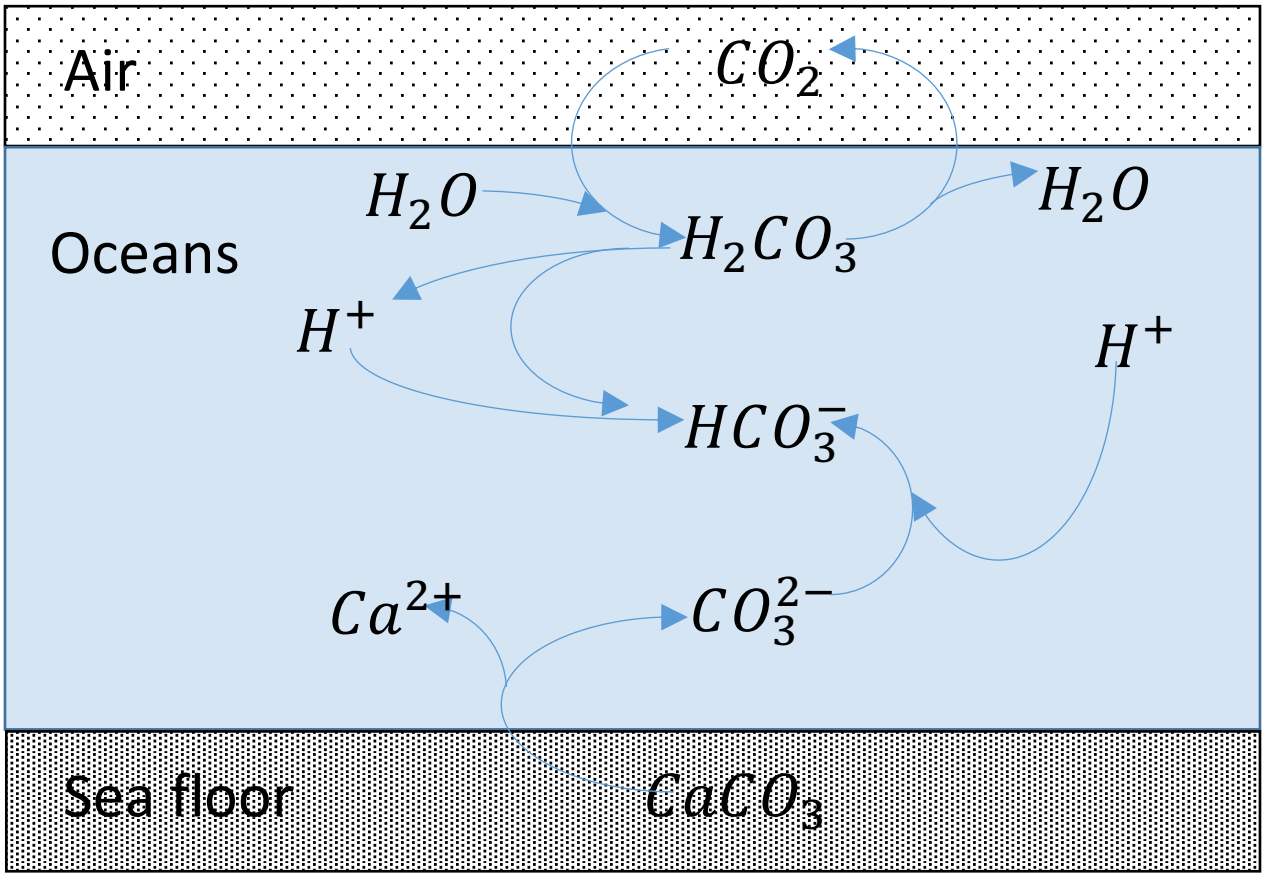
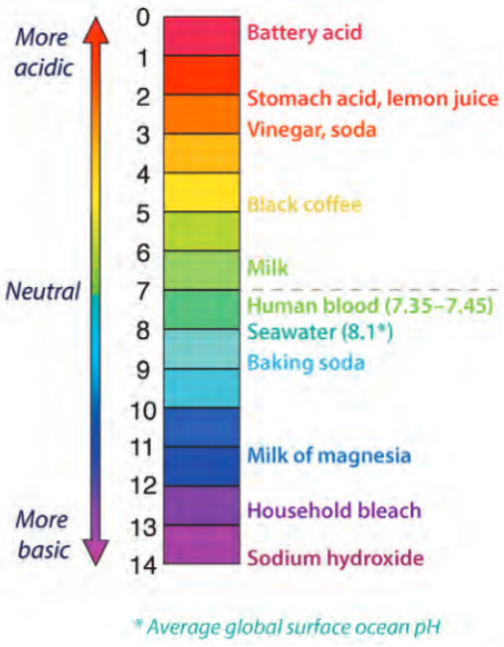
NAME: _____

FLOW DIAGRAM FOR CARBONATE CHEMISTRY



Step 1 – pH of water

Measure out about 100 mL of tap water into an Erlenmeyer flask. Add a few drops of pH indicator. What's the pH? Is the solution acidic or basic?



Step 2 – Effect of CO_2

Bubble some CO_2 through the water in your flask. What's the pH now? The reaction you just carried out can be expressed as

$$CO_2 + H_2O \rightarrow H_2CO_3$$

followed by

$$H_2CO_3 \rightarrow H^+ + HCO_3^-$$

which ***releases*** $\boldsymbol{H^+}$, and therefore makes the solution **more acidic** (Did it?). Circle these reactions and label them as "Step 2" on your flow diagram.

Step 3 – Effect of carbonate ion ($\boldsymbol{CO_3^-}$) on pH

Add a little sodium carbonate to your flask What's the pH now? The reaction you just carried out can be expressed as

$$CO_3^{2-} + H^+ \rightarrow HCO_3^-$$

which ***consumes*** $\boldsymbol{H^+}$, and therefore makes the solution less acidic (Did it?). Circle this reaction and label it as "Step 3" on your flow diagram.

Step 4 – Properties of calcium carbonate ($\boldsymbol{CaCO_3}$)

Empty out your flask, and (just like Step 1) add water and a few drops of pH indicator. Now add a little calcium carbonate to your flask. What's the pH now? How does it compare to the pH of ocean water (pH = 8.2, and falling)? Does it look like the carbonate is fully dissolving? The reaction you just carried out is

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

Circle this reaction and label it as "Step 4" on your flow diagram.

Step 5 – A super-acidified ocean

Add some concentrated hydrochloric acid to your flask. What's the pH now? Does it look like the calcium carbonate is dissolving?