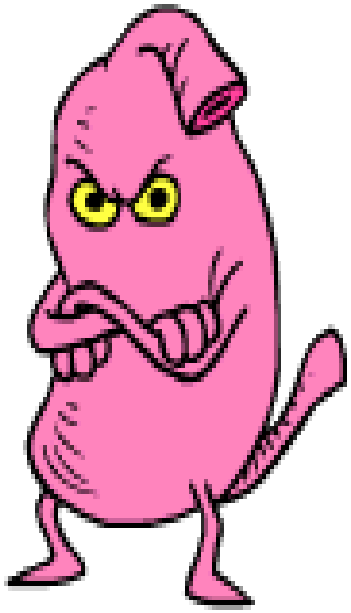
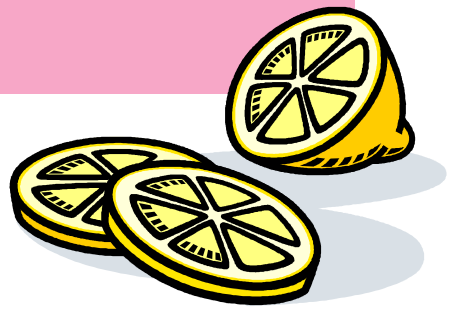


Acids and Bases

Chapter 4 section 3

Properties of Acids

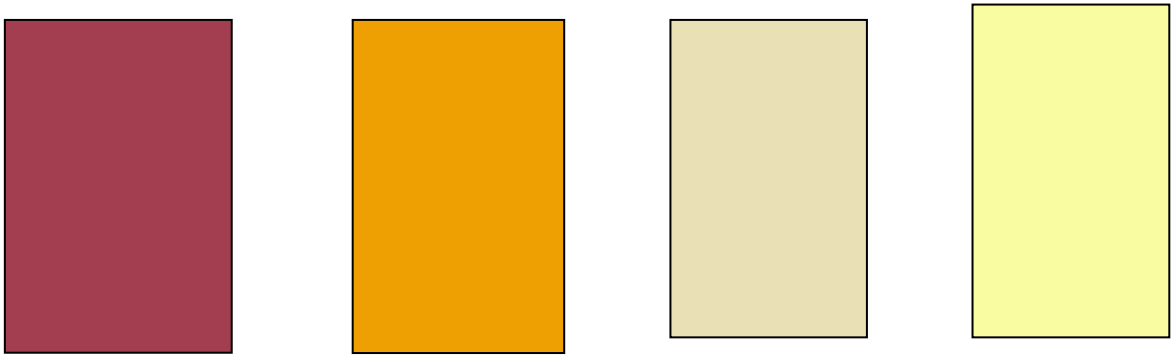


- Tastes Sour
- Reacts with metal and carbonate
- All acids contain H^+ and form H^+ ions when dissolved in water.
- Acids are corrosive – they “Eat away” at other materials

