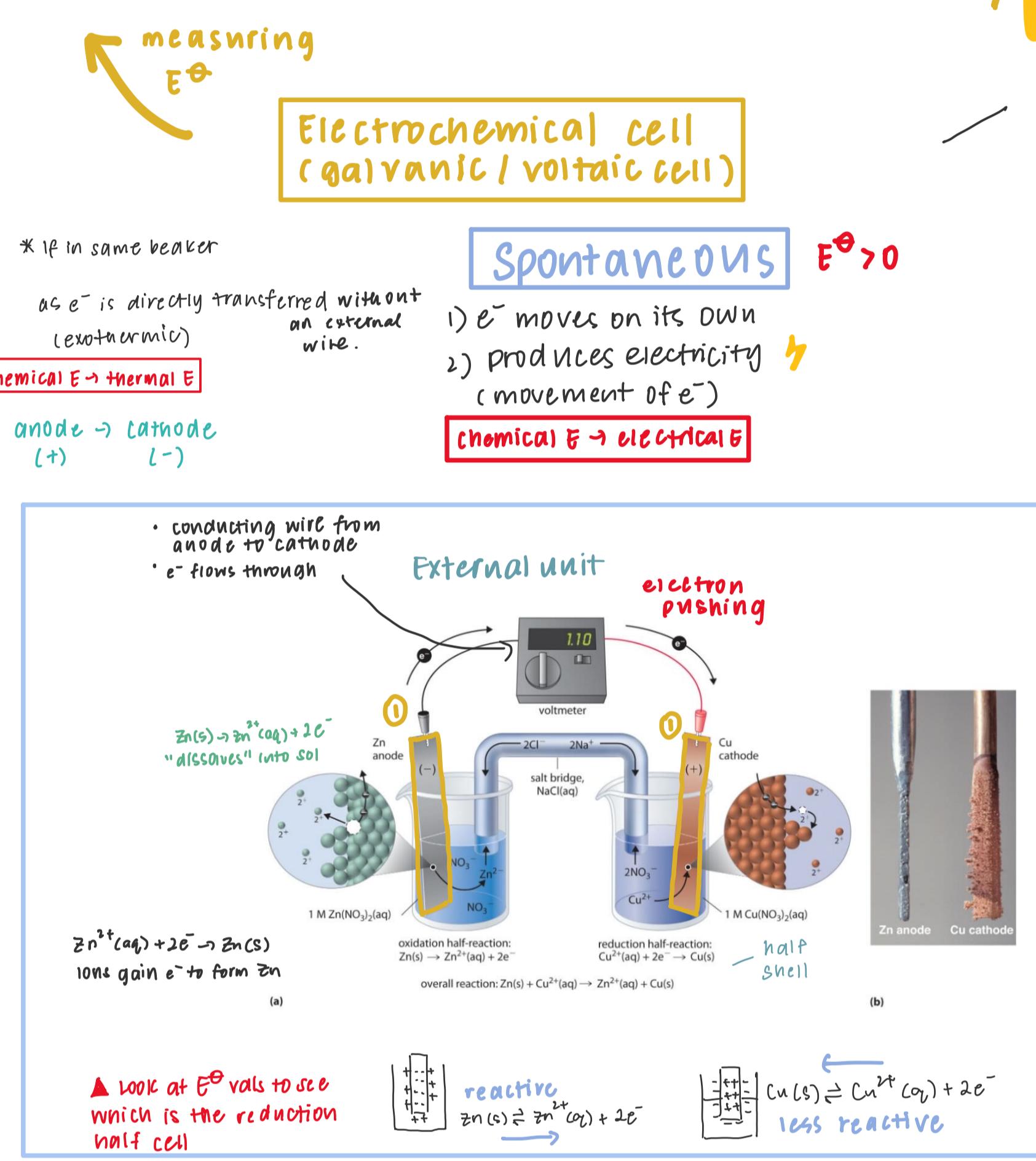


Electrode potential: potential difference between metal and a solution of its ions at equilibrium
 $M^{2+}(aq) + 2e^- \rightleftharpoons M(s)$ (E^\ominus)

↳ caused by charge separation across metal-solution surface
↳ (+) or (-) depending on the relative ease the metal loses electrons

measuring P.d.



