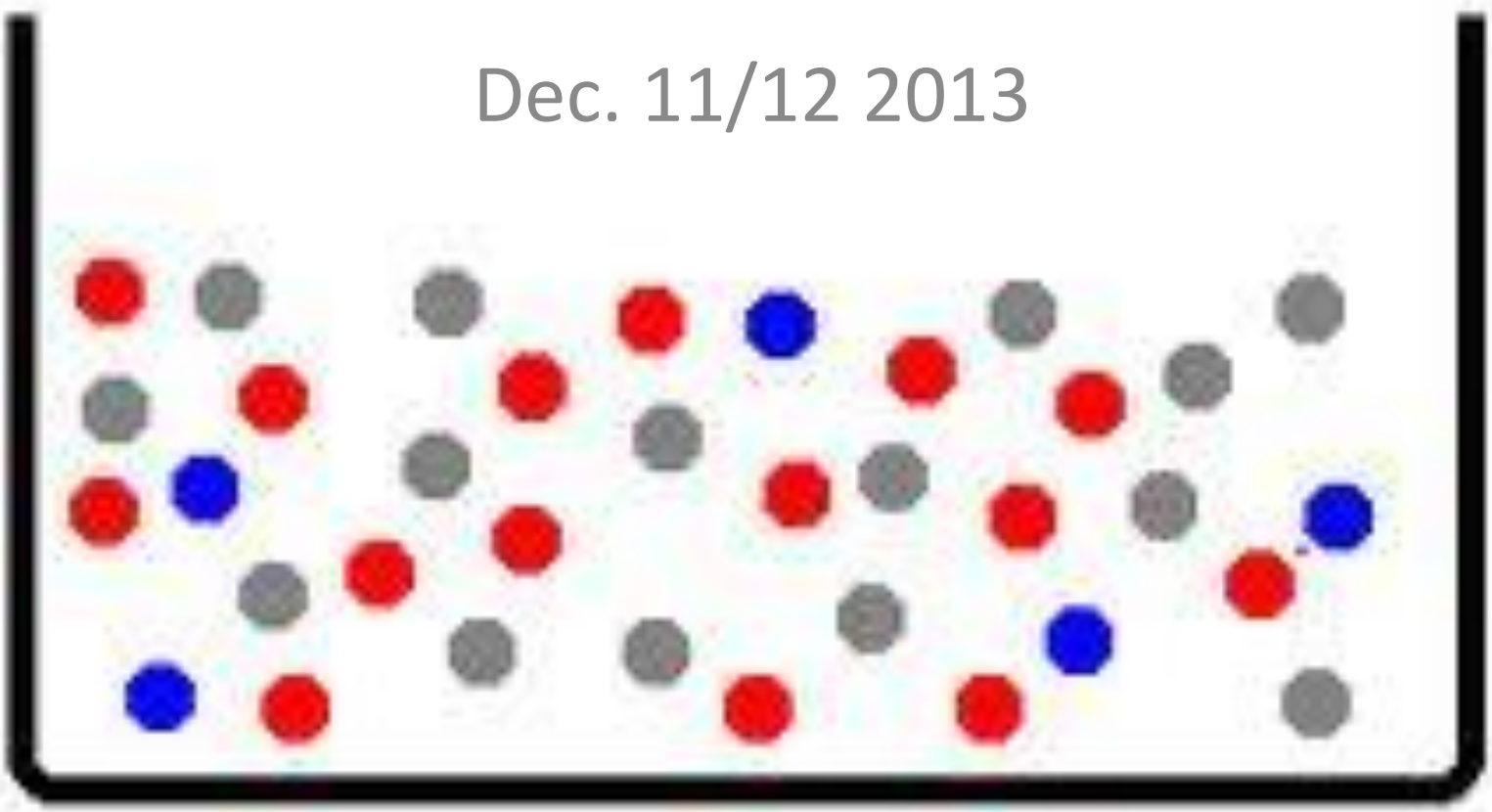
pH & Acids/Bases

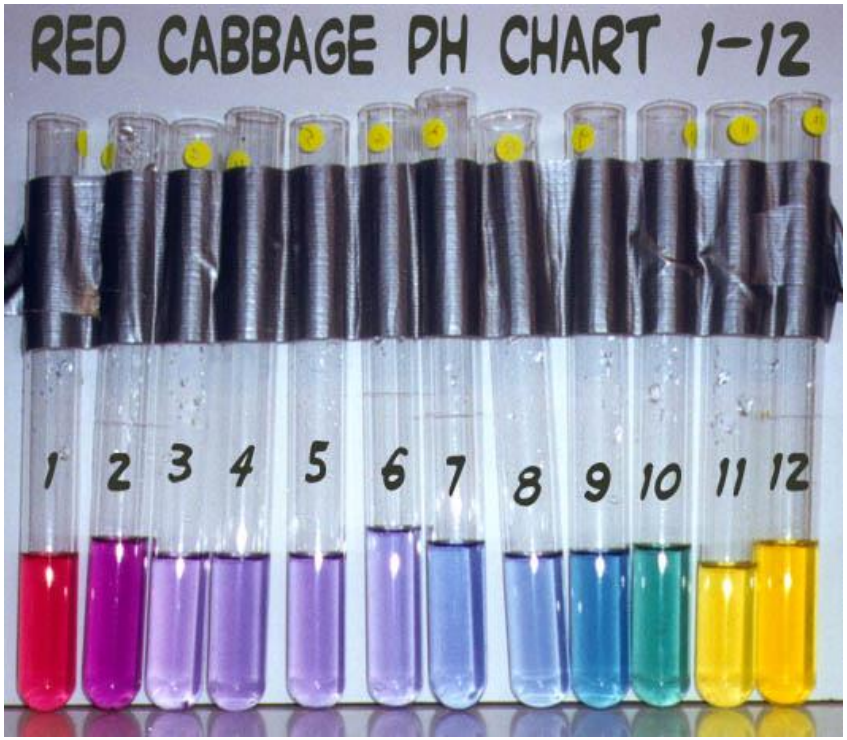
Dec. 11/12 2013



Introduction to pH

- What is so special about cabbage juice?
