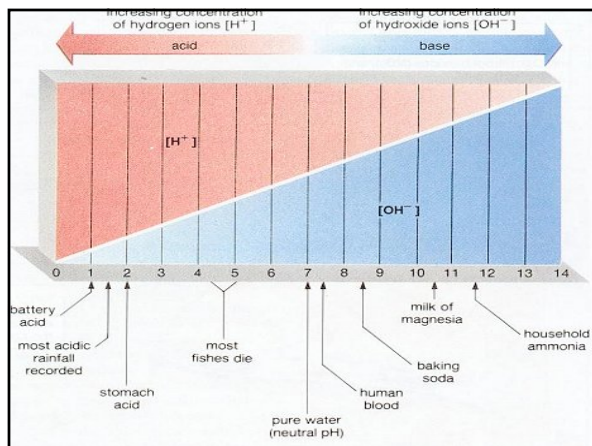
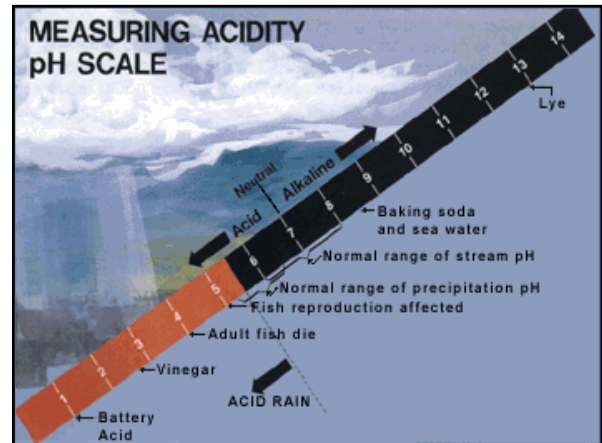


Acids and Bases

- **Acid** – a substance (compound) that donates a hydrogen ion (H^+)
- **Bases**- substances (compounds) that accept hydrogen ions (H^+)
- Acids and Bases are corrosive (chemically eats away)

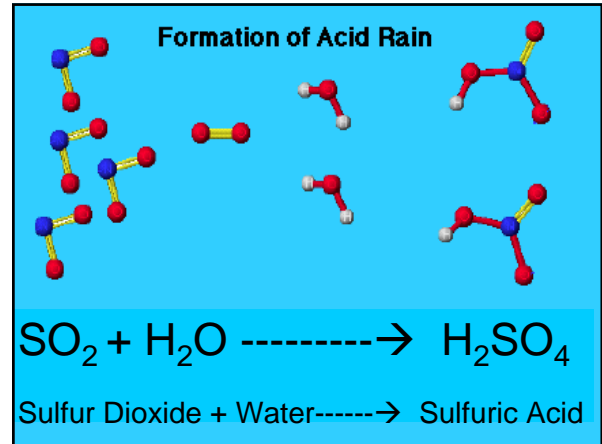
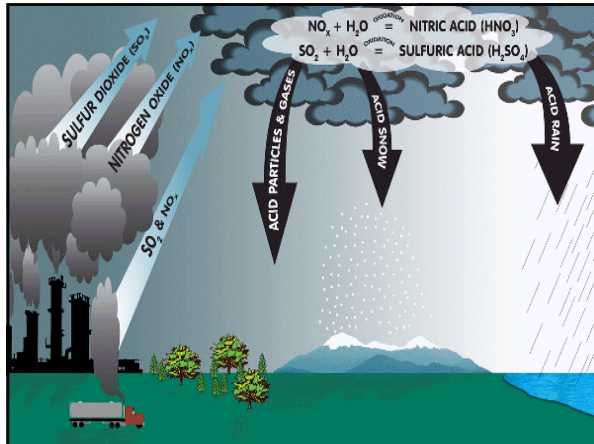
- **pH**- a measure of the concentration of hydrogen ions (H^+) that are in solution
 - the more H^+ in solution the more acidic the solution
 - the less H^+ in solution the more basic the solution
- **pH scale**- number line that shows the range of acids and bases (range = 0-14)
 - Each step shows a tenfold change in acidity

