Milk of Magnesia Investigation

Pre-Lab Questions:

1.

Color	Red	Orange	Yellow	Green	Turquoise	Blue	Violet
pH	4	5	6	7	8	9	10

2. A) $Mg(OH)_{2(aq)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + 2H_2O_{(l)}$

   B) Total Ionic: $Mg^{2+}_{(aq)} + 2OH^-_{(aq)} + 2H^+_{(aq)} + 2Cl^-_{(aq)} \rightarrow Mg^{2+}_{(aq)} + 2Cl^-_{(aq)} + 2H_2O_{(l)}$
   Net Ionic Equation: $2OH^-_{(aq)} + 2H^+_{(aq)} \rightarrow 2H_2O_{(l)}$

   C) $Mg(OH)_{2(s)} \Leftrightarrow Mg^{2+}_{(aq)} + OH^-_{(aq)}$

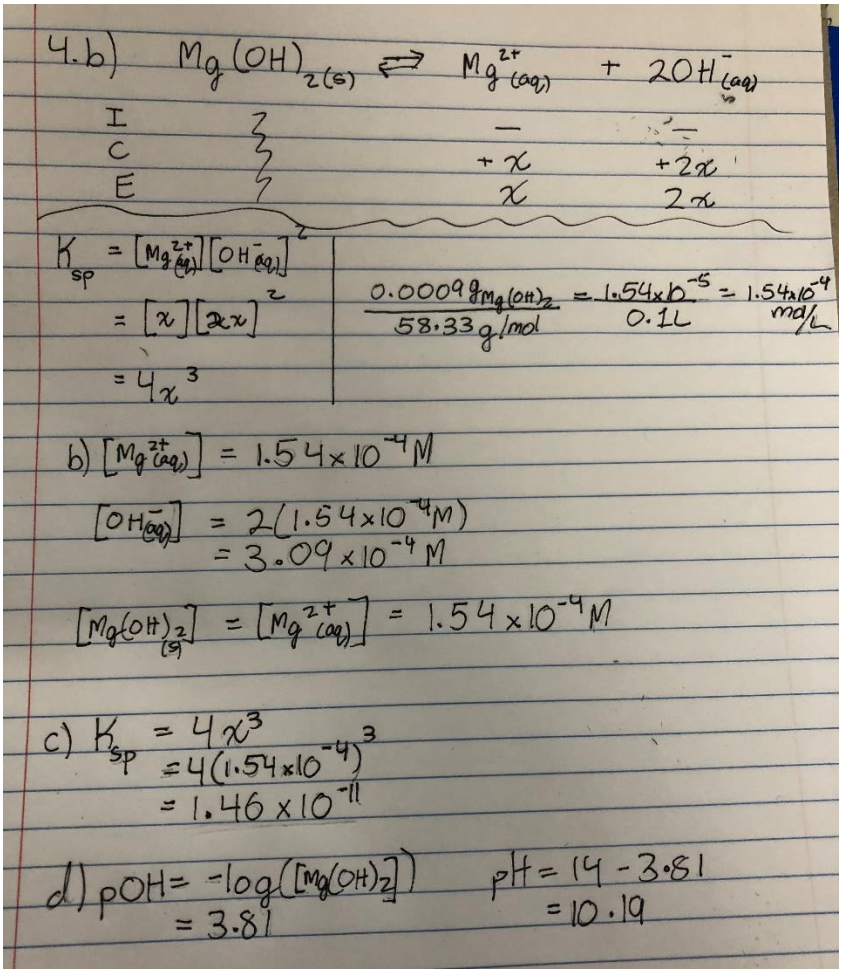
Observation Table:

	Amount of HCl/Indicator	Color Change	Observations
Universal Indicator	4mL	White, green, purple	The MOM changed to many different colors when the acid was added
HCl Acid	2.5 mL	Pink, blue, purple	Initially pink, then blue, and then back to purple
HCl Acid	2.5 mL	Pink, light blue, purple	
HCl Acid	2.5 mL	Pink, teal, blue, purple	
HCl Acid	2.5 mL	Pink, blue, green, purple	
HCl Acid	2.5 mL	Pink, blue, green, purple	
HCl Acid	2.5 mL	Pink, blue, green, purple, yellow	New color appeared, orange/yellow
HCl Acid	2.5 mL	Pink, yellow, red, green, blue	
HCl Acid	2.5 mL	Pink/red, orange, yellow	
HCl Acid	2.5 mL	Red	Finally stays red after MOM has dissolved

Discussion Questions:

3. a) b) The reason the color of the universal indicator changed has to do with Le Chatelier's Principle and the principles of equilibrium. As the HCl was being added to magnesium hydroxide, the equilibrium shifted. As the equilibrium was reestablished, two things happened, some magnesium hydroxide dissolved, and the color of the solution went back to dark blue (indicating it is still basic). Eventually, once enough acid was added, the color of the solution changed to red, indicating that the magnesium hydroxide had dissolved and the solution was no longer basic.

4. a) Temperature is a factor that must be taken into consideration when analyzing the solubility of a substance. If the solvent is hot, then the solute will dissolve much faster than if it was to be put into a cold solvent. This is because hot liquids have fast energized particles. This allows them to encounter collisions at a higher frequency than slow-moving particles. As a result, the solute can quickly dissolve within a hot solvent. Contrarily, cold solvents have slow moving particles. So, they encounter collisions at a much slower frequency. Therefore, they reduce the solubility of the substance.



Application Questions:

5. a) If the experiment was to be conducted with water at room temperature, then the magnesium hydroxide would dissolve much faster. Because water at room temperature has faster moving particles than cold water, there would be more frequent collisions between magnesium hydroxide and hydrochloric acid. As a result, the magnesium hydroxide would dissolve much faster while requiring a fewer amount of HCl.

   b) If the experiment was to be conducted with hot water, then the magnesium hydroxide would dissolve fastest because the particles would be moving very fast. There would be extremely fast and frequent collisions occurring between magnesium hydroxide and hydrochloric acid. As a result, the magnesium hydroxide would dissolve extremely quick while requiring a small amount of HCl

6. Calcium carbonate is also another antacid. One reason why calcium carbonate is an effective antacid is because it can quickly neutralize the acid that is building up in your body once the tablet is consumed.

   $CaCO_3 \Leftrightarrow Ca^{2+} + CO_3^{2-}$