Electrochemistry

relationship between chemical reactions and electricity

Electrolysis

Electrolytic cell

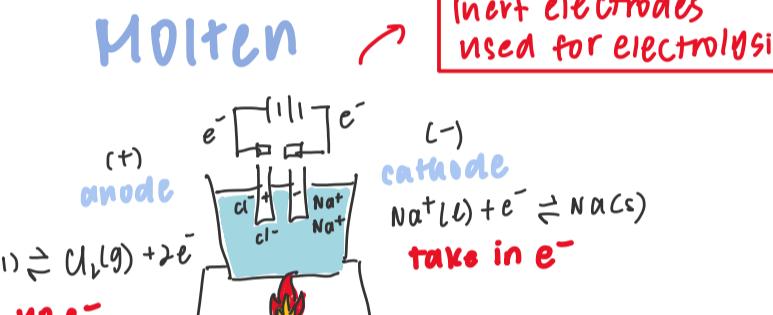
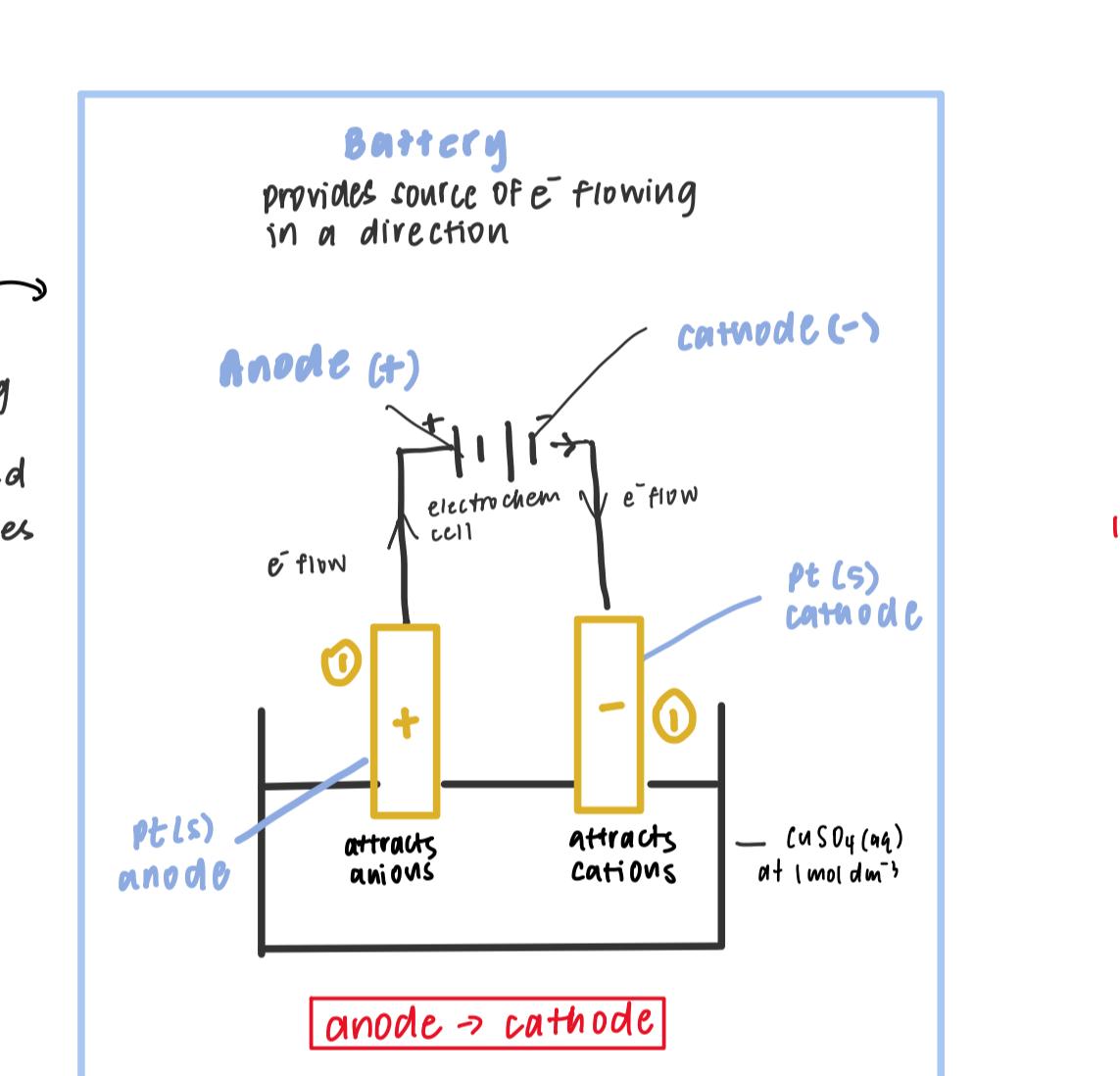
non-spontaneous

requires E to occur

electrical E → chemical E

anion → anode (+)
 cation → cathode (-)

