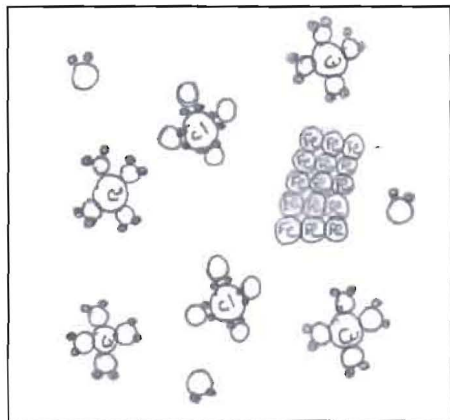


## Representing Reactions Worksheet

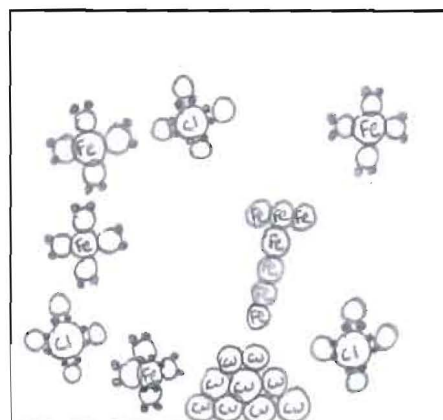
1. When an iron nail is placed in an aqueous solution of copper (II) chloride an orange solid appears around the nail, there is a change in color from blue to green and the nails lose mass.

a) In the spaces below do a before and after drawing at the particle level of the reaction

**Before**



**After**



b) Explain in your own words how the reaction took place and how your representation accounts for the visual observations described above. Make sure to mention the role of each atom participating in the reaction

Copper (II) chloride is an aqueous solution so its atoms are separated by the water. The iron nail is neutral and the copper atom has a stronger pull on electrons, so when the nail is placed in the solution its electrons are stolen by the copper. The iron becomes positive so it repels itself and is then surrounded and separated from the chloride by the water molecules.

The copper becomes neutral so it clings to itself forming a precipitate, the chloride is a spectator atom. The color changes because the

c) How would the amount of orange solid change if more iron nails were initially placed in the copper (II) chloride solution?

The amount of the orange solid would not change if more iron nails were added because the amount of copper in the aqueous solution is still the same.

aqueous solution is near iron chloride.

d) During our class discussion it was concluded that either iron (II) or iron (III) could be a product of the reaction. Use your data from the experiment to quantitatively determine which of the two ions was present after the reaction

$$2.397 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.485 \text{ g Fe}} = 0.0432 \text{ mol Fe} \approx 1:1 \quad \boxed{\text{Fe}^{2+}}$$

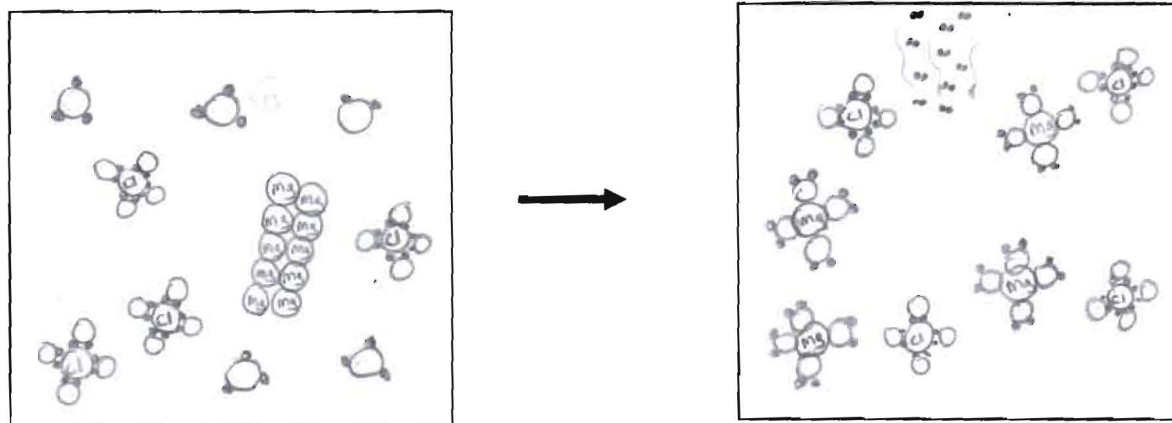
$$2.8 \text{ g Cu} \times \frac{1 \text{ mol Cu}}{63.546 \text{ g Cu}} = 0.0441 \text{ mol Cu}$$

e) Write the chemical equation which represents the reaction discussed above



2. When a piece of magnesium metal is dropped in an aqueous solution of hydrochloric acid, bubbles form around the magnesium metal and the metal disappears from view.

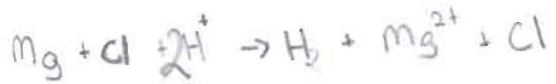
a) In the spaces below do a before and after drawing at the particle level of the reaction



b) Explain how the reaction took place and how your representation accounts for the visual observations listed above. Address the role of all species involved in the reaction.

The reaction took place when the Hydrogen atoms took electrons from the neutral magnesium. The magnesium became positive and repelled each other and then was surrounded by the water molecules. The hydrogen became neutral thus forming a gas, creating the bubbles. The chloride is a spectator atom. The solution became magnesium chloride. The color didn't change because magnesium is also clear.

c) Write the chemical equation which represents the reaction discussed above



d) How does this reaction compare to the reaction between the iron nail and the  $\text{CuCl}_2(\text{aq})$ ?

The reaction is the same being a 1:1 ratio, the only difference is that a gas was formed instead of a copper precipitate.

e) If a piece of copper metal is placed in the solution of HCl no change is observed but if an iron nail is placed in the same solution bubbles will be observed. Explain these observations.

Copper is stronger than Hydrogen, but Hydrogen is stronger than iron.