https://ChemEd.Study

Last item that was due

Solubility – two weeks ago

22 eq Chemical eq

(Ionic eq)

net Ionic eq

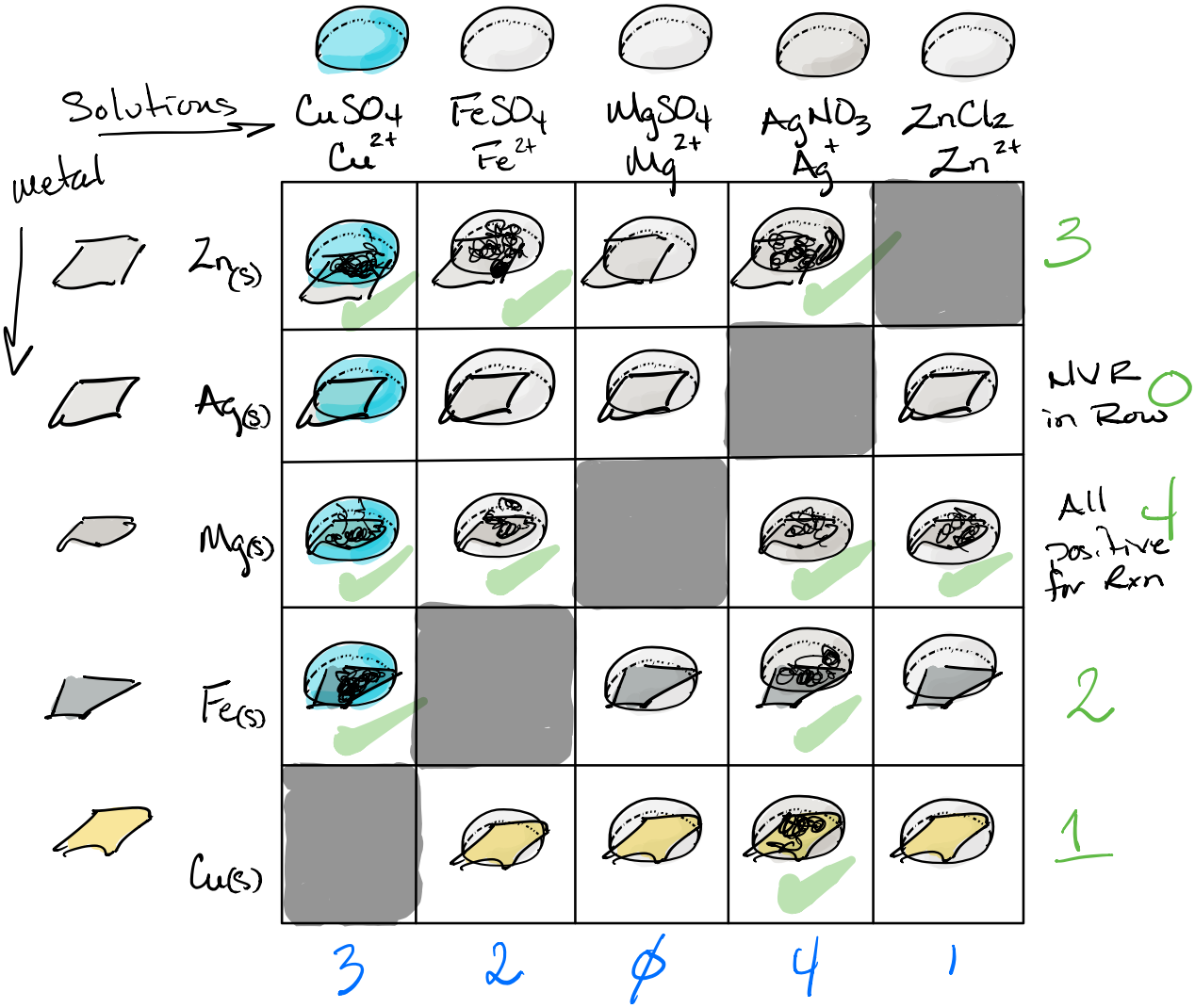
Last week → went over the unk lab

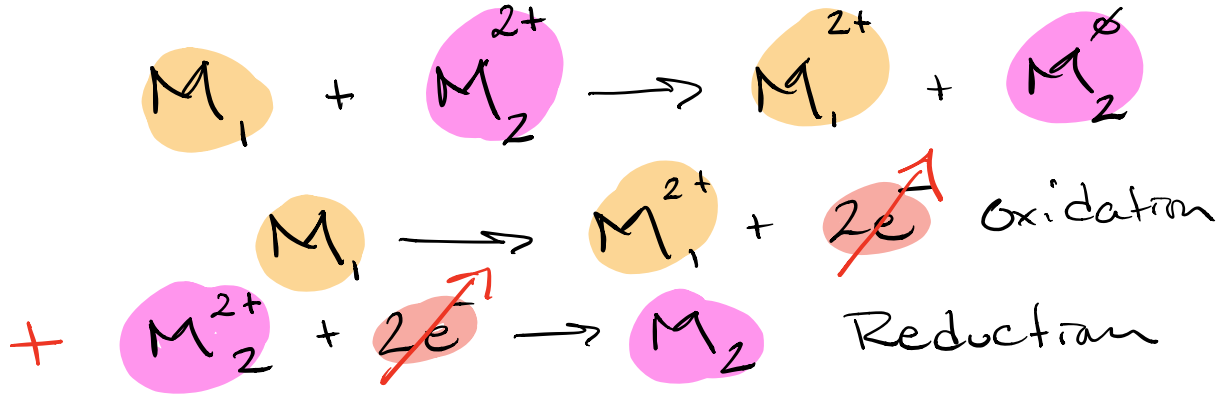
How to approach & solve for an unk. ⟹ Nothing due for lab

