Thickness of Zinc Coating Lab Notes

- The main observations of this reaction (changes) were: formation of bubbles, and decrease of mass of the metal piece. The particle level explanations must address these observations.
- The metal piece, before the reaction, can be thought of as an iron sandwich on zinc atoms. The zinc coating is very thin but it is still made up of millions of atoms of zinc.
- Hydrochloric acid is an aqueous solution. Gaseous HCl (called hydrogen chloride) is a molecular compound where the H and Cl are bonded together and flying as a gas (at room temperature, if cooled enough it can turn into a liquid). When this gaseous HCl is mixed with water, the water dissociates (breaks apart) the hydrogen and chloride into ions, H^+ and Cl^- which makes the solution an electrolyte (it can conduct electricity). The H and the Cl DO NOT remain together in solution. If they did, the solution would not conduct electricity.
- The H^+ attaches to the oxygen of a water molecule making the hydronium ion H_3O^+ while the Cl^- is surrounded by water molecules with the hydrogens pointing in.
- The zinc on the metal piece is elemental (neutral) zinc. As it reacts with the acid, the H^+ steals the electrons from the zinc which now becomes Zn^{2+}. Notice that each H^+ can only take one electron so TWO H^+ are necessary to turn a neutral zinc into Zn^{2+}.
- Once the Zinc had its two electrons stripped (it was oxidized by the H^+), water molecules surround the positive zinc ion making it aqueous.
- The hydrogen which stole the electron from zinc (underwent reduction) is now neutral but it quickly bonds to another neutral H forming diatomic hydrogen molecules (H_2). These molecules gather together and eventually form visible bubbles. Each bubbles contains millions of H_2 molecules.
- The chloride never changed throughout the reaction and is therefore considered a spectator ion.
- The aqueous zinc (cation) and the chloride (anion) are kept apart from each other by water and do not form molecules. This can be proven by the fact that the solution is an electrolyte. If the water were to be evaporated, the zinc and the chloride will come back together forming a crystal lattice typical of an ionic compound.