

Problem Set 3.1

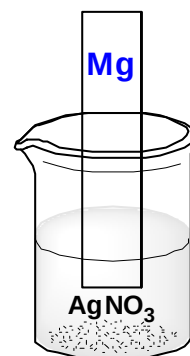
Oxidation-Reduction and Balancing redox reaction

- 1) Give the oxidation number of phosphorus in the following:
 1.1) $\text{H}_2\text{P}_2\text{O}_7^{2-}$ 1.2) PH_4^+ 1.3) PCl_5 2.4) H_3PO_4
- 2) Give the oxidation number of bromine in the following:
 2.1) KBr 2.2) BrF_3 2.3) HBrO_3 2.4) CBr_4
- 3) Magnesium ribbon is added into the silver nitrate solution. Solid silver is formed as shown in the scheme below;

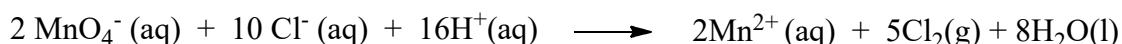
- (a) The oxidizing agent (species that is reduced) is _____
- (b) The reducing agent (species that is oxidized) is _____
- (c) write the oxidation reaction

- (d) write the reduction reaction

- (e) write the Redox reaction



- 4) Consider the following balanced redox reaction



- (a) Which species is being oxidized?
 - (b) Which species is being reduced?
 - (c) Which species is the oxidizing agent?
 - (d) Which species is the reducing agent?
 - (e) From which species to which does electron transfer occur?
- 5) Balance the following skeleton reactions and identify the oxidizing and reducing agents:

- (a) $\text{As}_4\text{O}_6 (\text{s}) + \text{MnO}_4^- (\text{aq}) \longrightarrow \text{AsO}_4^{3-} (\text{aq}) + \text{Mn}^{2+} (\text{aq})$ [acidic]
- (b) $\text{P}_4 (\text{s}) \longrightarrow \text{HPO}_3^{2-} (\text{aq}) + \text{PH}_3 (\text{g})$ [acidic]
- (c) $\text{MnO}_4^- (\text{aq}) + \text{CN}^- (\text{aq}) \longrightarrow \text{MnO}_2 (\text{s}) + \text{CNO}^- (\text{aq})$ [basic]
- (d) $\text{SO}_3^{2-} (\text{aq}) + \text{Cl}_2 (\text{g}) \longrightarrow \text{SO}_4^{2-} (\text{aq}) + \text{Cl}^- (\text{aq})$ [basic]
- (e) $\text{Fe}(\text{CN})_6^{3-} (\text{aq}) + \text{Re} (\text{s}) \longrightarrow \text{Fe}(\text{CN})_6^{4-} (\text{aq}) + \text{ReO}_4^-$ [basic]
- (f) $\text{H}_2\text{S} (\text{g}) + \text{NO}_3^- (\text{aq}) \longrightarrow \text{S}_8 (\text{s}) + \text{NO} (\text{g})$ [acidic]