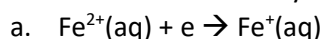


Lesson 1 – oxidation, reduction and redox reactions.

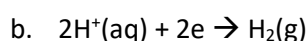
1. For each of the following reactions indicate the following:

- type of reaction
- identify the reductant or oxidant
- identify the conjugate.

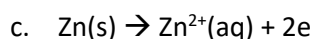
The first one is done for you.



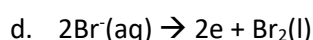
- type of reaction = reduction (electrons are used to reduce the charge on the oxidant)
- Oxidant is  $\text{Fe}^{2+}(\text{aq})$  (it accepts electrons)
- Conjugate reductant =  $\text{Fe}^+(\text{aq})$



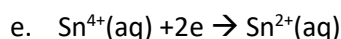
- type of reaction = *reduction (electrons are being used to reduce the oxidation number of  $\text{H}^+$  to zero)*
- identify the reductant or oxidant =  *$\text{H}^+(\text{aq})$  is the oxidant (it accepts electrons)*
- identify the conjugate =  *$\text{H}_2(\text{g})$  is the conjugate reductant*



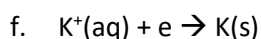
- type of reaction = *oxidation (electrons are being lost to increase the oxidation number of Zn from zero to 2+)*
- identify the reductant or oxidant =  *$\text{Zn}(\text{s})$  is a reductant (it gives away electrons)*
- identify the conjugate =  *$\text{Zn}^{2+}(\text{aq})$  conjugate oxidant*



- type of reaction = *oxidation (electrons are being lost to increase the oxidation number of  $\text{Br}^-$  from -1 to 0)*
- identify the reductant or oxidant =  *$\text{Br}^-(\text{aq})$  is a reductant (it gives away electrons)*
- identify the conjugate =  *$\text{Br}_2(\text{l})$  conjugate oxidant*



- type of reaction = *reduction (electrons are being used to decrease the oxidation number of  $\text{Sn}^{4+}$  from 4+ to 2+)*
- identify the reductant or oxidant =  *$\text{Sn}^{4+}(\text{aq})$  is an oxidant (it accepts electrons)*
- identify the conjugate =  *$\text{Sn}^{2+}(\text{aq})$  conjugate reductant*



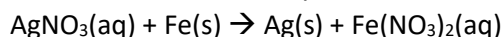
- type of reaction = *reduction (electrons are being used to decrease the oxidation number of  $\text{K}^+$  from 1+ to 0)*
- identify the reductant or oxidant =  *$\text{K}^+(\text{aq})$  is an oxidant (it accepts electrons)*
- identify the conjugate =  *$\text{K}(\text{s})$  is the conjugate reductant*



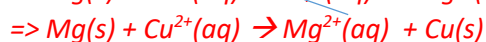
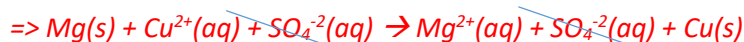
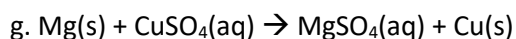
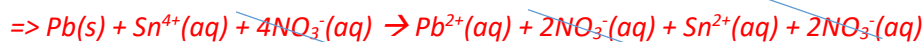
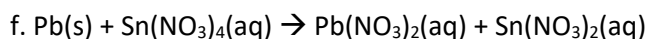
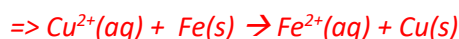
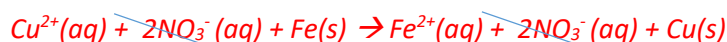
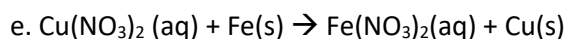
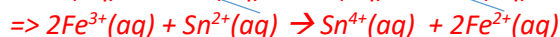
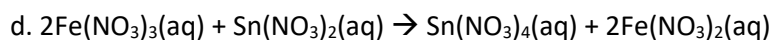
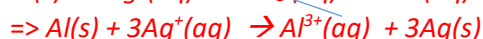
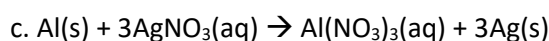
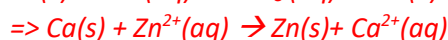
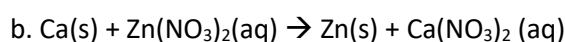
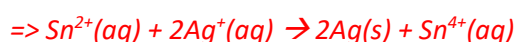
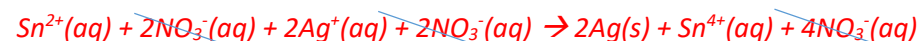
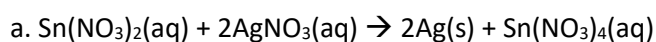
- type of reaction = *Oxidation (electrons are being lost to increase the oxidation number of  $\text{Mn}(\text{s})$  from 0 to 2+)*
- identify the reductant or oxidant =  *$\text{Mn}(\text{s})$  is a reductant (it donates electrons)*
- identify the conjugate =  *$\text{Mn}^{2+}(\text{aq})$  conjugate oxidant*

