent
- iii. balance the reaction

When a piece of copper metal is dropped into a beaker of dilute nitric acid, a gas (which later is identified as nitrogen monoxide) evolved and the solution turns blue gradually.

A blue solution hints the presence of Cu^{2+} ions. The unbalanced reaction equation is:



The oxidizing agent is NO_3^- (and the reducing agent is Cu).

Go through the steps described in Question 2 to obtain the balanced equation:

