

Name: _____

Blk: _____ Date: _____

Chemistry 12
Electrochemistry Lesson #13 a
ELECTROPLATING and ELECTROREFINING

ELECTROPLATING is the process in which a metal is _____ or _____ at a "cathode".

The _____ is made out of the material receiving the _____

The _____ contains ions of metal which are to be _____ onto the CATHODE

The _____ is generally made of the metal that is to be _____, but it may also be an inert material. Ex:

Draw an illustration of a copper medallion being electroplated with Nickel:

Here the _____ is the CATHODE

At the ANODE oxidation is occurring, the oxidation reaction is:

At the Cathode reduction is occurring, the reduction reaction is:

The electrons always flow from _____ therefore the DC supply is hooked up to supply the _____ with electrons.

The **ELECTROPLATING SOLUTION** contains Ni^{2+} and NO_3^- so that:

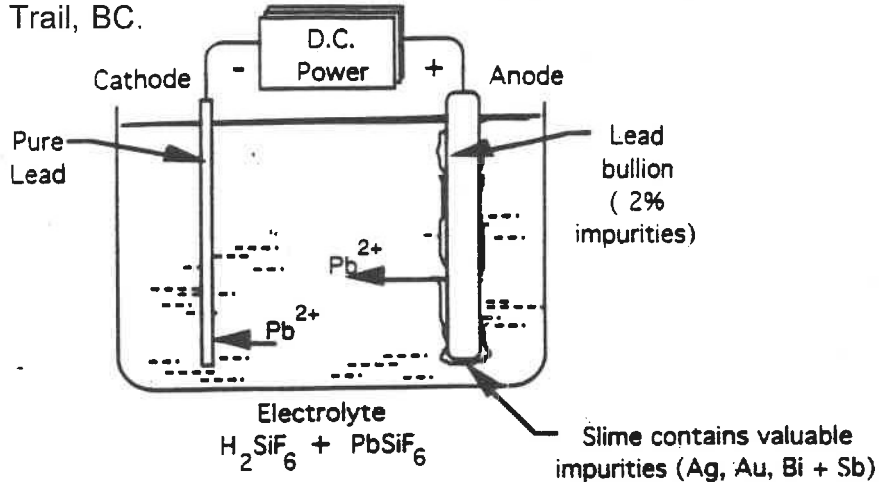
Ni^{2+} :

NO_3^- :

The **CATION** _____ is attracted to the _____ (s)

The **ANION** _____ is attracted to the _____ (s)

ELECTROREFINING is the process of _____
 Here is a cell that represents the electrorefining process used at Teck Cominco's lead refinery in Trail, BC.



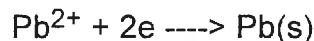
The **ANODE** reaction:



The reaction that prevails is for Pb(s). The reactions with LOWER E° values dissolve in solution. Those with HIGHER E° values do not oxidize but make up a Slime at the bottom of the electrolytic cell. Companies such as COMINCO sell the sludge for a profit (notice the presence of _____ and _____).

OXIDIZING AGENT	REDUCING AGENTS	E° (VOLTS)
$\text{Au}^{3+} + 3e^- \rightleftharpoons$	Au (s) These metals	1.42
$\text{Ag}^+ + e^- \rightleftharpoons$	Ag (s) do not	0.80
$\text{Cu}^{2+} + 2e^- \rightleftharpoons$	Cu (s) dissolve	0.34
$\text{Pb}^{2+} + 2e^- \rightleftharpoons$	Pb (s)	-0.13
$\text{Fe}^{2+} + 2e^- \rightleftharpoons$	Fe (s) These metals	-0.41
$\text{Zn}^{2+} + 2e^- \rightleftharpoons$	Zn (s) dissolve	-0.76

The **CATHODE** reaction:



The Pb^{2+} is present in larger amounts in the solution and has the highest E° value of all ions in solution, therefore it is reduced

OXIDIZING AGENT	REDUCING AGENTS	E° (VOLTS)
These metals are not present in the solution* $\text{Au}^{3+} + 3e^- \rightleftharpoons$	Au (s)	1.42
$\text{Ag}^+ + e^- \rightleftharpoons$	Ag (s)	0.80
$\text{Cu}^{2+} + 2e^- \rightleftharpoons$	Cu (s)	0.34
$\text{Pb}^{2+} + 2e^- \rightleftharpoons$	Pb (s)	-0.13
These metals are not deposited $\text{Fe}^{2+} + 2e^- \rightleftharpoons$	Fe (s)	-0.41
$\text{Zn}^{2+} + 2e^- \rightleftharpoons$	Zn (s)	-0.76

OVERALL REACTION:

HOMEWORK: READ PGS 243 - 246 do EXERCISES 73-74, 78-80

PLO's: W5-W7