  - It is a natural pH indicator

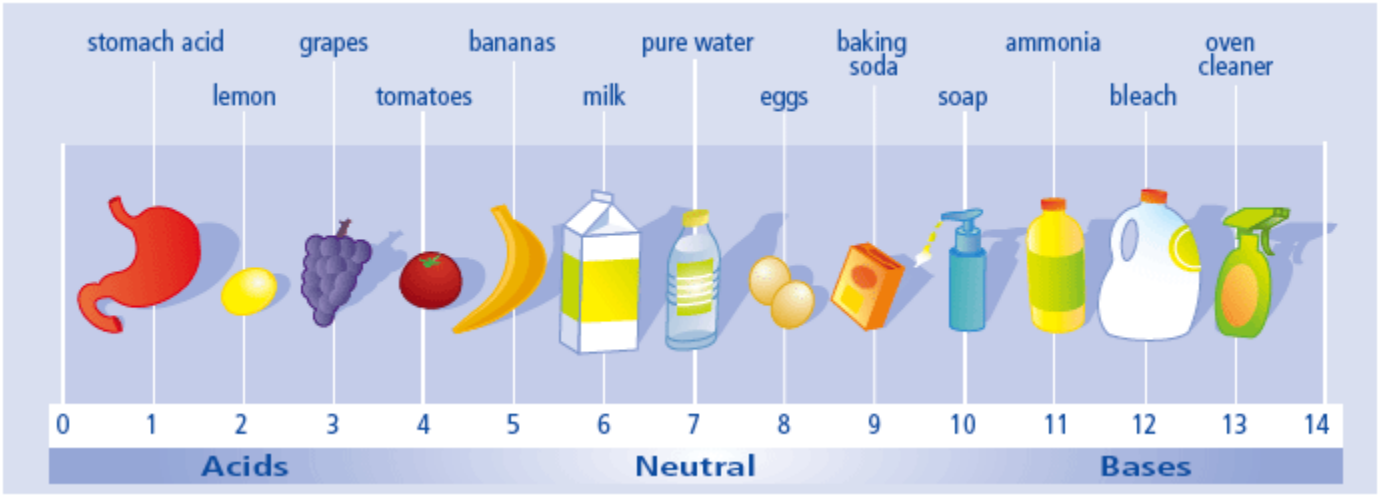
Hydrochloric Acid
HCl
H^+ Cl^-



Sodium Hydroxide
NaOH
OH^- Na^+

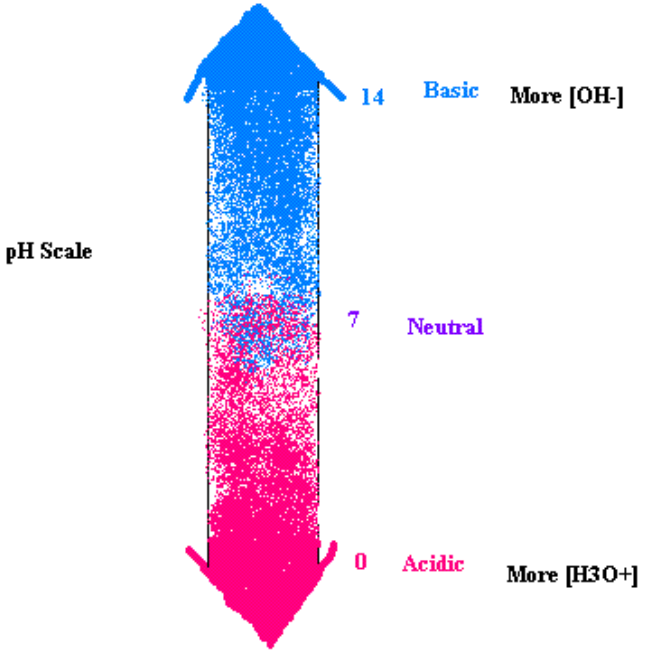
What is pH? (1)

