

What is Oxidation?

Where does the name come from?

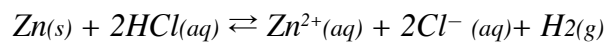
What is Reduction?

Where does the name come from?

What is a redox reaction?

Oxidizing Agent

Reducing agent



How can we know if something is being oxidized or reduced?

Oxidation Numbers

The imaginary charge an atom would have if the shared electrons were divided equally between identical atoms bonded covalently to each other.

Rules for assigning oxidation numbers:

1)

2)

3)

4)

5)

Assign Oxidation numbers to bromine in the following species:

Br^- _____ BrO_4^- _____

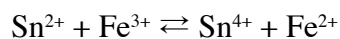
BrO^- _____ Br_2 _____

BrO_2^- _____ NaBr _____

BrO_3^- _____ KBrO _____

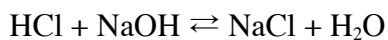
Which of the following are oxidation-reduction reactions?

Identify how each species is changing and the agents involved in the change.



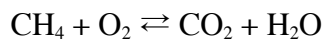
Oxidized _____ *Oxidizing Agent* _____

Reduced _____ *Reducing Agent* _____



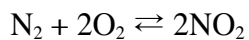
Oxidized _____ *Oxidizing Agent* _____

Reduced _____ *Reducing Agent* _____



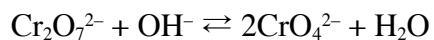
Oxidized _____ *Oxidizing Agent* _____

Reduced _____ *Reducing Agent* _____



Oxidized _____ *Oxidizing Agent* _____

Reduced _____ *Reducing Agent* _____



Oxidized _____ *Oxidizing Agent* _____

Reduced _____ *Reducing Agent* _____

Rules for Balancing Redox Equations in Acid

1)

2)

3)

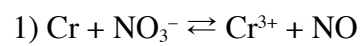
4)

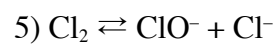
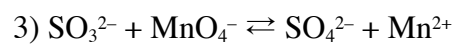
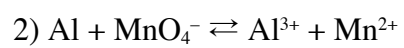
5)

6)

7)

Balance the following redox equations in acid:





Rules for Balancing Redox Equations in base

1)

2)

3)

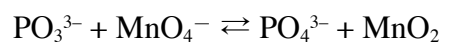
4)

5)

6)

7)

Balance the following redox equation in base:



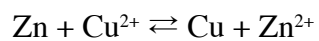
Electrochemical Cells

Any device in which a redox reaction occurs is an Electrochemical Cell

The Daniell Cell

	Left side	Right side
Half Reaction		
Change		
Electrode		
Charge on electrode		
Ion Flow from Salt Bridge		

What is the purpose of the salt bridge?



Standard Reduction Potentials @ 25°C

Half – Reaction			E° (Volts)
F ₂	+2e ⁻ →	2F ⁻	+ 2.87
H ₂ O ₂ + 2H ⁺	+2e ⁻ →	2H ₂ O	+ 1.77
4H ⁺ + SO ₄ ²⁻ + PbO ₂	+2e ⁻ →	PbSO ₄ + 2H ₂ O	+ 1.68
MnO ₄ ⁻ + 8H ⁺	+5e ⁻ →	Mn ²⁺ + 4H ₂ O	+ 1.52
Au ³⁺	+3e ⁻ →	Au	+ 1.50
Cl _{2(g)}	+2e ⁻ →	2Cl ⁻	+ 1.36
Cr ₂ O ₇ ²⁻ + 14H ⁺	+6e ⁻ →	2Cr ³⁺ + 7H ₂ O	+ 1.33
MnO ₂ + 4H ⁺	+2e ⁻ →	Mn ²⁺ + 2 H ₂ O	+ 1.28
1/2O _{2(g)} + 2H ⁺	+2e ⁻ →	H ₂ O	+ 1.23
Br _{2(l)}	+2e ⁻ →	2Br ⁻	+ 1.06
NO ₃ ⁻ + 4H ⁺	+3e ⁻ →	NO _(g) + 2 H ₂ O	+ 0.96
Ag ⁺	+ e ⁻ →	Ag	+ 0.80
NO ₃ ⁻ + 2H ⁺	+ e ⁻ →	NO _{2(g)} + H ₂ O	+ 0.78
Fe ³⁺	+ e ⁻ →	Fe ²⁺	+ 0.77
O _{2(g)} + 2H ⁺	+2e ⁻ →	H ₂ O ₂	+ 0.68
I ₂	+2e ⁻ →	2I ⁻	+ 0.53
Cu ⁺	+ e ⁻ →	Cu	+ 0.52
Cu ²⁺	+2e ⁻ →	Cu	+ 0.34
SO ₄ ²⁻ + 4H ⁺	+2e ⁻ →	SO _{2(g)} + 2H ₂ O	+ 0.17
Cu ²⁺	+ e ⁻ →	Cu ⁺	+ 0.15
Sn ⁴⁺	+2e ⁻ →	Sn ²⁺	+ 0.15
1/8S ₈ + 2H ⁺	+2e ⁻ →	H ₂ S _(g)	+ 0.14
2H ⁺	+2e ⁻ →	H _{2(g)}	0.00
Pb ²⁺	+2e ⁻ →	Pb	- 0.13
Sn ²⁺	+2e ⁻ →	Sn	- 0.14
Ni ²⁺	+2e ⁻ →	Ni	- 0.25
Co ²⁺	+2e ⁻ →	Co	- 0.28
PbSO ₄	+2e ⁻ →	Pb + SO ₄ ²⁻	- 0.36
Cr ³⁺	+ e ⁻ →	Cr ²⁺	- 0.41
Fe ²⁺	+2e ⁻ →	Fe	- 0.44
Ag ₂ S	+2e ⁻ →	2Ag + S ²⁻	- 0.69
Cr ³⁺	+3e ⁻ →	Cr	- 0.74
Zn ²⁺	+2e ⁻ →	Zn	- 0.76
2H ₂ O	+2e ⁻ →	H _{2(g)} + 2OH ⁻	- 0.83
Mn ²⁺	+2e ⁻ →	Mn	- 1.18
Al ³⁺	+3e ⁻ →	Al	- 1.66
Ti ²⁺	+2e ⁻ →	Ti	- 1.75
Mg ²⁺	+2e ⁻ →	Mg	- 2.37
Na ⁺	+ e ⁻ →	Na	- 2.71
Ca ²⁺	+2e ⁻ →	Ca	- 2.87
Sr ²⁺	+2e ⁻ →	Sr	- 2.89
Ba ²⁺	+2e ⁻ →	Ba	- 2.90
Cs ⁺	+ e ⁻ →	Cs	- 2.92
K ⁺	+ e ⁻ →	K	- 2.92
Li ⁺	+ e ⁻ →	Li	- 3.00