With indicators Acids

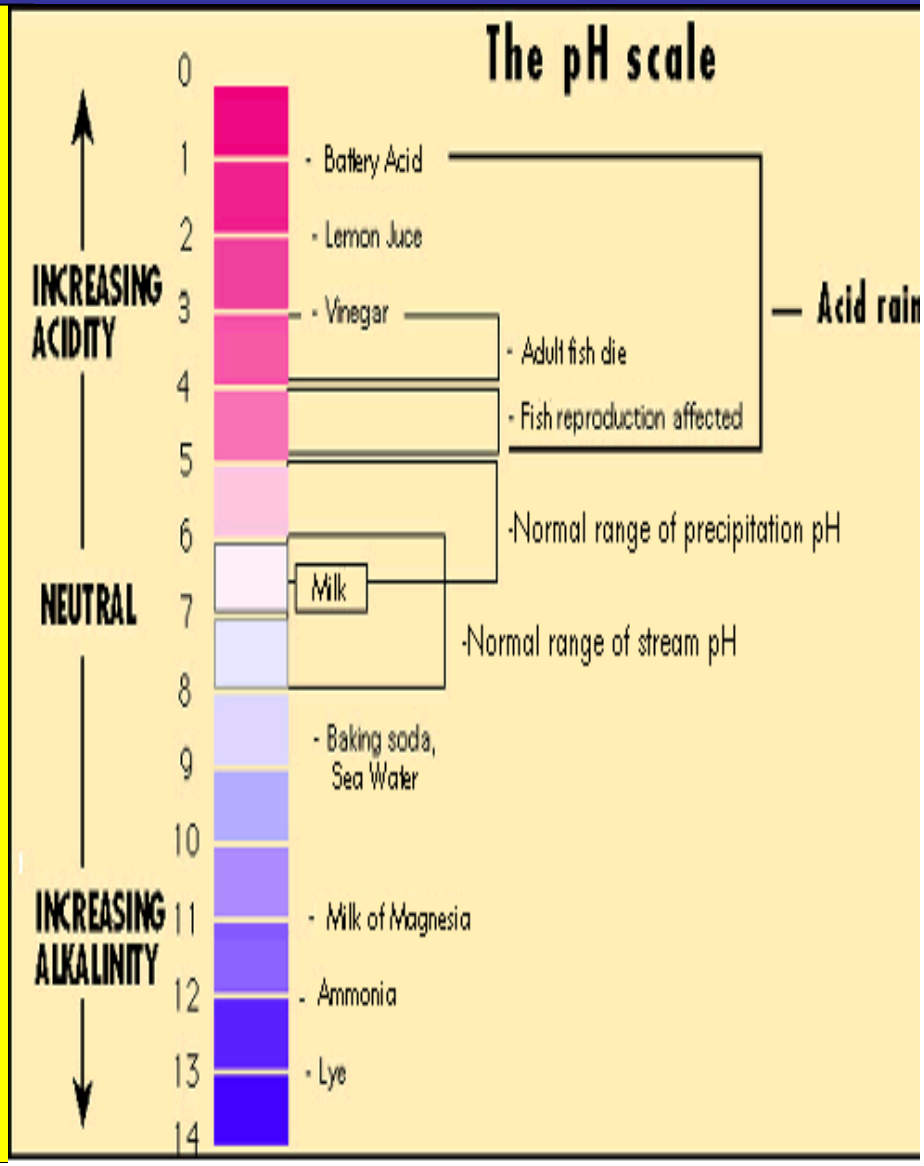
- Turns Blue litmus paper to Red

- Phenolphthalein stays the same color (clear)
- Turns pH paper red -----yellow



Acids & Bases

- **1. Acids and bases are measured on a pH Scale**
- **2. The scale runs from 0-14, substances less than7 are considered to be acids, substances greater than 7are considered to be bases. Neutral = 7.**
- **Common pH Values**
- **1. Gastric Juice = 1.6-1.8**
- **2. Vinegar = 2.5**
- **3. Soft Drinks = 2.0-4.0**
- **4. Blood = 7.4**
- **5. Unpolluted Rain = 5.6**



The pH Scale

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

1 M HCl

Stomach Acid

Lemon Juice

Vinegar

Milk

Pure Water

Blood

Milk of Magnesia

Ammonia

1 M NaOH

10^{0} 10^{-1} 10^{-2} 10^{-3} 10^{-4} 10^{-5} 10^{-6} 10^{-7} 10^{-8} 10^{-9} 10^{-10} 10^{-11} 10^{-12} 10^{-13} 10^{-14}

Acidic

$[H^+]$

Basic

Acids

Name	Formula	Use	Strength
Hydrochloric Acid			
Nitric Acid			
Sulfuric Acid			
Acetic Acid			
Carbonic Acid			
Phosphoric Acid			

Properties of Bases

- Tastes Bitter
- Feels slippery
- Do not react with metal or carbonate
- Most bases contain a positive Ion plus OH^-

