

## REDOX VARIATIONS:

1. Specify which of the following are redox rxns, and identify the oxidizing agent, the reducing agent, the substance being oxidized and the substance being reduced.

- $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
- $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g})$
- $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 2\text{OH}^-(\text{aq}) \rightarrow 2\text{CrO}_4^{2-}(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- $\text{O}_3(\text{g}) + \text{NO}(\text{g}) \rightarrow \text{O}_2(\text{g}) + \text{NO}_2(\text{g})$
- $2\text{H}_2\text{O}_2(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$
- $2\text{CuCl}(\text{aq}) \rightarrow \text{CuCl}_2(\text{aq}) + \text{Cu}(\text{s})$

2. Specify which of the following are redox rxns, and identify the oxidizing agent, the reducing agent, the substance being oxidized and the substance being reduced.

- $\text{Cu}(\text{s}) + 2\text{Ag}^+(\text{aq}) \rightarrow 2\text{Ag}(\text{s}) + \text{Cu}^{2+}(\text{aq})$
- $\text{HCl}(\text{g}) + \text{NH}_3(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$
- $\text{SiCl}_4(\text{l}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 4\text{HCl}(\text{aq}) + \text{SiO}_2(\text{s})$
- $\text{SiCl}_4(\text{l}) + 2\text{Mg}(\text{s}) \rightarrow 2\text{MgCl}_2(\text{s}) + \text{Si}(\text{s})$
- $\text{Al}(\text{OH})_4^-(\text{aq}) \rightarrow \text{AlO}_2^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$

## ANSWER KEY TO REDOX VARIATIONS:

1.

- Yes, Redox. C in methane is Oxidized.  $\text{O}_2$  is reduced. O is the oxidizer. C is the reducer.
- Yes, Redox. Zn is oxidized. H in acid is reduced. Zn is the reducer. H is the oxidizer.
- Not Redox.
- Yes, Redox. N in NO is oxidized. Some of the O in  $\text{O}_3$  is reduced. N is the reducer.  $\text{O}_3$  is the oxidizer.
- Yes, Redox. O in peroxide is simultaneously oxidized and reduced so it is also the oxidizer and the reducer.
- Yes, Redox. Cu in CuCl is simultaneously oxidized and reduced so it is also the oxidizer and the reducer.

2.

- Yes, Redox. Cu is being oxidized.  $\text{Ag}^+$  is being reduced.
- Not Redox.
- Not Redox.
- Si in  $\text{SiCl}_4$  is reduced. Mg is oxidized. Si is the oxidizer. Mg is the reducer.
- Not Redox.

## REDOX PRACTICE PROBLEMS (IN ACID BASE MEDIA)

1. Balance the following oxidation-reduction reactions that occur in acidic solution using the half-reaction method.

- $\text{Cu}(\text{s}) + \text{NO}_3^-(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + \text{NO}(\text{g})$
- $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{Cr}^{3+} + \text{Cl}_2(\text{g})$
- $\text{Pb}(\text{s}) + \text{PbO}_2(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{PbSO}_4(\text{s})$
- $\text{Mn}^{2+}(\text{aq}) + \text{NaBiO}_3(\text{s}) \rightarrow \text{Bi}^{3+}(\text{aq}) + \text{MnO}_4^-(\text{aq})$
- $\text{H}_3\text{AsO}_4(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{AsH}_3(\text{g}) + \text{Zn}^{2+}(\text{aq})$

2. Balance the following oxidation-reduction reactions that occur in basic solution using the half-reaction method.

- $\text{Al}(\text{s}) + \text{MnO}_4^- \rightarrow \text{MnO}_2(\text{s}) + \text{Al}(\text{OH})_4^-(\text{aq})$
- $\text{Cl}_2(\text{g}) \rightarrow \text{Cl}^-(\text{aq}) + \text{OCl}^-(\text{aq})$
- $\text{NO}_2^-(\text{aq}) + \text{Al}(\text{s}) \rightarrow \text{NH}_3(\text{g}) + \text{AlO}_2^-(\text{aq})$

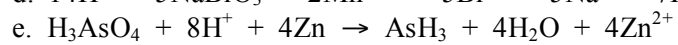
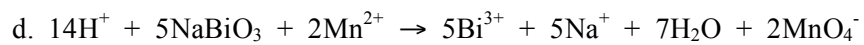
3. Balance the following oxidation-reduction reactions that occur in basic solution using the half-reaction method.

- $\text{Cr}(\text{s}) + \text{CrO}_4^{2-}(\text{aq}) \rightarrow \text{Cr}(\text{OH})_3(\text{s})$
- $\text{MnO}_4^-(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{MnS}(\text{s}) + \text{S}(\text{s})$

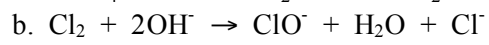
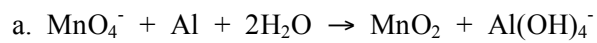
## ANSWER KEY FOR REDOX PRACTICE PROBLEMS (IN ACID BASE MEDIA)

1.

- $8\text{H}^+ + 2\text{NO}_3^- + 3\text{Cu} \rightarrow 2\text{NO} + 4\text{H}_2\text{O} + 3\text{Cu}^{2+}$
- $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Cl}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O} + 3\text{Cl}_2$
- $\text{PbO}_2 + \text{Pb} + 4\text{H}^+ + 2\text{SO}_4^{2-} \rightarrow 2\text{PbSO}_4 + 2\text{H}_2\text{O}$



2.



3.

