PSS

Corrosion and Standard Electrode Potential

The **potential difference** between an anode and a cathode can be measured by a voltage measuring device. The absolute potential of the anode and cathode cannot be measured directly. Defining a standard electrode, all other potential measurements can be made against this standard electrode. If the standard electrode potential is set to zero, the potential difference measured can be considered as the absolute potential.

Standard Hydrogen Electrode: The half-cell in which the hydrogen reaction takes place is called the Standard Hydrogen Electrode - SHE.

Standard Electrode Potential: The potential difference measured between metal M, and the Standard Hydrogen Electrode - SHE.

The electrochemical series consists of a list of metals which have been arranged in order of their standard electrode potentials.

Element	Electrode Potential (Volts)	Element	Electrode Potential (Volts)
Lithium	-3.04	Tin	-0.14
Rubidium	-2.92	Lead	-0.13
Potassium	-2.92	Hydrogen	+0.00
Calcium	-2.87	Copper	+0.34
Barium	-2.80	Iodine	+0.54
Sodium	-2.71	Silver	+0.80
Magnesium	-2.37	Gold	+0.80
Aluminum	-1.67	Mercury	+0.80
Magnesium	-2.34	Iodide	+0.54
Zinc	-0.76	Bromine	+1.07
Chromium	-0.74	Chlorine	+1.36
Iron	-0.44	Fluorine	+2.87
Nickel	-0.24		

IMPORTANT! Metals which are higher in the electrochemical series displace metals which are lower in the sequence, which means when connecting two metals, the metal with lowest potential will corrode.

A very common connection in piping systems is copper and iron/steel. In a connection like this iron/steel will corrode **many times faster** than iron/steel alone.

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