  Ammonia NH_3
- When dissolved in water bases form positive ion and Hydroxide OH^-

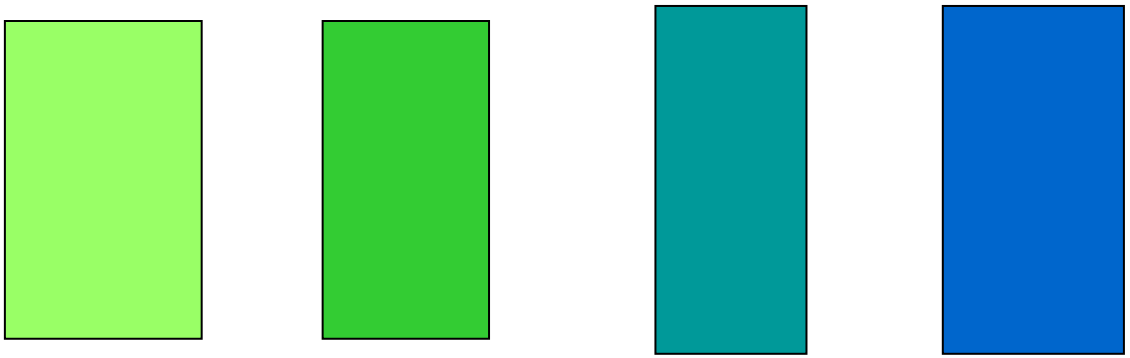
$NH_3 + H_2O$ ---------- > $NH_4 + OH$

With Indicators Bases

- Red litmus paper turns Blue

- Turns Magenta in phenolphthalein

- Turns pH paper Yellowish green ------ Blue

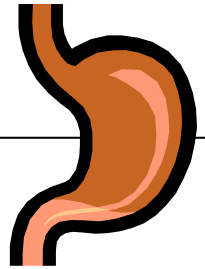


Bases

Name	Formula	Use	Strength
Sodium Hydroxide			
Potassium Hydroxide			
Magnesium Hydroxide			
Calcium Hydroxide			
Aluminum Hydroxide			
Ammonia			
Calcium Oxide			

Properties

- Properties of an Acid
- 1.
- 2.
- 3.
- 4.



- Properties of a Base
- 1.
- 2.
- 3.
- 4.

