

Name \_\_\_\_\_ Block: \_\_\_\_\_ Date: \_\_\_\_\_

Chemistry 12  
**BALANCING REDOX HALF-REACTIONS**

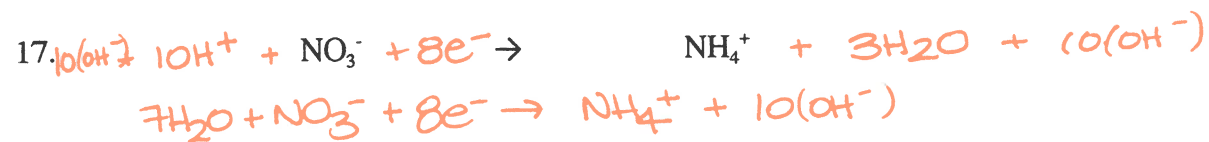
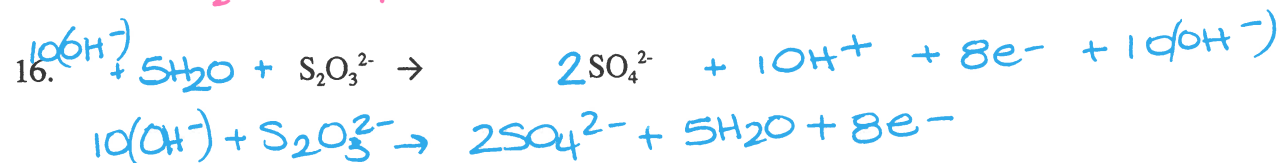
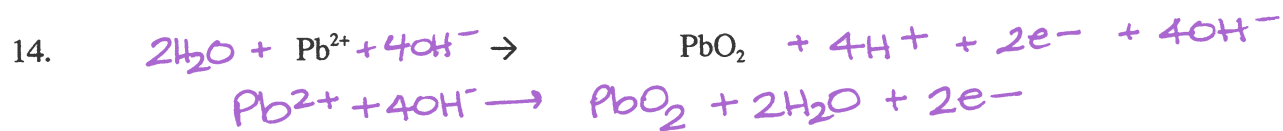
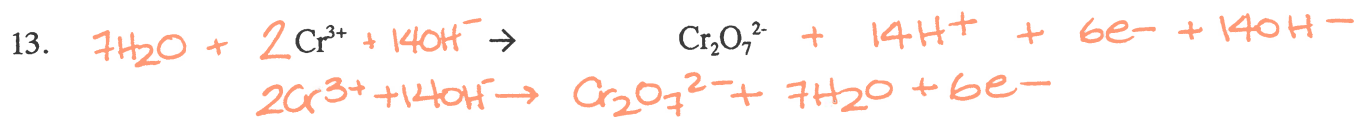
KEY

Balance each of the following half-cell reactions in ACIDIC solution. Also, state whether the reaction is oxidation or reduction.

1.  $5\text{H}_2\text{O} + \text{S}_2\text{O}_3^{2-} \rightarrow 2\text{SO}_4^{2-} + 10\text{H}^+ + 8\text{e}^-$  oxidation
2.  $8\text{H}^+ + \text{MnO}_4^- + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$  - reduction
3.  $4\text{H}_2\text{O} + \text{As} \rightarrow \text{AsO}_4^{3-} + 8\text{H}^+ + 5\text{e}^-$  oxidation
4.  $7\text{H}_2\text{O} + 2\text{Cr}^{3+} \rightarrow \text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^-$  oxidation
5.  $2\text{H}_2\text{O} + \text{Pb}^{2+} \rightarrow \text{PbO}_2 + 4\text{H}^+ + 2\text{e}^-$  oxidation
6.  $8\text{H}^+ + \text{SO}_4^{2-} + 6\text{e}^- \rightarrow \text{S} + 4\text{H}_2\text{O}$  reduction
7.  $4\text{H}^+ + \text{NO}_3^- + 3\text{e}^- \rightarrow \text{NO} + 2\text{H}_2\text{O}$  reduction
8.  $10\text{H}^+ + \text{NO}_3^- + 8\text{e}^- \rightarrow \text{NH}_4^+ + 3\text{H}_2\text{O}$  reduction
9.  $12\text{H}^+ + 2\text{BrO}_3^- + 10\text{e}^- \rightarrow \text{Br}_2 + 6\text{H}_2\text{O}$  reduction

Balance each of the following half-cell reactions in BASIC solution.

10.  $4\text{OH}^- + 4\text{H}^+ + \text{NO}_3^- + 3\text{e}^- \rightarrow \text{NO} + 2\text{H}_2\text{O} + 4\text{OH}^-$   
 $2\text{H}_2\text{O} + \text{NO}_3^- + 3\text{e}^- \rightarrow \text{NO} + 4\text{OH}^-$
11.  $8\text{OH}^- + 8\text{H}^+ + \text{MnO}_4^- + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O} + 8\text{OH}^-$   
 $4\text{H}_2\text{O} + \text{MnO}_4^- + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 8\text{OH}^-$
12.  $4\text{H}_2\text{O} + \text{As} + 8\text{OH}^- \rightarrow \text{AsO}_4^{3-} + 8\text{H}^+ + 5\text{e}^- + 8\text{OH}^-$   
 $\text{As} + 8\text{OH}^- \rightarrow \text{AsO}_4^{3-} + 4\text{H}_2\text{O} + 5\text{e}^-$



19. Determine if each of the following changes is oxidation, reduction or neither.

