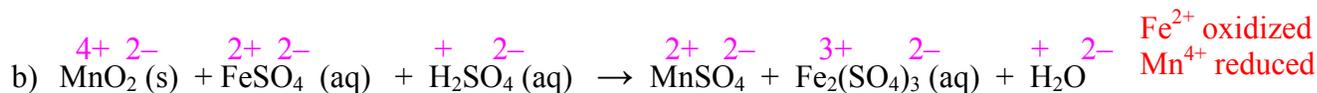
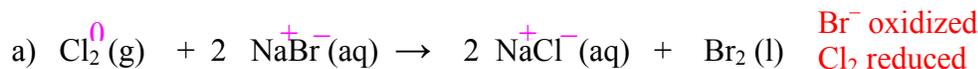


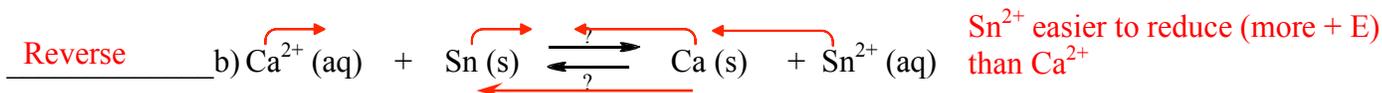
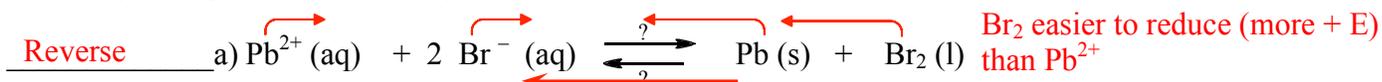
Unit 16: Electrochemistry

42) For the following reactions put in all charges and indicate what is being oxidized and what is being reduced.

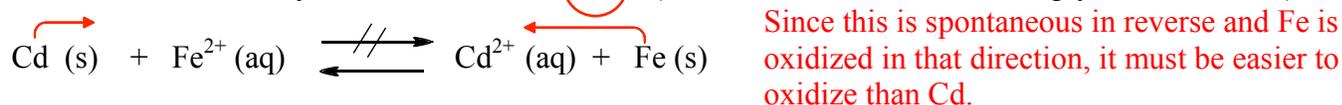


43) Determine if these reactions are spontaneous in the **forward** direction or in the **reverse** direction.

(Look at your reference chart, but you do NOT need to calculate E°_{net})



44) This reaction is non-spontaneous in the forward direction. (Thus, it is spontaneous in the reverse direction) Which metal is more easily oxidized? **Cd or Fe** (Reference charts will NOT help you for this one.)



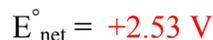
45) Given enough time, what will happen if tomato sauce (acidic-- contains H^+) is covered with aluminum foil? To answer, complete these half reactions: (HINT: use reference chart to determine this Rxn.)



Thus, the Al will oxidize and the Al^{3+} ions will dissolve into the sauce (YUCK!)

46) Given this reaction, $\text{F}_2(\text{g}) + \text{Cu}(\text{s}) \rightarrow \text{CuF}_2(\text{s})$

Write the two half reactions (balanced), determine the E°_{net} , and determine if the reaction is spontaneous.



Yes, it is spontaneous because E°_{net} is positive.

47) Look at the diagram of the voltaic cell (spontaneous reaction). Determine which metal is more easily oxidized, write balanced half reactions, determine the overall reaction (balanced), determine the E°_{net} . Label the **anode and cathode**, show the **flow of electrons** and **flow of ions** in the salt bridge.

$E^\circ(\text{Ni}^{2+}/\text{Ni}) > E^\circ(\text{Cr}^{3+}/\text{Cr})$, so it is the reduction & cathode



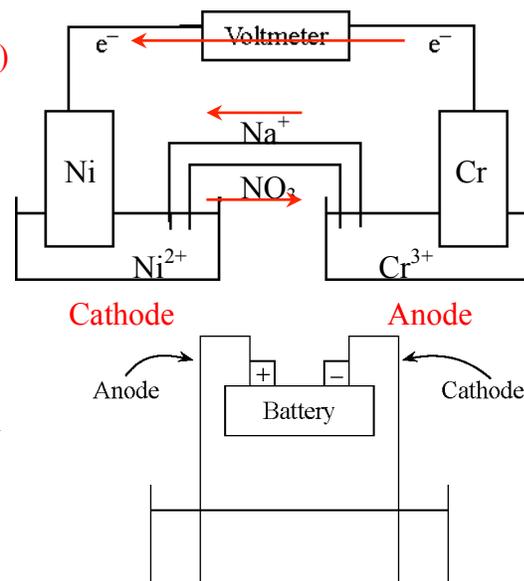
a) Which electrode will gain mass? Ni Why?

Ni^{2+} is reduced to Ni, which attaches to electrode

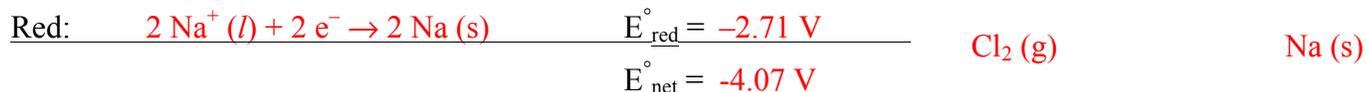
b) Which electrode will lose mass? Cr Why?

Cr is oxidized to Cr^{3+} , which dissolves into solution.

48) Sodium metal (Na) and Cl_2 gas can be produced by electrolysis (a battery is used). To do this, one sends an electrical current through molten NaCl. The overall reaction is as follows:



a) Write the two half reactions, and determine the E_{net} .



b) In diagram, label where the **solid** and the **gas** are produced.

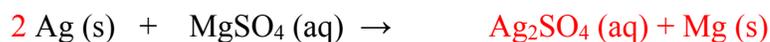
c) What does the sign of E_{net}° tell you about the reaction? **That is it nonspontaneous and needs energy.**

49) For the following situations below, complete the chemical equations assuming each reaction takes place.

Then, determine if the reaction is spontaneous. Based on this decision, predict what would be observed in each case.

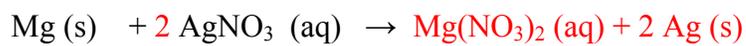
(*HINT: Both reactions are just simple single replacement reactions.*)

a) A strip of silver metal (Ag) is placed into an aqueous solution of MgSO_4 .



Spontaneous reaction? No Observations? No Reaction

b) A strip of magnesium metal is placed into an aqueous solution of AgNO_3 .



Spontaneous reaction? Yes Observations? Solid Ag forms, Mg disappears

c) Neither one of these situations as described above produces electricity. Why not? **System (a) is not spontaneous, so no e^- flow; in (b) e^- flow directly from Mg to Ag, no external circuit.**