look at E^\ominus to determine which is oxidised/reduced → consider electrode



① only 1 cation and 1 anion available for discharge

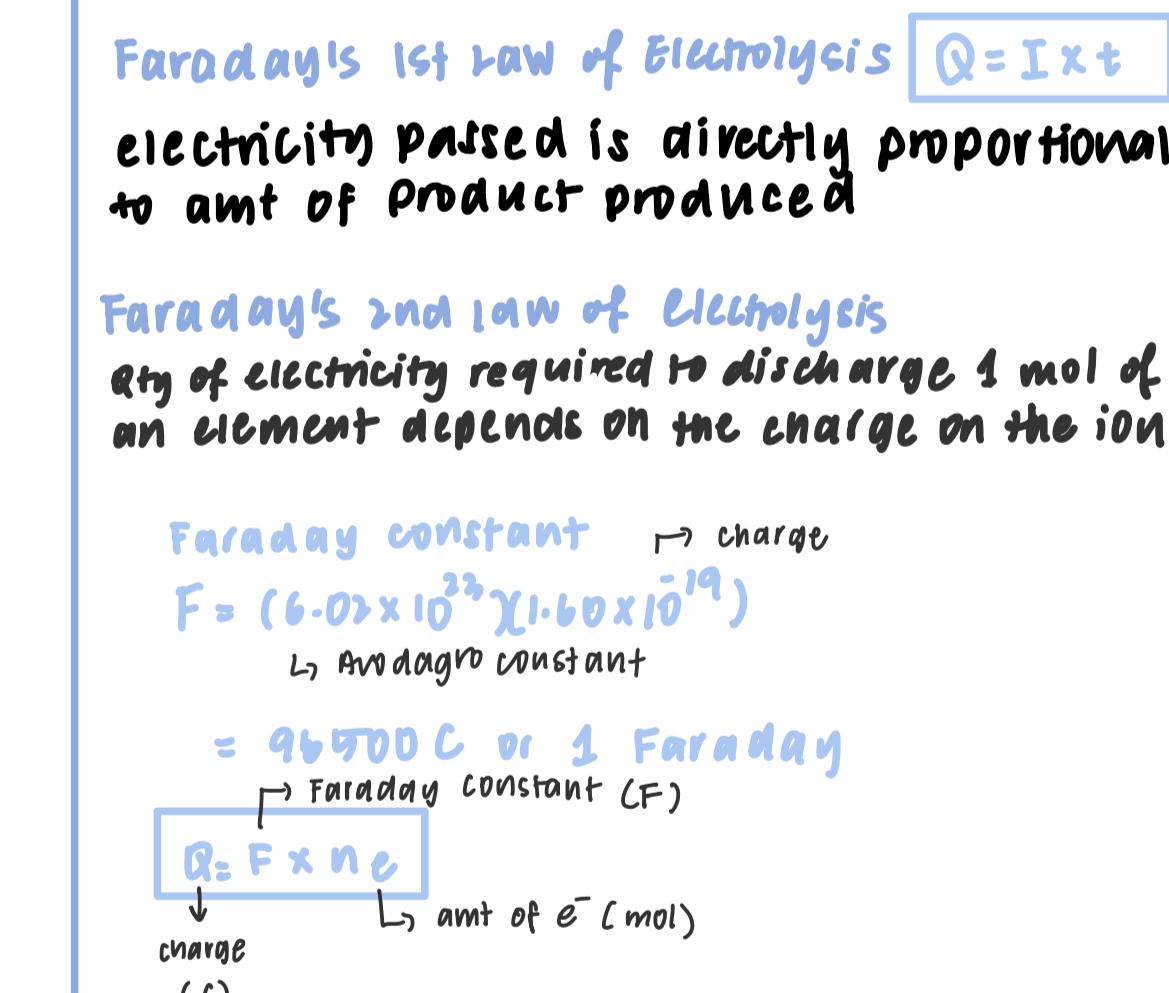
For aqueous:

Anode (oxidation): $2H_2O(l) \rightarrow O_2(g) + 4H^{+}(aq) + 4e^-$
 $E^\ominus = +1.23V$
 O_2 is produced

Cathode (reduction): $2H^{+}(aq) + 2e^- \rightarrow H_2(g)$
 $E^\ominus = -0.83V$
 H_2 is produced

- Selected discharge**
- Ease of oxidation/reduction**
 - at (-) chloride (anode)
 - at (+) chloride (cathode)
 - goes to oxidise (smaller E^\ominus)
 - fastest to be reduced (larger E^\ominus)
 - Concentration of species**
 - higher conc discharged in preference of lower conc
 - If $E_A^\ominus < E_B^\ominus$ but conc B conc A is reduced
 - Nature of electrode**
 - dilute: more water
 - anode: $W^{2+} \rightarrow W^{3+} + e^-$ W^{2+} is preferentially oxidised
 - consider reactive electrode for anode and cathode
 - repolarising

Quantitative aspects



Industrial applications of electrolysis

Electric purification of copper

anode: more reactive (impure Cu) more reactive than Cu
 cathode: Cu²⁺ (hard to oxidise)
 sludge: metallic less reactive than Cu

Electroplating

depositing a layer of metal onto another metal

anode: metal to be coated
 cathode: metal to be covered