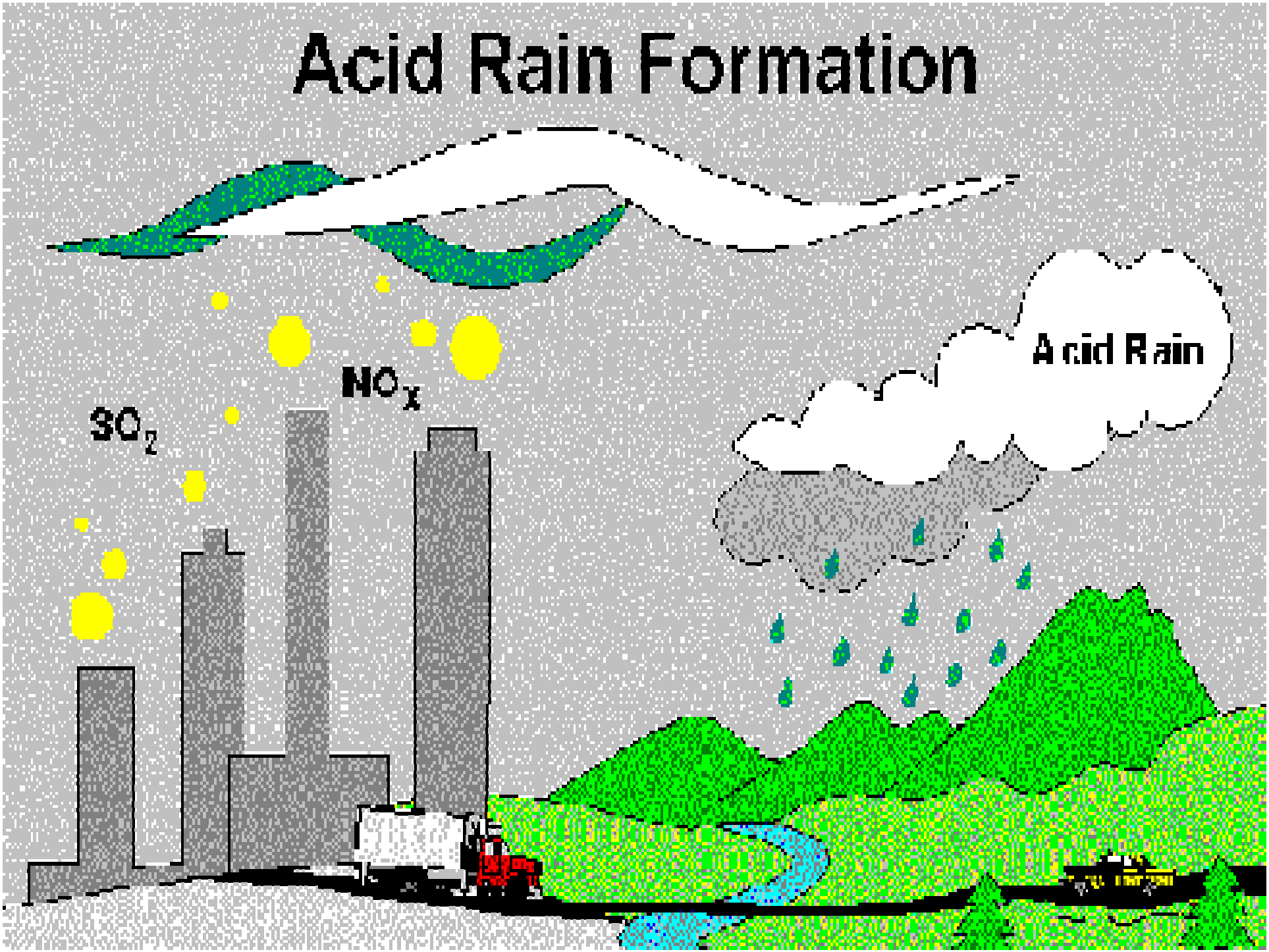
Reaction with indicators

- Acid
- 1.
- 2.
- 3.

- Base
- 1.
- 2.
- 3.

