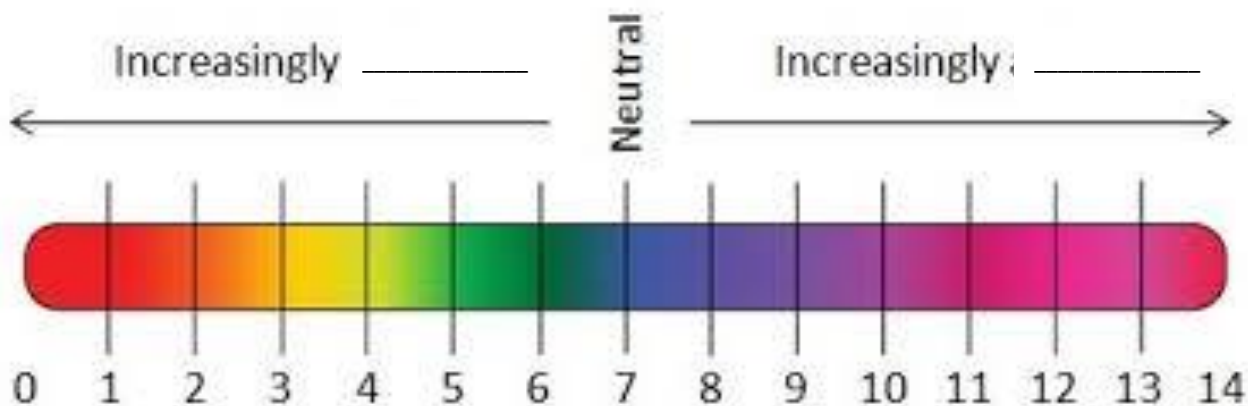


# Investigating the pH Scale

1. Navigate to the PhET "pH scale" Simulation.
  - You can google "PhET pH scale", go to the first link, then click on the play button in the center of the picture
  - OR you can follow this link: [https://phet.colorado.edu/sims/html/ph-scale/latest/ph-scale\\_en.html](https://phet.colorado.edu/sims/html/ph-scale/latest/ph-scale_en.html)
2. Click on the "Macro" box.
3. There is a pH scale on the left hand side of the screen. Label the pH scale below as acidic and basic.



4. Investigate the pH of each of the following substances.
  - a) Drag the pH sensor into the solution to see the pH reading.
  - b) Record the pH of the substance and whether the substance falls into the acid or base end of the pH scale.
5. Now add these substances to the pH scale above.
6. Using the information from the chart and simulation answer the following questions.
  - a) What pH values correspond to acids?
  - b) What pH values correspond to bases?

Substance	pH	acid/base
Drain cleaner		
Hand soap		
Blood		
Spit		
Milk		
Chicken Soup		
Coffee		
Orange Juice		
Soda Pop		
Vomit		
Battery Acid		

7. Now test five substances and see how the addition of water affects the pH. Record your data below. Be sure to do at least 2 acids and 2 bases.

Substance	Volume (Liters)		pH		Which direction did pH move? (closer to 7 or farther away)
	Starting	Final	Starting	Final	
	0.5 L				
	0.5 L				
	0.5 L				
	0.5 L				
	0.5 L				

8. Based on your data how does addition of water affect the pH of the solutions?
9. Do you think you will ever be able to get the pH back to a perfect 7 if you start with an acid or base.

**Create a t-chart in your notebook. Title it Acids and Bases. Use the following information to fill in at least 5 characteristics and 3 examples.**

## The pH Scale

The pH scale is used to measure how acidity and alkalinity. Something which is neither acid alkaline nor is said to be neutral. The neutral pH is pH7. Distilled water is neutral.

Any pH value below pH 7 is acid. Weak acids will be around pH 6 or pH 5. Strong acids will show pH 1 or pH 2 when tested. Acids will turn pH paper red.

Bases how a pH value above pH 7. Weak bases are around pH 8 or pH 9. Strong bases will have a reading of pH 13 or pH 14. Bases will turn pH paper blue.

What is an acid?

You normally have a good idea about acids because of the taste of vinegar and lemon juice, for example. These solutions taste sour and can hurt if they touch a cut in your mouth or your hand. Strong acids are corrosive and they can 'eat' through metal. There are many examples of weak acids in our everyday lives. Rainwater is slightly acidic because it has carbon dioxide gas dissolved in it. Fizzy drinks are acidic for the same reason (and bad for your teeth if you drink too many of them!). You will not often come into contact with strong acids, fortunately. A car battery contains concentrated acid (pH1 or pH2) and you might be surprised to know that your stomach produces an acid at pH2 which helps you to digest your food

What is a base?

Bases are less well known but, in fact, you use an bases every time you pick up a piece of soap. Bases are just as corrosive as acids even though they feel smooth to the touch. Soap cleans you by taking away your outer layer of skins cells (and with these the dirt!). Strong bases taste bitter can feel soapy or slippery if you get them on your fingers but beware, a strong base would take off more than just the outer layer of skin cells. One base, ammonium hydroxide, is used in household cleaning fluids. The strongest of these are those that are used to clean the toilet bowl. Ammonium hydroxide is also a bleach (a chemical that whitens anything it touches). Bleaching agents are able to kill harmful bacteria.

How to test pH

You can test the pH of a solution using indicator paper or indicator liquid. An indicator is a chemical which will change color as the pH changes. There are quite a few indicators in use in the laboratory. This is why each type of indicator paper comes with its own color chart. When you use indicator liquids, such as universal indicator or bromothymol blue, you are always given pH standards for these solutions to compare your results to.