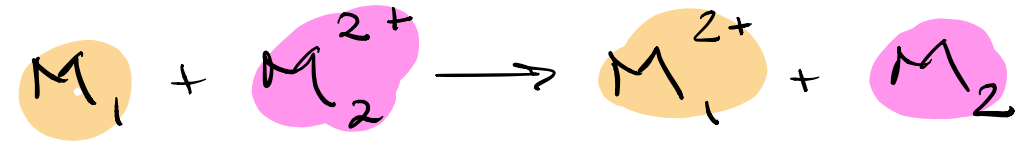
① Redox – Activity Series

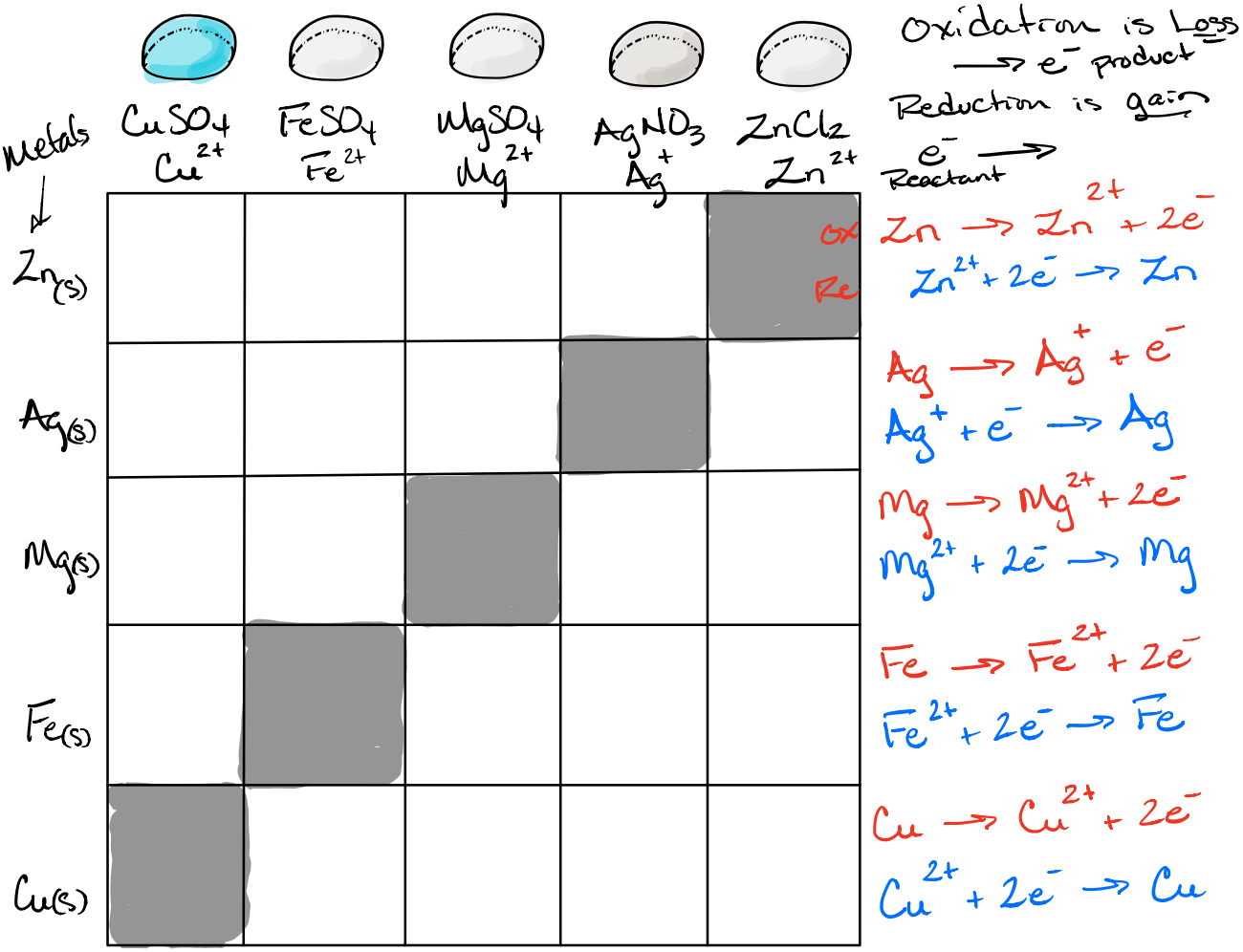
② Gas Laws

Activity Series









Oxidation is Loss → e^- product

Reduction is gain e^- → Reactant

$Zn \rightarrow Zn^{2+} + 2e^-$

$Zn^{2+} + 2e^- \rightarrow Zn$

$Ag \rightarrow Ag^+ + e^-$

$Ag^+ + e^- \rightarrow Ag$

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

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

$Fe \rightarrow Fe^{2+} + 2e^-$

$Fe^{2+} + 2e^- \rightarrow Fe$

$Cu \rightarrow Cu^{2+} + 2e^-$

$Cu^{2+} + 2e^- \rightarrow Cu$

① Rank metals base on # of reactions in each row

Zn	3
Ag	0
Mg	4
Fe	2
Cu	1

→

# of times we saw oxidized

Increasing Activity ↑

4	Mg	$Mg \rightarrow Mg^{2+} + 2e^-$
3	Zn	$Zn \rightarrow Zn^{2+} + 2e^-$
2	Fe	$Fe \rightarrow Fe^{2+} + 2e^-$
1	Cu	$Cu \rightarrow Cu^{2+} + 2e^-$
0	Ag	$\times Ag \rightarrow Ag^{+} + e^-$

Activity is the ability to be oxidized.

2) Rank the ions in the number of reactions in each column.

Cu^{2+}	Fe^{2+}	Mg^{2+}	Ag^{+}	Zn^{2+}
3	2	∅	4	1

Reductions

4	Ag^{+}	$Ag^{+} + e^{-} \rightarrow Ag$
3	Cu^{2+}	$Cu^{2+} + 2e^{-} \rightarrow Cu$
2	Fe^{2+}	$Fe^{2+} + 2e^{-} \rightarrow Fe$
1	Zn^{2+}	$Zn^{2+} + 2e^{-} \rightarrow Zn$
0	Mg^{2+}	$Mg^{2+} + 2e^{-} \rightarrow Mg$

↑ Increasing Reactivity was the Reduction the ability to be Reduced

3)