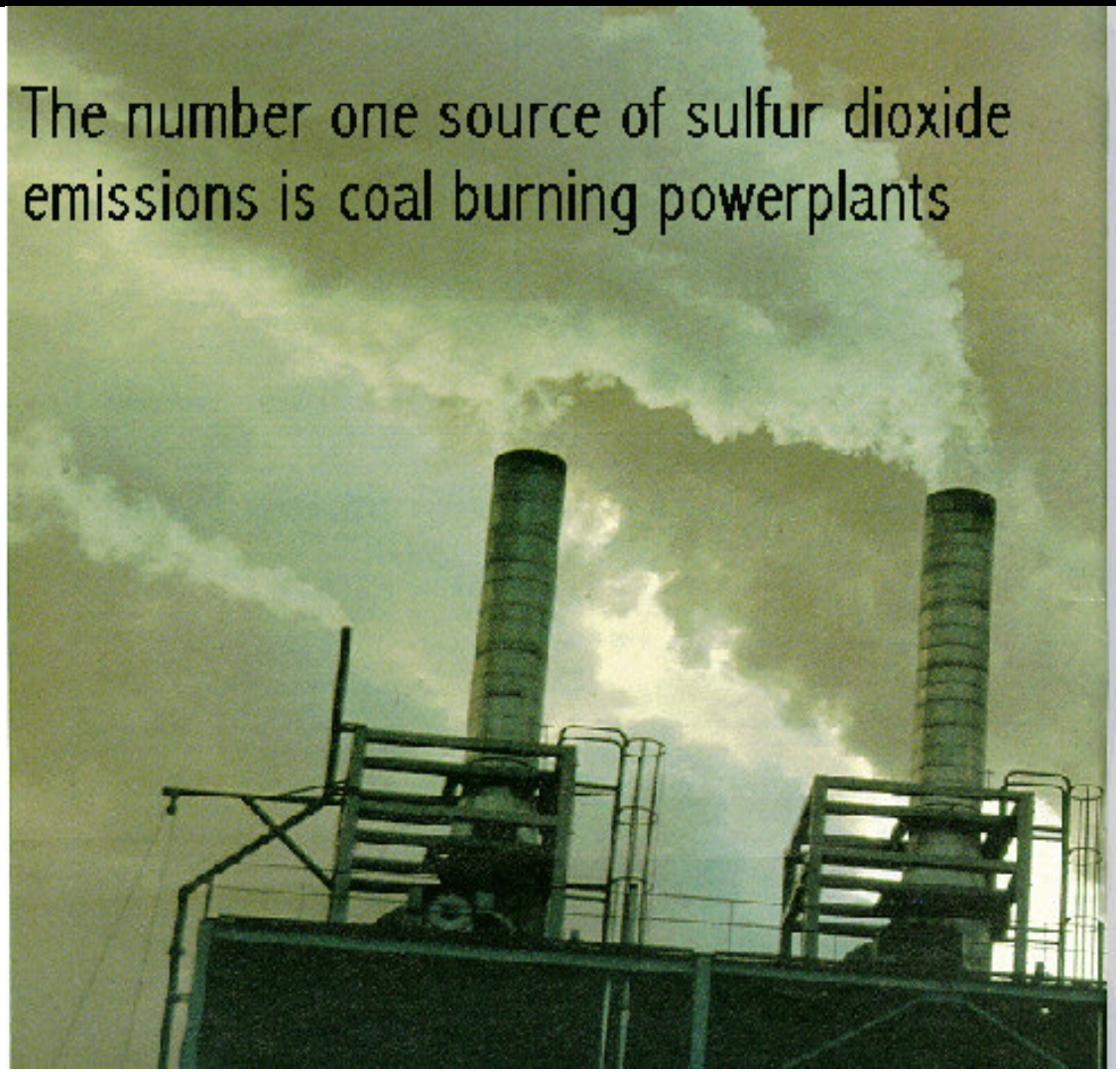
Acid Rain

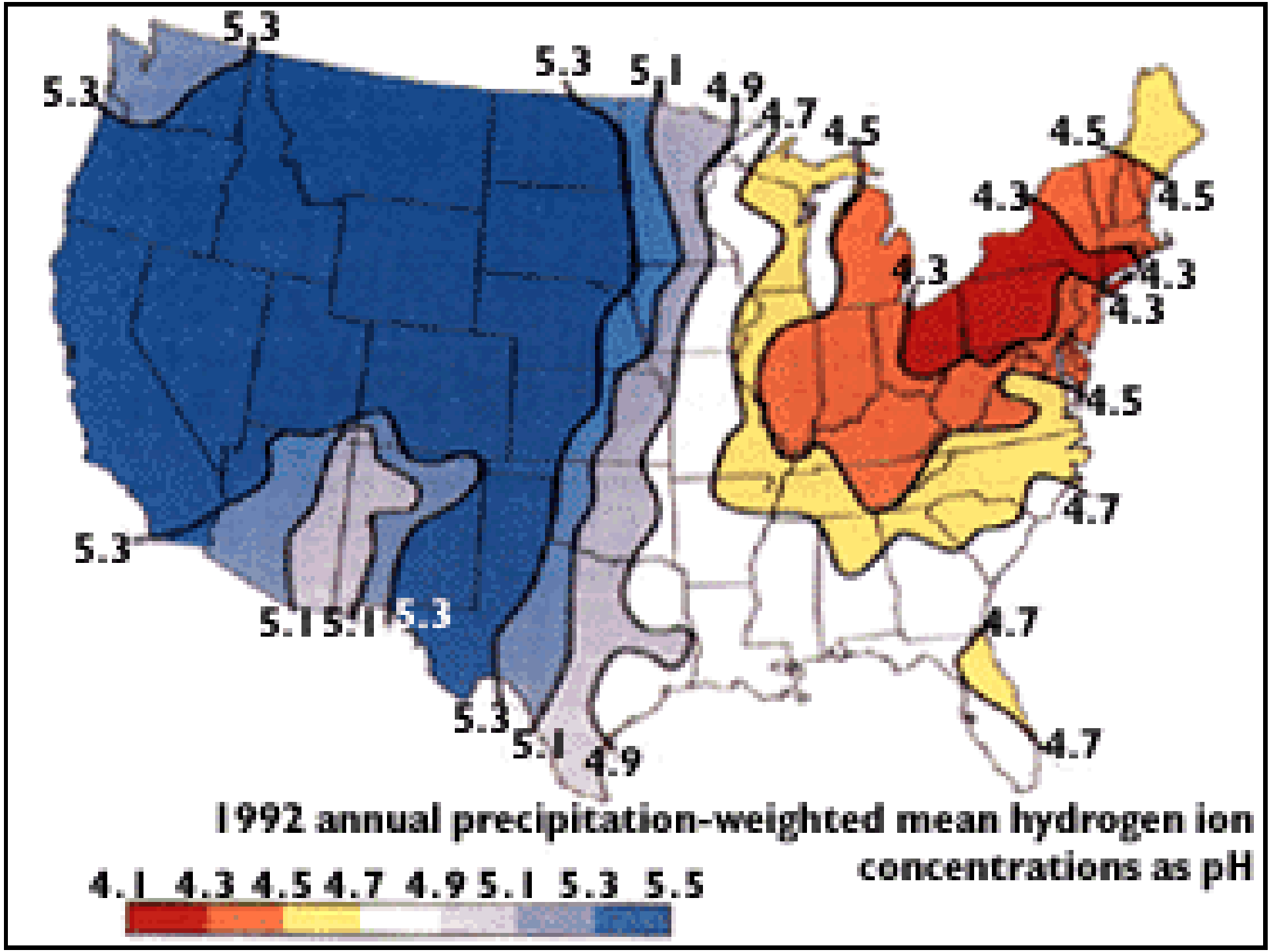
- Acid rain is any precipitation that has a pH less than 5.6.
- The number one cause of acid rain is the burning of fossil fuels.
- Two Major Pollutants
- 1. Sulfur Dioxides
- 2. Nitrogen Oxides