Environmental Effects	pH Value	Examples	
ACIDIC	pH = 0	Battery acid	
	pH = 1	Sulfuric acid	
	pH = 2	Lemon juice, Vinegar	
	pH = 3	Orange juice, Soda	
	pH = 4	Acid rain (4.2-4.4)	
	pH = 4.2-4.4	All fish die	
	pH = 4.5	Acidic lake (4.5)	
	pH = 5	Bananas (5.0-5.3)	
	pH = 5.5	Frog eggs, tadpoles, crayfish, and mayflies die (5.5)	
	pH = 5.6	Clean rain (5.6)	
NEUTRAL	pH = 6	Healthy lake (6.5)	
	pH = 6.5-6.8	Milk (6.5-6.8)	
	pH = 7	Pure water	
	BASIC	pH = 8	Sea water, Eggs
		pH = 9	Baking soda
		pH = 10	Milk of Magnesia
		pH = 11	Ammonia
		pH = 12	Soapy water
		pH = 13	Bleach
		pH = 14	Liquid drain cleaner



Acid formation in the atmosphere

- **Nitric acid**-
 - Forms from nitrogen oxides as a secondary pollutant in the atmosphere
 - Nitrogen oxides form when nitrogen and oxygen combine above 1000 degrees F during combustion.
- **Sulfuric acid**-
 - Forms from sulfur oxides as a secondary pollutant in the atmosphere
 - Sulfur oxides form when sulfur in the fuel that is being burned combines with oxygen to form sulfur oxides.



Buffer

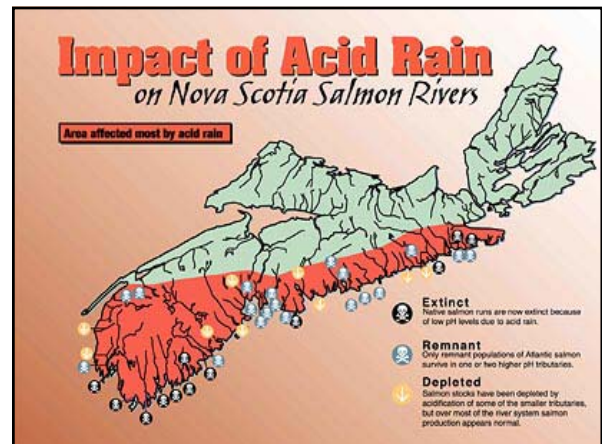
- Acids become less acidic when reacted with metals or other minerals
- Examples – Hard water
 - Tums / Roloids

Effects of Acid Rain (1)

- Acid snow melt can cause **acid shock** which is when a large amount of acid is released into a lake or stream usually when acid snow melts.
- Damage statues and buildings particularly those that are constructed of limestone or marble.
- Kills vegetation (forests and crops)

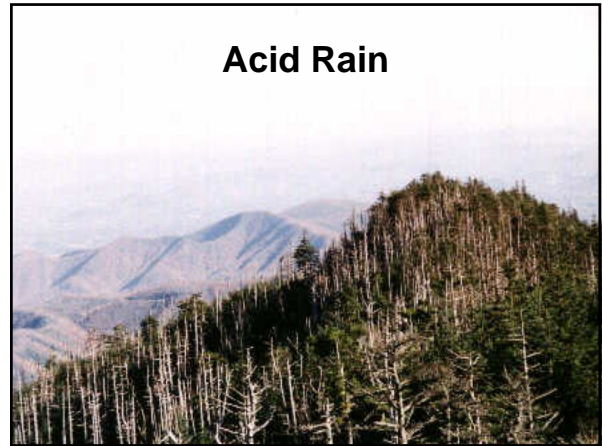
Effects of Acid Rain (2)

- Kills adult fish and amphibians
- low pH water prevents fish and amphibian eggs from hatching.
- Mobilizes heavy metals (aluminum, lead, cadmium) in the soil which can poison vegetation, fish, and drinking water.





Acid Rain



Acid Rain

Distribution of Acid Rain

- Often acid rain is released (NO_x & SO_x) in one place from industry and transportation.
- the acid rain forms in the atmosphere and is carried downwind
- can be released to distant areas.
(this can even cause political friction between different states or countries)

