Redox

Reduction: gain of e^-, charge ↓

$Cu^{2+} \rightarrow Cu^{+1}$

oxidation: Loss of e^-, charge ↑

$Al(s) \rightarrow Al^{3+}$

LEO — Loss Electrons Oxidation

GER — Gain Electrons Reduction

Check oxidation states

Has oxidation or red. occurred?

group 1 (Na, Li) .... +1

group 2 (Ca, Mg) .... +2

group 13 (Al) .... +3

Oxygen: -2

Hydrogen: +1

Noble gas: 0

* Sum of ox. states in compound = 0

Ex: NaCl

+1 -1 = 0 ✓

MgF_2

$+2 \quad (-1)2$

$+2 + -2 = 0$ ✓

$LiNO_3$

$+1 \quad x \quad (-2)3$

$1 + x + -6 = 0$

$x = 5$

Is this Redox?

$$\overset{0}{C} + \overset{0}{O_2} \rightarrow \overset{+4}{C}O_2$$

$(-2)2$

-4

$C^0 \rightarrow C^{+4}$

$O_2^0 \rightarrow O^{2-}$

Yes! There is a change in oxidation states

Always Redox:

- Decomposition
- Synthesis
- Single Replacement
- Combustion

> An element alone (charge zero) then in a compound on the other side

Half-Reactions

Show the change in charge + How many e^- have transferred.

$$Mg + \underline{Ag}Cl \rightarrow MgCl_2 + \underline{Ag}^0$$

① Which I has been Reduced (Ox # ↓)