Acid Rain Formation
NO_x
SO_2
Acid Rain

Acid Rain

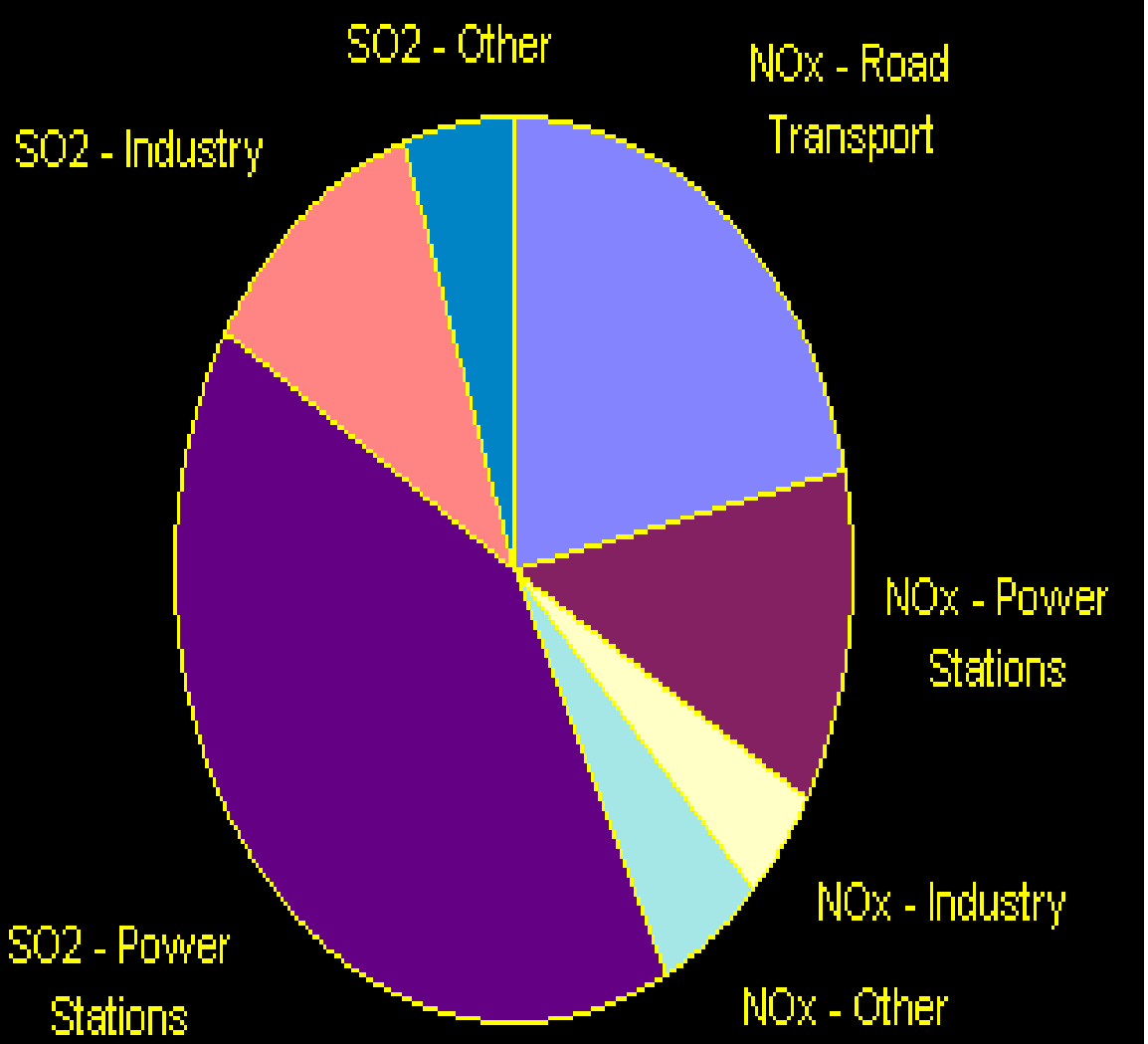
- Acids in acid rain
- 1. Sulfuric Acid
  - H_2SO_4
- 2. Nitric Acid
  - HNO_3