Lists are reversed

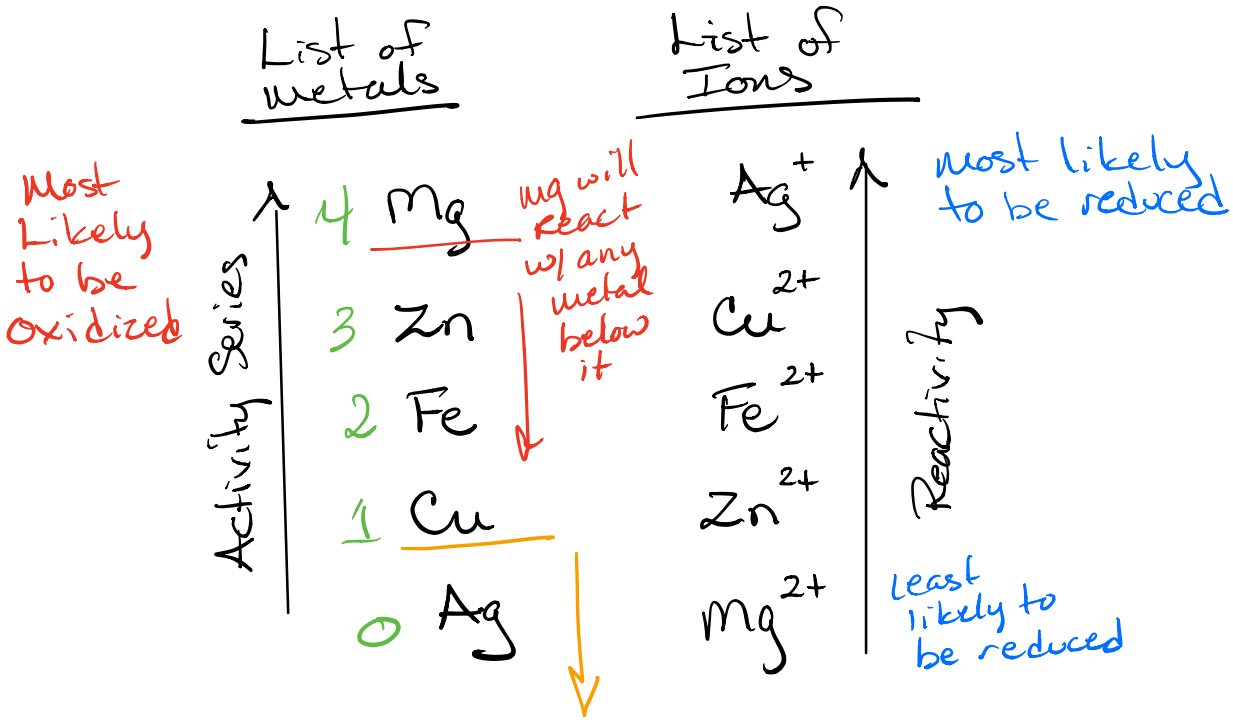
4) Write each oxidation half reaction observed

# of Rxns	
4	$Mg \rightarrow Mg^{2+} + 2e^-$
3	$Zn \rightarrow Zn^{2+} + 2e^-$
2	$Fe \rightarrow Fe^{2+} + 2e^-$
1	$Cu \rightarrow Cu^{2+} + 2e^-$
∅	$\times Ag \rightarrow Ag^+ + e^-$ Never observed

5) Write the observed reduction half Rxn in order of most reactive.

# of Rxns	
4	$Ag^+ + e^- \rightarrow Ag$
3	$Cu^{2+} + 2e^- \rightarrow Cu$
2	$Fe^{2+} + 2e^- \rightarrow Fe$
1	$Zn^{2+} + 2e^- \rightarrow Zn$
∅	$\times Mg^{2+} + 2e^- \rightarrow Mg$ Never observed

