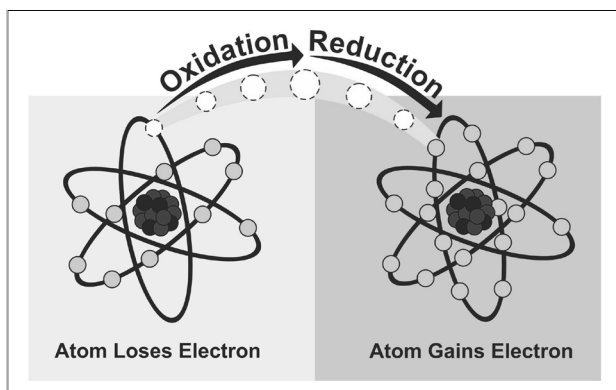


New Redox Lab

40 minutes

name: _____

Objective: to observe a redox reaction between copper (II) chloride solution and aluminum metal and then to dissect the half reactions out of it.

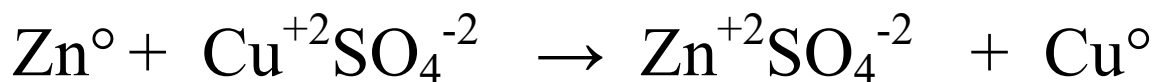
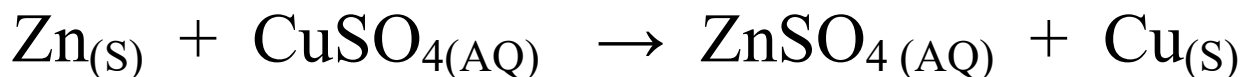


READ THIS FIRST: This is a goggles on lab. Be careful with glass and any temperature situations you encounter. Clean up info below.

Materials needed: two clean 250 mL beakers, a glass stirring rod, and approximately 60 cm³ of aluminum foil (as shown), and one small scoop of CuCl₂ crystals to dissolve into about a 50 mL solution with deionized water. Also a filter paper and funnel set up to filter the beaker of solids.

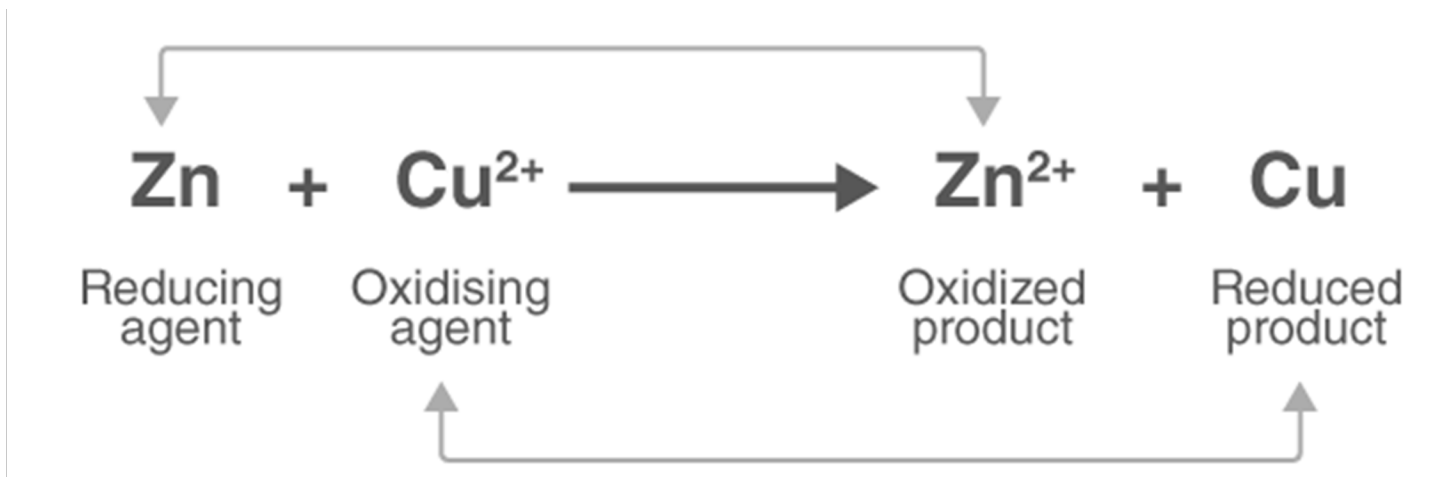
Procedure: Put CuCl₂ crystals into a beaker, pour in the deionized water. Stir until all is dissolved. Take observation notes at all times. Next, tear the foil into bits, collect these bits and put them into the CuCl_{2(AQ)} solution you just made. Stir with the glass rod. Observe visually and touch beaker with hand carefully. If solution is not clear, add more aluminum foil bits until the solution is clear. When the reaction is over observe residue and remaining solution. Discuss what happened with your lab partner.

Another example of a redox reaction that is also single replacement.

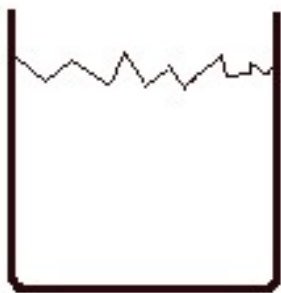


Here the zinc replaces the copper in solution. The zinc atom oxidizes into the Zn⁺² cation. The Cu⁺² cation is reduced into the copper atom. The sulfate SO₄⁻² is the spectator ion. It's necessary but plays only a passive role. It "watches" the chemistry happen.