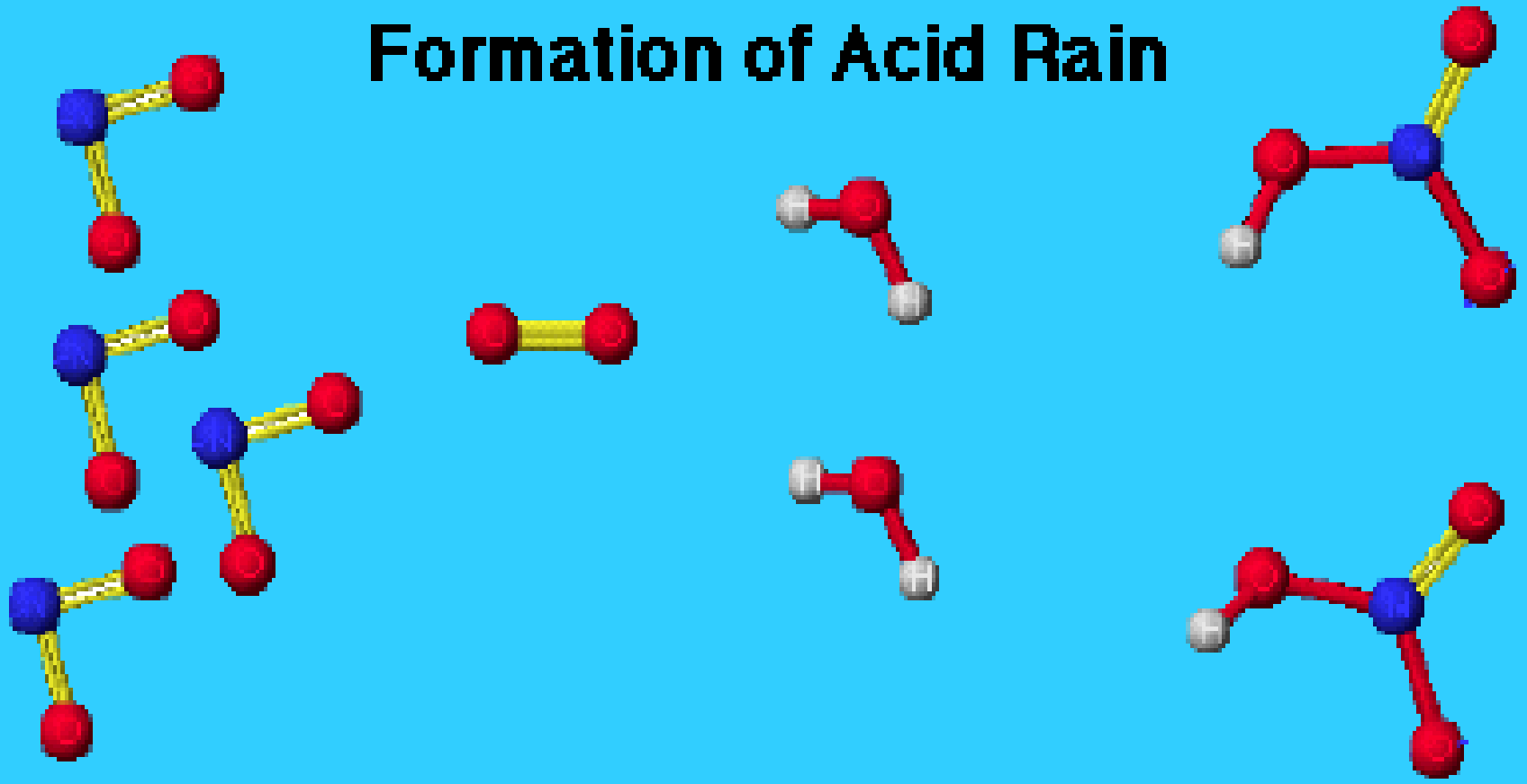

5.3
5.3
5.3
5.1
4.9
4.7
4.5
4.5
4.3
4.5
4.3
4.3
4.5
4.7
5.3
5.1
5.1
5.3
4.7
4.7
5.3
5.1
4.9
1992 annual precipitation-weighted mean hydrogen ion concentrations as pH
4.1 4.3 4.5 4.7 4.9 5.1 5.3 5.5

Acid Rain

- What can be done to solve the problem?
- 1. Clean up smoke stacks and exhaust pipes
- 2. Use alternative energy sources



Formation of Acid Rain



$4\ NO_2 + O_2 \longrightarrow 2\ H_2O + 2\ HNO_3$

Nitrogen Dioxide | Oxygen | Water | Nitric Acid

Fine works of sculpture are slowly being destroyed by acid rain.

One Brick Shy

"Dad, what's acid rain?"