- “Power of the Hydrogen”
- Measure of the concentration of hydrogen ions (H+) in a solution
- pH = -log[H+]
- The more H ions, the more acidic



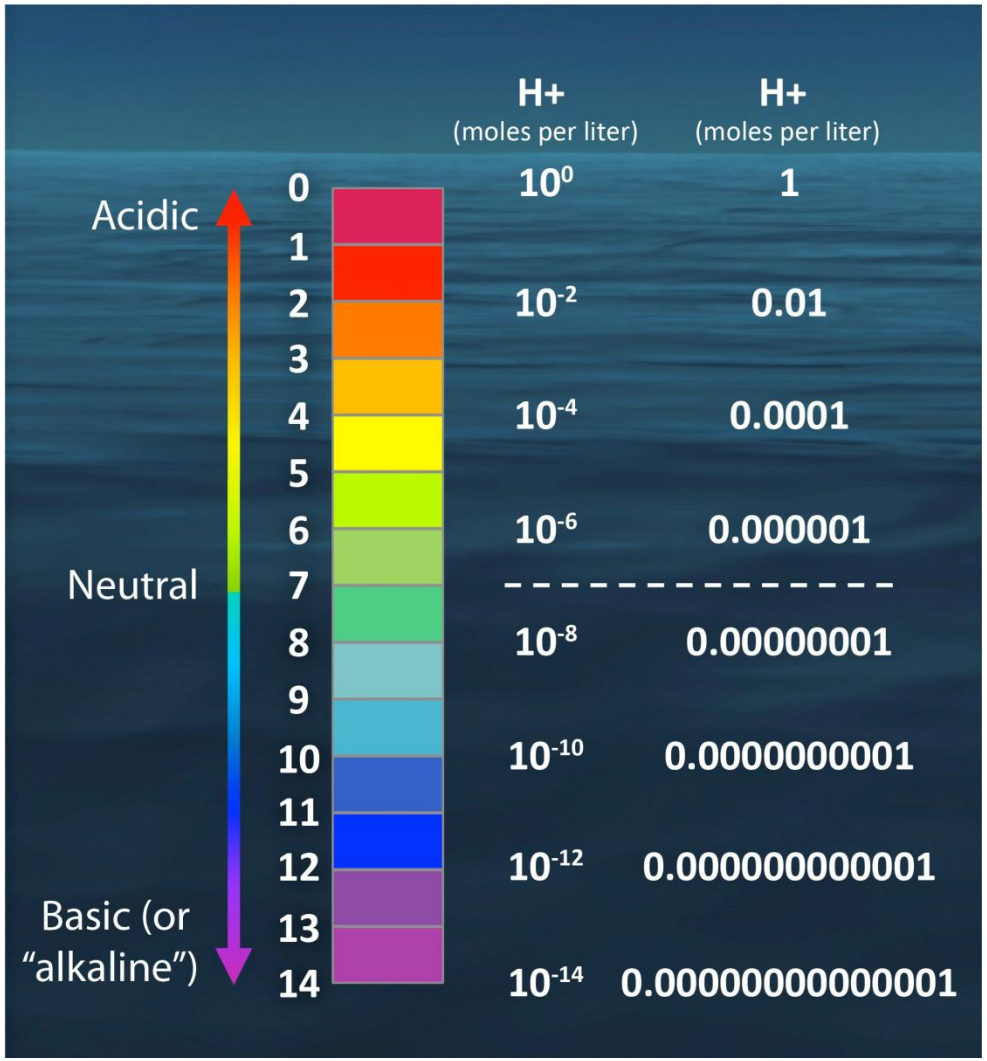
pH Scale (2)

