# TP ELECTROQUIMICA

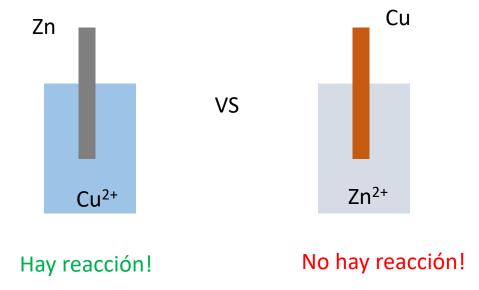
PILAS Y CELDAS ELECTROLITICAS

### PARTE 1 – PILAS

Que son?

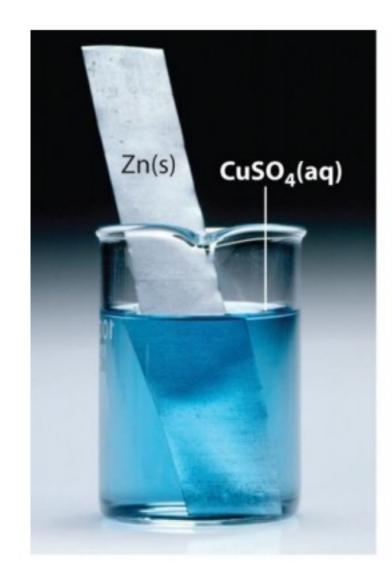
Reaccion quimica espontanea -> Welectrico

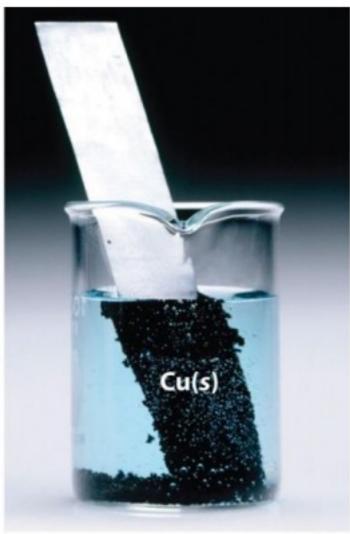
#### Que ocurre en cada caso:



$$Zn^{2+} + 2e^- -> Zn^0$$
  $E^0$ : -0.76 V

$$Cu^{2+} + 2e^{-} -> Cu^{0}$$
 E<sup>0</sup>: 0.34 V



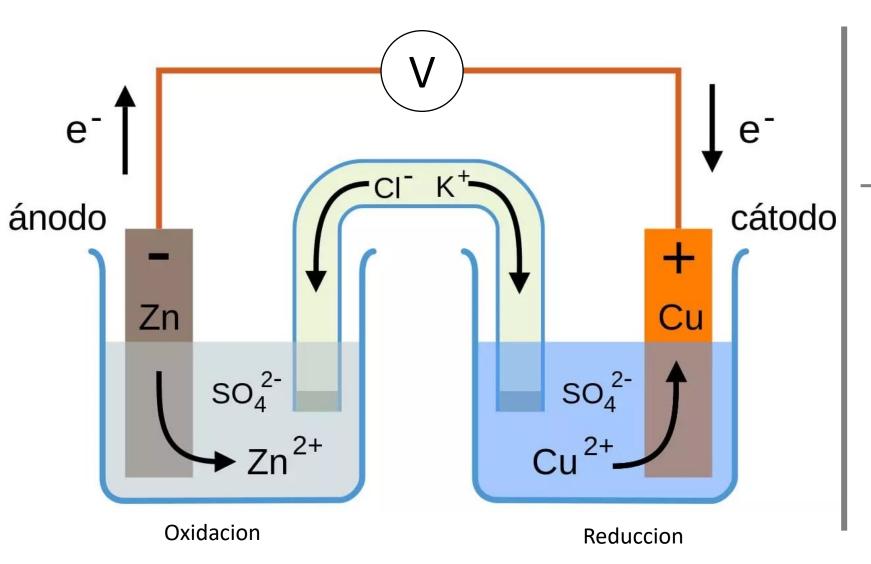


Es esto una pila???

NO!!

Antes Despues

## Hay que separar las hemi-reacciones!!!



$$Cu^{2+} + 2e^{-} -> Cu^{0}$$
  $E^{0}: 0.34 \text{ V}$ 

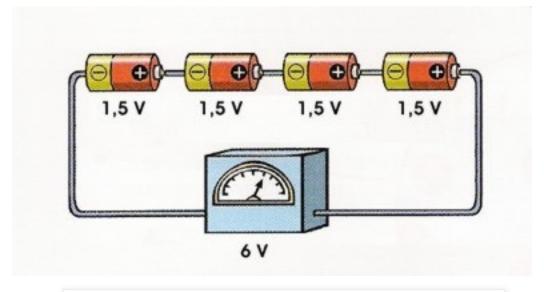
$$Zn^0 \rightarrow Zn^{2+} + 2e^ E^0$$
: -0.76 V