2. Consider the following balanced equations representing different redox reactions.  
Write the balanced ionic equations for each.

The first one is done for you.



*Make sure all ionic equations are balanced for charge and elements.*



3. For each ionic equation mentioned in question 2. Identify the :

i. reductant and its conjugate

ii. Oxidant and its conjugate

The first one is done for you

Don't forget look for the:

- species that accepts electrons to decrease in oxidation number (charge number)- that is the oxidant

- species that donates electrons to increase in oxidation number - that is the reductant



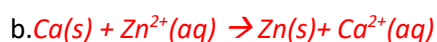
$\text{Ag}^+(\text{aq})$  (oxidant) /  $\text{Ag}(\text{s})$  (conjugate reductant)

$\text{Fe}(\text{s})$  (reductant) /  $\text{Fe}^{2+}(\text{aq})$  (conjugate oxidant)



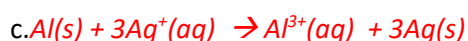
$\text{Ag}^+(\text{aq})$  (oxidant) /  $\text{Ag}(\text{s})$  (conjugate reductant)

$\text{Sn}^{2+}(\text{aq})$  (reductant) /  $\text{Sn}^{4+}(\text{aq})$  (conjugate oxidant)



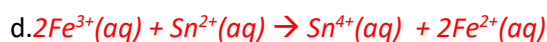
$\text{Zn}^{2+}(\text{aq})$  (oxidant) /  $\text{Zn}(\text{s})$  (conjugate reductant)

$\text{Ca}(\text{s})$  (reductant) /  $\text{Ca}^{2+}(\text{aq})$  (conjugate oxidant)



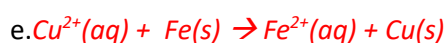
$\text{Ag}^+(\text{aq})$  (oxidant) /  $\text{Ag}(\text{s})$  (conjugate reductant)

$\text{Al}(\text{s})$  (reductant) /  $\text{Al}^{3+}(\text{aq})$  (conjugate oxidant)



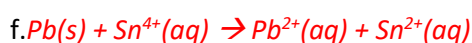
$\text{Sn}^{2+}(\text{aq})$  (oxidant) /  $\text{Sn}^{4+}(\text{aq})$  (conjugate reductant)

$\text{Fe}^{3+}(\text{aq})$  (reductant) /  $\text{Fe}^{2+}(\text{aq})$  (conjugate oxidant)



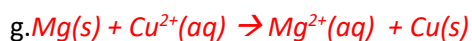
$\text{Cu}^{2+}(\text{aq})$  (oxidant) /  $\text{Cu}(\text{s})$  (conjugate reductant)

$\text{Fe}(\text{s})$  (reductant) /  $\text{Fe}^{2+}(\text{aq})$  (conjugate oxidant)



$\text{Sn}^{4+}(\text{aq})$  (oxidant) /  $\text{Sn}^{2+}(\text{aq})$  (conjugate reductant)

$\text{Pb}(\text{s})$  (reductant) /  $\text{Pb}^{2+}(\text{aq})$  (conjugate oxidant)



$\text{Cu}^{2+}(\text{aq})$  (oxidant) /  $\text{Cu}(\text{s})$  (conjugate reductant)

$\text{Mg}(\text{s})$  (reductant) /  $\text{Mg}^{2+}(\text{aq})$  (conjugate oxidant)

4. Write the balanced equations for the oxidation and reduction half reactions for the balanced redox reactions that you have derived in q2. above. The first one is done for you.