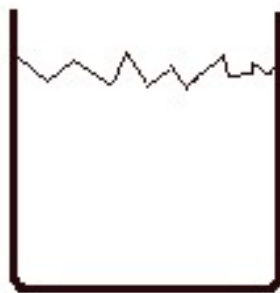
Below is the NET IONIC EQUATION.



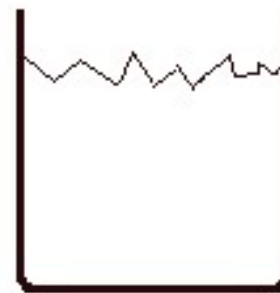
Using color pencils, draw what you see during this experiment in each beaker. Label what you draw (solutions, reactants, products, etc.) Use chemical symbols when ever you can.



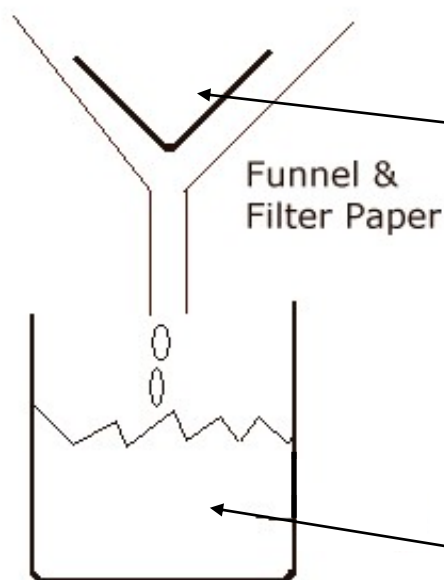
$\text{CuCl}_2(\text{s}) + \text{H}_2\text{O}$



$\text{CuCl}_2(\text{aq}) + \text{Al}$



_____?



What is stuck in the filter paper?

What flows into the beaker?

There are 3 things that could happen with this reaction:

1. You could eyeball measure perfectly, putting in exactly enough aluminum to completely react with the $\text{CuCl}_2(\text{AQ})$ with out any left over Al or $\text{CuCl}_2(\text{AQ})$. (this is possible, but unlikely)
2. You could add too little aluminum to completely react with the solution you made.
3. You could add too much aluminum to react completely with the $\text{CuCl}_2(\text{AQ})$.

Which of these happened to you? *Circle your results...* # 1 2 3

Imagine each of these chemical possibilities: What would be in the filter paper in the funnel, and what would be in your catch beaker under it, for each? Choose ONE choice in each of the six boxes.

aluminum is added to the $\text{CuCl}_2(\text{AQ})$	what is in your funnel with the filter paper? check one	what is in your catch beaker under your filter paper and funnel?
You add a perfect amount of aluminum to react with the $\text{CuCl}_2(\text{AQ})$	<input type="checkbox"/> Cu only <input type="checkbox"/> Al only <input type="checkbox"/> Cu + Al	<input type="checkbox"/> $\text{CuCl}_2(\text{AQ})$ only <input type="checkbox"/> $\text{AlCl}_3(\text{AQ})$ only <input type="checkbox"/> both $\text{CuCl}_2(\text{AQ})$ + $\text{AlCl}_3(\text{AQ})$
You add too little aluminum to react with the $\text{CuCl}_2(\text{AQ})$	<input type="checkbox"/> Cu only <input type="checkbox"/> Al only <input type="checkbox"/> Cu + Al	<input type="checkbox"/> $\text{CuCl}_2(\text{AQ})$ only <input type="checkbox"/> $\text{AlCl}_3(\text{AQ})$ only <input type="checkbox"/> both $\text{CuCl}_2(\text{AQ})$ + $\text{AlCl}_3(\text{AQ})$
You add too much aluminum to react with the $\text{CuCl}_2(\text{AQ})$	<input type="checkbox"/> Cu only <input type="checkbox"/> Al only <input type="checkbox"/> Cu + Al	<input type="checkbox"/> $\text{CuCl}_2(\text{AQ})$ only <input type="checkbox"/> $\text{AlCl}_3(\text{AQ})$ only <input type="checkbox"/> both $\text{CuCl}_2(\text{AQ})$ + $\text{AlCl}_3(\text{AQ})$

Lab questions 10 x 2 points each on WHITE PAPER, do not squeeze them below.

1. Write the balanced chemical equation with phase symbols for aluminum metal added to the copper (II) chloride solution.
2. Write $\frac{1}{2}$ OX and the $\frac{1}{2}$ RED and the net ionic equation for this chemical reaction
3. Write the balanced chemical equation of the strongest acid in table K being neutralized with the strongest base in table L. Add oxidation numbers to all reactants and products.
4. Is the acid base neutralization reaction also redox? Why do you think it is, or is not?
5. When an iron nail was put into the $\text{NaCl}_{(\text{AQ})}$ earlier in the year, was that an example of a redox reaction? Explain. (write the equation with table J, don't guess)
6. When lithium metal is put into a solution of copper sulfate, tell specifically which species is oxidized and which species is reduced and which species is the spectator ion. (Example: say specifically Cu atom or Cu^{+2} cation, not just "copper").
7. Write a balanced chemical equation for the decomposition of carbon dioxide into solid carbon & oxygen gas. Put in the relative oxidation numbers for each of the 3 species.
8. Is the decomposition of CO_2 a redox reaction? If no explain why. If yes, write the two half reactions for oxidation and for reduction.
9. In one sentence explain the chemistry behind a voltaic cell.
10. In one sentence explain the chemistry behind an electrolytic cell.

This lab	requires	for these points
Cover	Title, single sentence objective.	1
Drawings	colors, labels, symbols	2
3 scenarios	fill in boxes	2
Page 3	10 questions	20
due date: _____		25