Ag Red: $(Ag^{+1} + 1e^- \rightarrow Ag^0)2$

Mg Ox: $Mg^0 \rightarrow Mg^{2+} + 2e^-$

Balanced Rxn

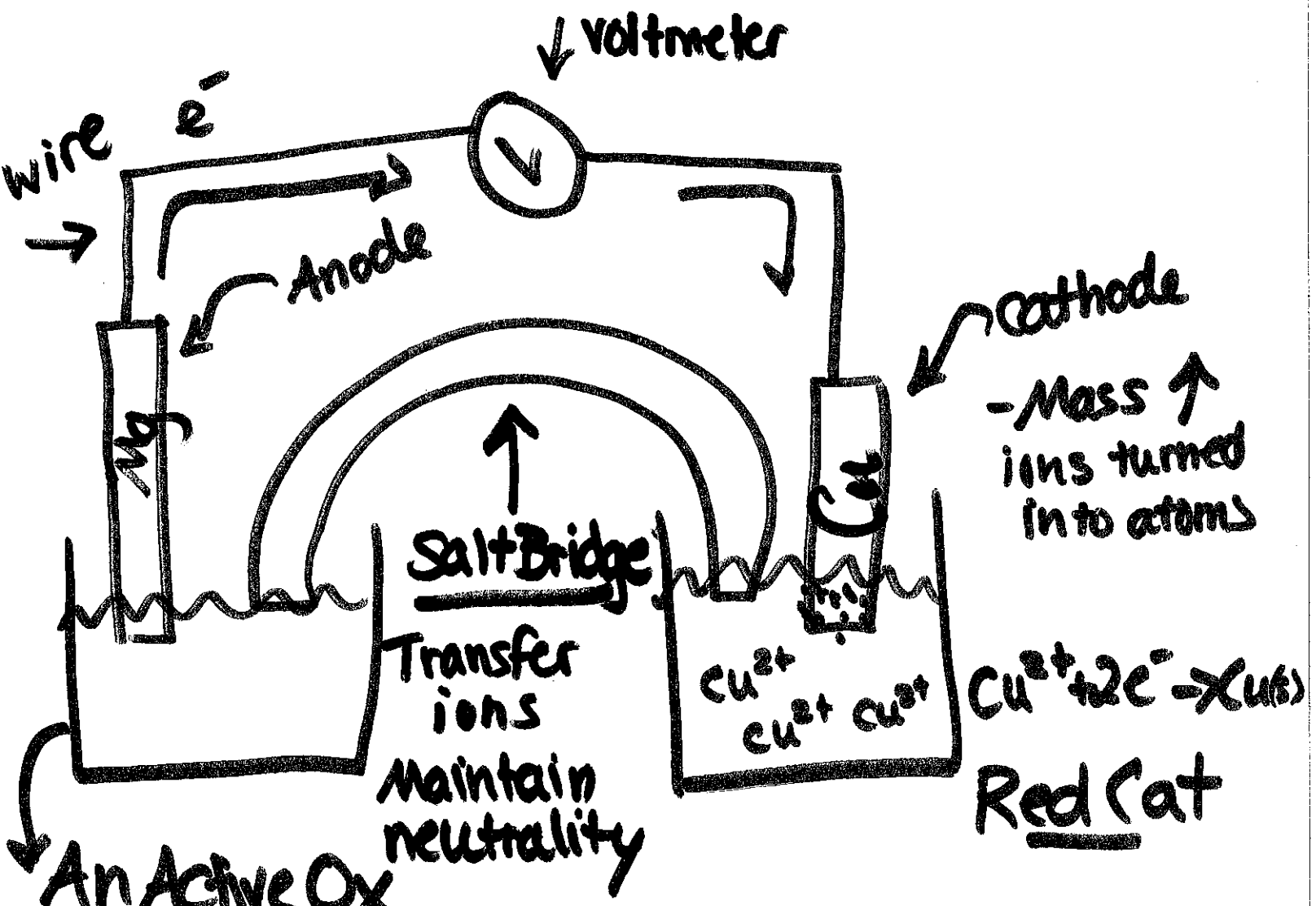
$Mg^0 \rightarrow Mg^{2+} + 2e^-$

$2Ag^{+1} + 2e^- \rightarrow 2Ag^0$

$$Mg^0 + 2Ag^{+1} \rightarrow Mg^{2+} + 2Ag$$

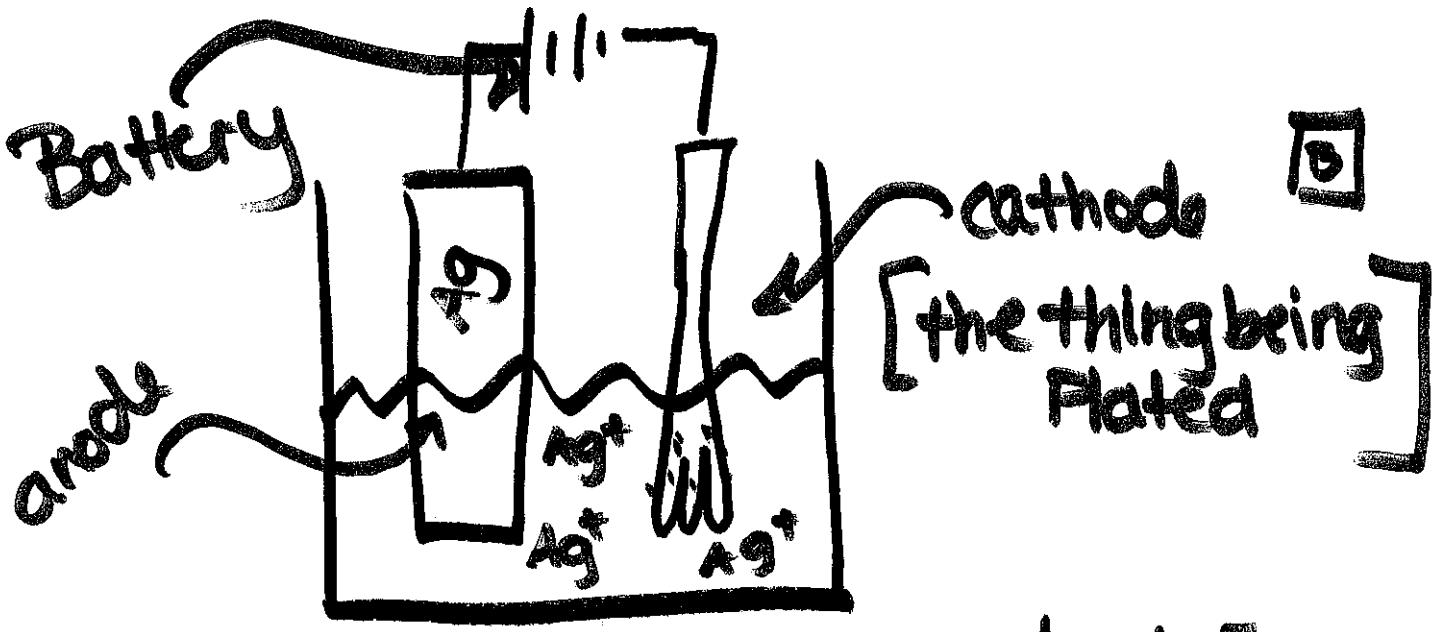
Voltaic Cell (electrochemical) 4

* Chemical → electrical



Electrolytic Cell

* Electrical → Chemical Energy



Anode : Ox → $Ag \rightarrow Ag^+ + 1e^-$

Cathode : Red $Ag^+ + e^- \rightarrow Ag(s)$ ← End up on the object

Voltaic	Electrolyic.
- Spontaneous	- Non-Spontaneous
- Chemical → Elect.	Electro → Chemical
- Salt Bridge	- No Salt Bridge
- 2 containers	- 1 container

Similarites
- oxidation at Anode
- Red at cathode
- e⁻ flow A → C