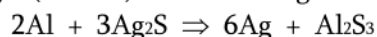


## II) Oxidizing Agents & Reducing Agents

April 30, 2018 8:28 PM

Silverware (silver metal) reacts with  $H_2S$  that is present in trace amounts in air to produce  $Ag_2S$  (tarnish). The cleaning of silverware is a redox reaction:



\*This reaction requires heat to attain  $E_0$  and water to act as an electron transfer medium. Thus, the silverware is placed into a pan of water which is lined with aluminum foil and then heated in the oven.

Oxidation half-reaction:

\*Remember, oxidation is a loss of electrons, so electrons will be a product

Reduction half-reaction:

\*Reduction is a gain of electrons, so electrons will be a reactant

Balance electrons to create the net redox reaction:

Notice that the electrons are not part of the net reaction, as they have been transferred from one substance to the other.

$OIL$   $RIG$  <sup>loss  $e^-$</sup>  <sup>gain  $e^-$</sup>

### II) Oxidizing Agents and Reducing Agents

An **oxidizing agent** is a substance that oxidize another substance.

Therefore, the **oxidizing agent itself** undergoes reduction (gain  $e^-$ )

What was the **oxidizing agent** in the previous example?  $Ag^+$  ( $Ag^+$  ... not  $Ag$  ... b/c it is  $Ag^+$  that gains the  $e^-$ )

A **reducing agent** is a substance that reduces another substance. (cause the other to gain  $e^-$ )

Therefore, the **reducing agent itself** undergoes oxidation (lose  $e^-$ )

What was the **reducing agent** in the previous example?  $Al$  ( $Al$  ... not  $Al^{3+}$  ... b/c  $Al$  that loses  $3e^-$  to become  $Al^{3+}$ )

4

$OIL - loss\ of\ e^-$   $RIG - gain\ e^-$

Practice Questions: For each of the following reactants, give the

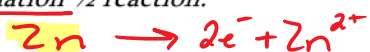
OIL - loss of  $e^-$     RIG - gain  $e^-$

Practice Questions: For each of the following reactants, give the

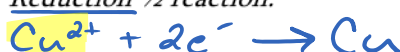
- a) oxidation half-reaction
- b) reduction half-reaction
- c) balanced redox reaction
- d) oxidizing agent
- e) reducing agent

1) Zn and  $Cu^{2+}$

Oxidation  $\frac{1}{2}$  reaction:



Reduction  $\frac{1}{2}$  reaction:



Balanced redox:



Oxidizing agent:



Reducing agent:



causes the other atom to oxidize. (itself = reduce)

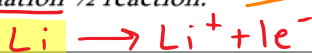
causing the other atom to reduce (itself = oxidizing)

usually going to be the  $\oplus$  ion

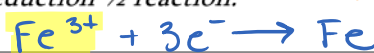
if  $e^-$  are balanced, they cancelled.

2) Li and  $Fe^{3+}$

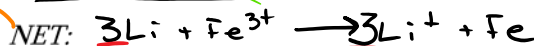
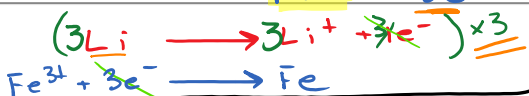
Oxidation  $\frac{1}{2}$  reaction:



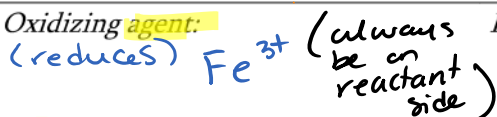
Reduction  $\frac{1}{2}$  reaction:



Balanced redox:



Oxidizing agent:

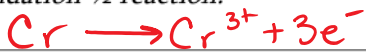


Reducing agent:

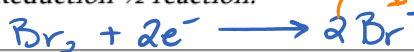


3)  $Br_2$  and Cr to produce  $2Br^-$  and  $Cr^{3+}$

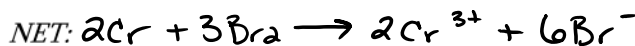
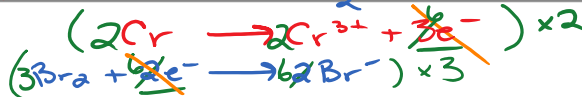
Oxidation  $\frac{1}{2}$  reaction:



Reduction  $\frac{1}{2}$  reaction:



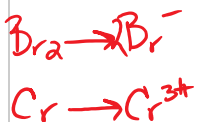
Balanced redox:



Oxidizing agent:



Reducing agent:



gain  $e^-$

cancel  $e^-$



Assignment 1: Read Hebden p.190 (start at 'Definitions') & 191 and do p.192 #1&2