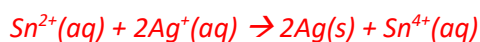
$\text{Ag}^+(\text{aq})$  (oxidant) /  $\text{Ag}(\text{s})$  (conjugate reductant)

$\text{Fe}(\text{s})$  (reductant) /  $\text{Fe}^{2+}(\text{aq})$  (conjugate oxidant)

Oxidation  $\text{Fe}(\text{s}) \rightarrow \text{Fe}^{2+}(\text{aq}) + 2\text{e}$

Reduction--  $\text{Ag}^+(\text{aq}) + \text{e} \rightarrow \text{Ag}(\text{s})$

a.

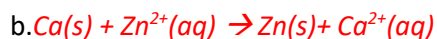


$\text{Ag}^+(\text{aq})$  (oxidant) /  $\text{Ag}(\text{s})$  (conjugate reductant)

$\text{Sn}^{2+}(\text{aq})$  (reductant) /  $\text{Sn}^{4+}(\text{aq})$  (conjugate oxidant)

Reduction--  $\text{Ag}^+(\text{aq}) + \text{e} \rightarrow \text{Ag}(\text{s})$

Oxidation--  $\text{Sn}^{2+}(\text{aq}) \rightarrow \text{Sn}^{4+}(\text{aq}) + 2\text{e}$



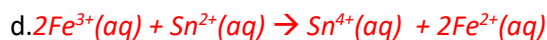
Reduction--  $\text{Zn}^{2+}(\text{aq}) + 2\text{e} \rightarrow \text{Zn}(\text{s})$

Oxidation--  $\text{Ca}(\text{s}) \rightarrow \text{Ca}^{2+}(\text{aq}) + 2\text{e}$



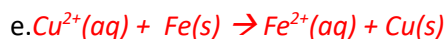
Reduction--  $\text{Ag}^+(\text{aq}) + \text{e} \rightarrow \text{Ag}(\text{s})$

Oxidation--  $\text{Al}(\text{s}) \rightarrow \text{Al}^{3+}(\text{aq}) + 3\text{e}$



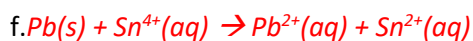
Oxidation--  $\text{Sn}^{2+}(\text{aq}) \rightarrow \text{Sn}^{4+}(\text{aq}) + 2\text{e}$

Reduction--  $\text{Fe}^{3+}(\text{aq}) + \text{e} \rightarrow \text{Fe}^{2+}(\text{aq})$



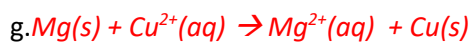
Reduction--  $\text{Cu}^{2+}(\text{aq}) + 2\text{e} \rightarrow \text{Cu}(\text{s})$

Oxidation--  $\text{Fe}(\text{s}) \rightarrow \text{Fe}^{2+}(\text{aq}) + 2\text{e}$



Reduction--  $\text{Sn}^{4+}(\text{aq}) + 2\text{e} \rightarrow \text{Sn}^{2+}(\text{aq})$

Oxidation--  $\text{Pb}(\text{s}) \rightarrow \text{Pb}^{2+}(\text{aq}) + 2\text{e}$



Reduction--  $\text{Cu}^{2+}(\text{aq}) + 2\text{e} \rightarrow \text{Cu}(\text{s})$

Oxidation--  $\text{Mg}(\text{s}) \rightarrow \text{Mg}^{2+}(\text{aq}) + 2\text{e}$