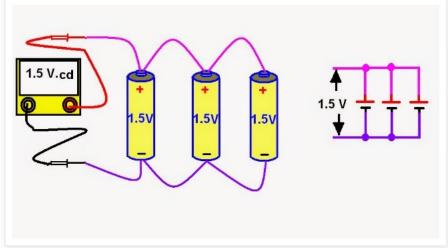
$$Cu^{2+} + Zn^0 -> Zn^{2+} + Cu^0$$

$$\Delta E^0 = E^0_{catodo} - E^0_{anodo} = 1.1V$$

## Multimetro, conexiones en paralelo y en serie

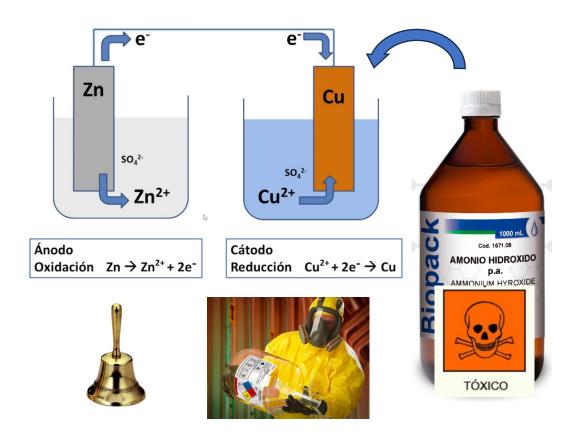






### Agregado de amoniaco

Agregamos 5 mL de NH3 14 mol/L al compartimento catodico (solucion de  $CuSO_4$ )



$$Cu^{2+} + Zn^0 \leftrightharpoons Zn^{2+} + Cu^0$$
$$\Delta E = \Delta E^0 - \frac{RT}{nF} ln \frac{[Zn^{2+}]_{eq}}{[Cu^{2+}]_{eq}}$$

$$Cu^{2+} + 4NH_3 \leftrightharpoons [Cu(NH_3)_4]^{2+}$$

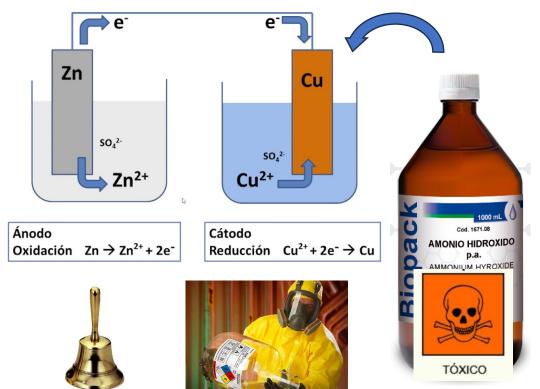
$$K_{eq} = \frac{[Cu(NH_3)_4]_{eq}^{2+}}{[Cu^{2+}]_{eq}[NH_3]_{eq}^4}$$

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$$Cu^{2+} + 4NH_3 \iff [Cu(NH_3)_4]^{2+}$$
  
 $[Cu^{2+}]_0 = [NH_3]_0 = -$ 

$$[Cu^{2+}]_0 - x$$
  $[NH_3]_0 - 4x$   $x$ 

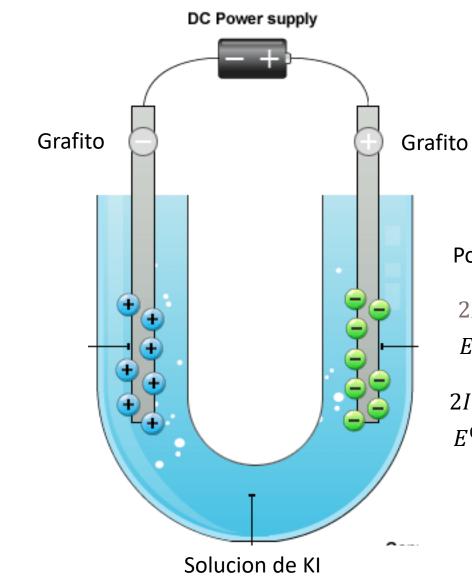
$$K_{eq} = \frac{x}{([Cu^{2+}]_0 - x)([NH_3]_0 - 4x)^4}$$

$$[Cu^{2+}]_0 - x = [Cu^{2+}]_{eq}$$

Tener en cuenta las diluciones para calcular las concentraciones iniciales

# Electrolisis de KI(ac)

### W\_electrico -> reaccion quimica



Recordar que la solucion de KI era estable antes de aplicar trabajo electrico!!!

Especies en solucion en cantidades significativas:

$$H_2O, I^-, K^+$$

Posibles oxidaciones:

$$2H_2O \rightarrow O_2 + 4H^+ + 4e^-$$
  
 $E^0 = +1.23 V$ 

$$2I^- \rightarrow I_2 + 2e^-$$
  
 $E^0 = +0.54 V$ 

**Posibles Reducciones:** 

$$2 H_2 O + 2e^- \rightarrow H_2 + 2 OH^-$$
  
 $E^0 = -0.83 V$ 

$$K^+ + 1e^- \to K^0$$
  
 $E^0 = -2.93 V$ 

# Electrolisis de KI(ac)

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$$E^0 = +0.54 V$$

#### **REACCION GLOBAL:**

$$2I^{-} \rightarrow I_{2} + 2e^{-}$$
  
 $2 H_{2}O + 2e^{-} \rightarrow H_{2} + 2 OH^{-}$ 

???

#### LA REACCION ES ESPONTANEA?

$$\Delta E^0 = E^0_{catodo} - E^0_{anodo} = -0.83 - 0.54 = -1.37 \text{ V}$$

#### Posibles Reducciones:

$$2 H_2 O + 2e^- \rightarrow H_2 + 2 OH^-$$
  
 $E^0 = -0.83 V$ 

$$K^+ + 1e^- \to K^0$$
  
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