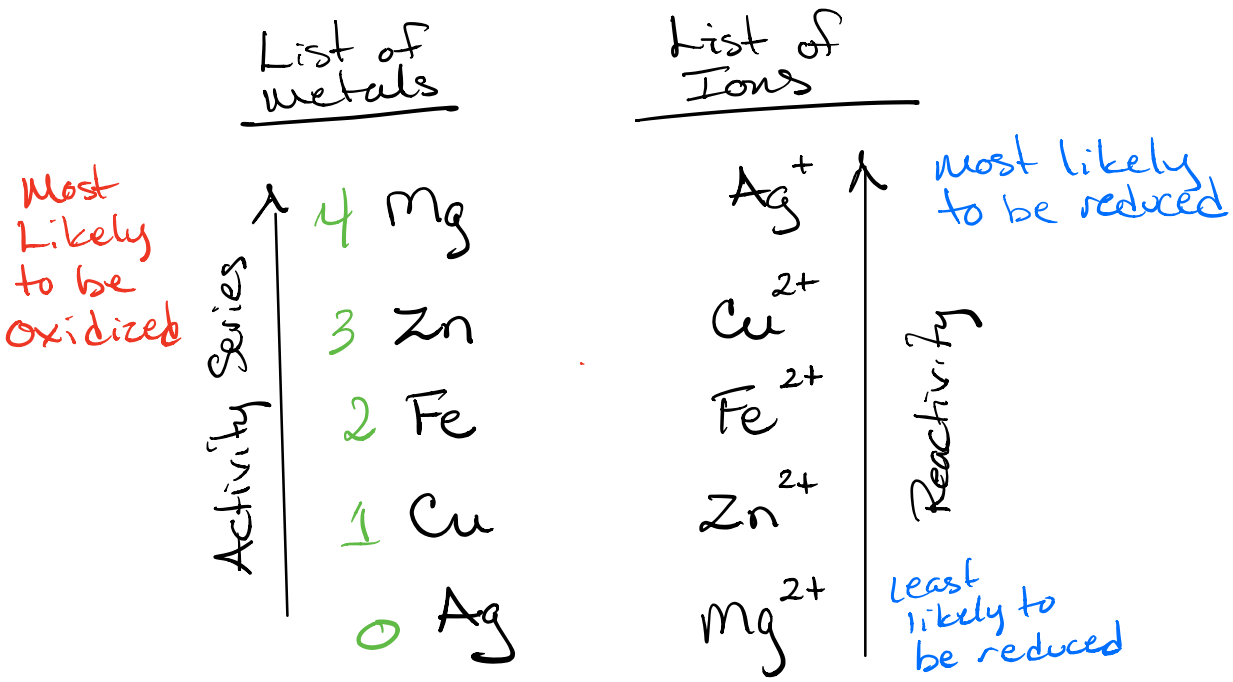
6) Explain how the activity lists can be used to predict reactivity



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

$Zn^{2+} + 2e^- \rightarrow Zn$ Reduction

$Mg + Zn^{2+} \rightarrow Mg^{2+} + Zn$ would be expected to be observed



a) Will Fe react with Zn^{2+}?

no Fe is below Zn in the activity series

b) Will Ag react with Mg^{2+}?

Mg is more likely to be oxidized

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

than is ~~Ag~~

c) Will Zn react with Cu^{2+}?

yes we expect Zn to react w/ Cu^{2+}

7) write the Half Rxns & Add to give the net ionic eq for all 10 Rxns observed

A) $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$ Single Replacement ⇒ Redox

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

$+ \quad Cu^{2+} + 2e^- \rightarrow Cu$ Reduction

$Mg + Cu^{2+} \rightarrow Mg^{2+} + Cu$ net ionic

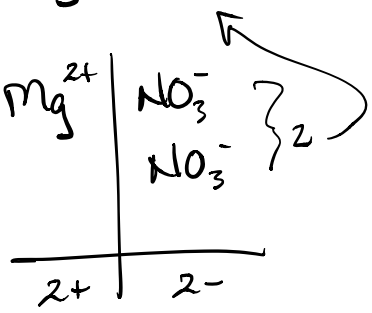
B) $Mg_{(s)} + FeSO_{4(aq)} \rightarrow MgSO_{4(aq)} + Fe_{(s)}$

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

$+ \quad Fe^{2+} + 2e^- \rightarrow Fe$ red

$Mg_{(s)} + Fe^{2+}_{(aq)} \rightarrow Mg^{2+}_{(aq)} + Fe_{(s)}$ net ionic equation

c) $Mg_{(s)} + 2AgNO_{3(aq)} \rightarrow Mg(NO_3)_2 + 2Ag$



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

$+ \; 2Ag^+ + 2e^- \rightarrow 2Ag$ ⇐ Balance in # of e^-

$Mg + 2Ag^+ \rightarrow Mg^{2+} + 2Ag$ net Ionic Eq.