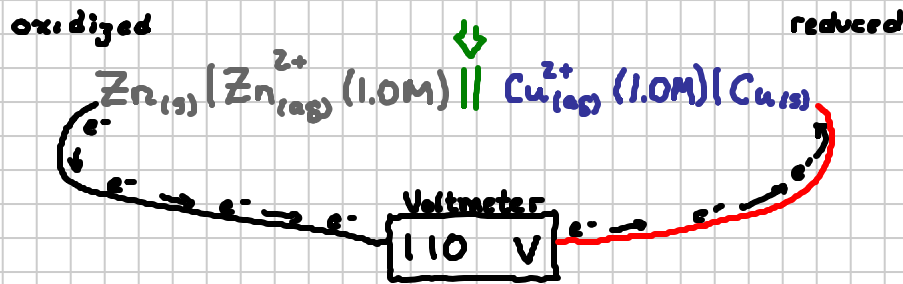


# Lecture 213 SHE and Standard Reduction Potentials

Note Title

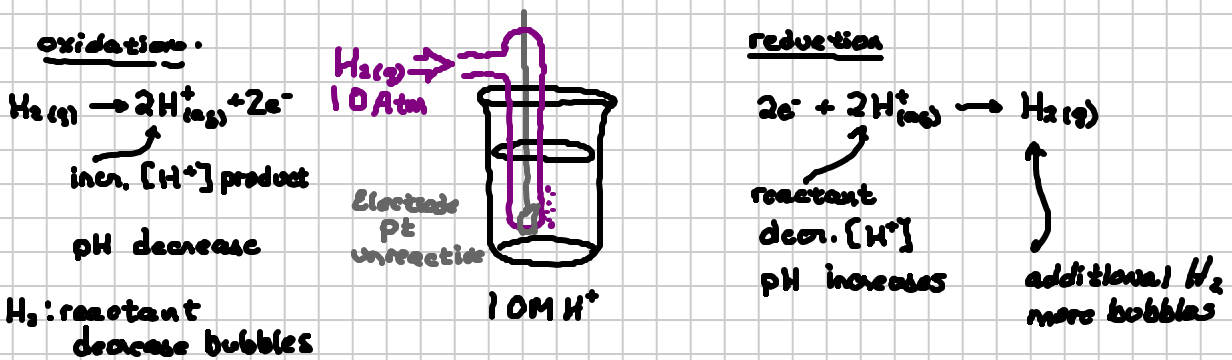
JJ\53\5011

Zn vs. Cu: Zn oxidized, Cu<sup>2+</sup> reduced

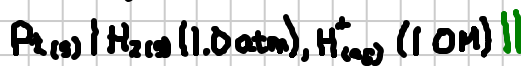


## Systematic Comparison: Standard Hydrogen Electrode S.H.E.

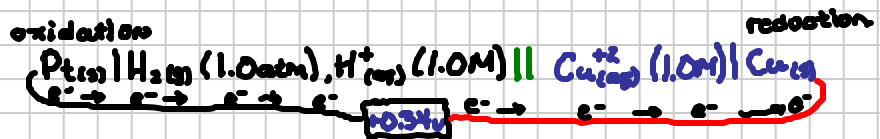
... compare other 1/2 cells



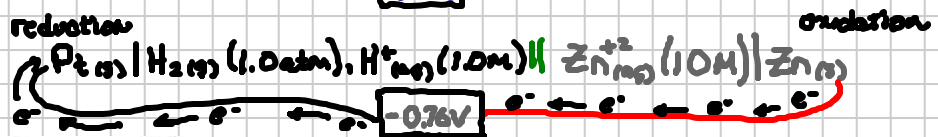
### Abbr Cell Diagram



Copper Vs SHE.



Zinc Vs SHE.



$O_2(g) + 2H_2O(l) + 4e^{-}$	$\rightarrow 4OH^{-}(aq)$	0.40
$Cu^{2+}(aq) + 2e^{-}$	$\rightarrow Cu(s)$	0.34
$SO_4^{2-}(aq) + 4H^{+}(aq) + 2e^{-}$	$\rightarrow H_2SO_4(aq) + H_2O(l)$	0.20
$Cu^{+}(aq) + e^{-}$	$\rightarrow Cu(s)$	0.16
$Sn^{4+}(aq) + 2e^{-}$	$\rightarrow Sn^{2+}(aq)$	0.15
$2H^{+}(aq) + 2e^{-}$	$\rightarrow H_2(g)$	0
$Fe^{3+}(aq) + 3e^{-}$	$\rightarrow Fe(s)$	-0.036
$Pb^{2+}(aq) + 2e^{-}$	$\rightarrow Pb(s)$	-0.13
$Sn^{2+}(aq) + 2e^{-}$	$\rightarrow Sn(s)$	-0.14
$Ni^{2+}(aq) + 2e^{-}$	$\rightarrow Ni(s)$	-0.23
$Cd^{2+}(aq) + 2e^{-}$	$\rightarrow Cd(s)$	-0.40
$Fe^{2+}(aq) + 2e^{-}$	$\rightarrow Fe(s)$	-0.45
$Cr^{3+}(aq) + e^{-}$	$\rightarrow Cr^{2+}(aq)$	-0.50
$Cr^{3+}(aq) + 3e^{-}$	$\rightarrow Cr(s)$	-0.73
$Zn^{2+}(aq) + 2e^{-}$	$\rightarrow Zn(s)$	-0.76
$2H_2O(l) + 2e^{-}$	$\rightarrow H_2(g) + 2OH^{-}(aq)$	-0.83

### Standard Reduction Potential

$E_{red}^{\circ} = 0.34V$   
Cu

$E_{red}^{\circ} = -0.76V$   
Zn

$E_{cell}^{\circ} = E_{cathode}^{\circ} - E_{anode}^{\circ}$   
reduction oxidation  
Cu Zn

$E_{cell}^{\circ} = 0.34V - (-0.76V) = 1.10V$