- Scale from ____ to ____
- Anything _____ than 7 is acidic
- Anything _____ than 7 is basic
- Anything at 7 is neutral



The pH scale (3)

- Logarithmic
- 10X difference between each pH unit
- This means…
  - Between each ‘step” the solution becomes 10x more or less acidic and has 10x more or less hydrogen ions



Concept Check

- How much more acidic is a solution with a pH of 2 compared to a solution with a pH of 4?

$4-2 = 2$

$10^2 = 100$

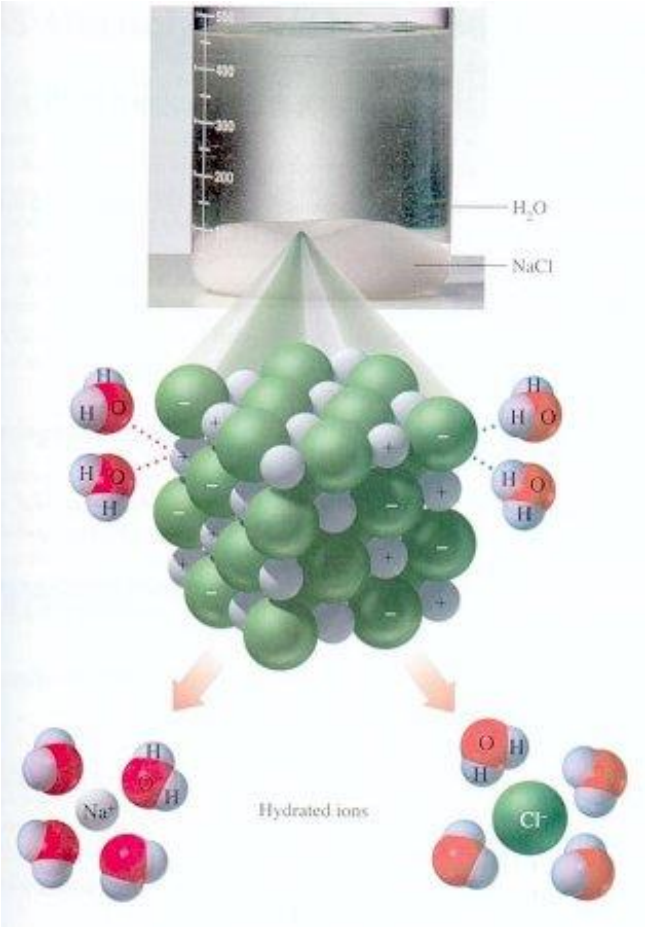
How much more basic is a solution with a pH of 14 compared to a solution with a pH of 10?

$14-10 = 4$

$10^4 = 10000$

Water (H_2O)

- Why is water so important?
- Polar molecule
  - Negative dipole (O)
  - Positive dipole (H)



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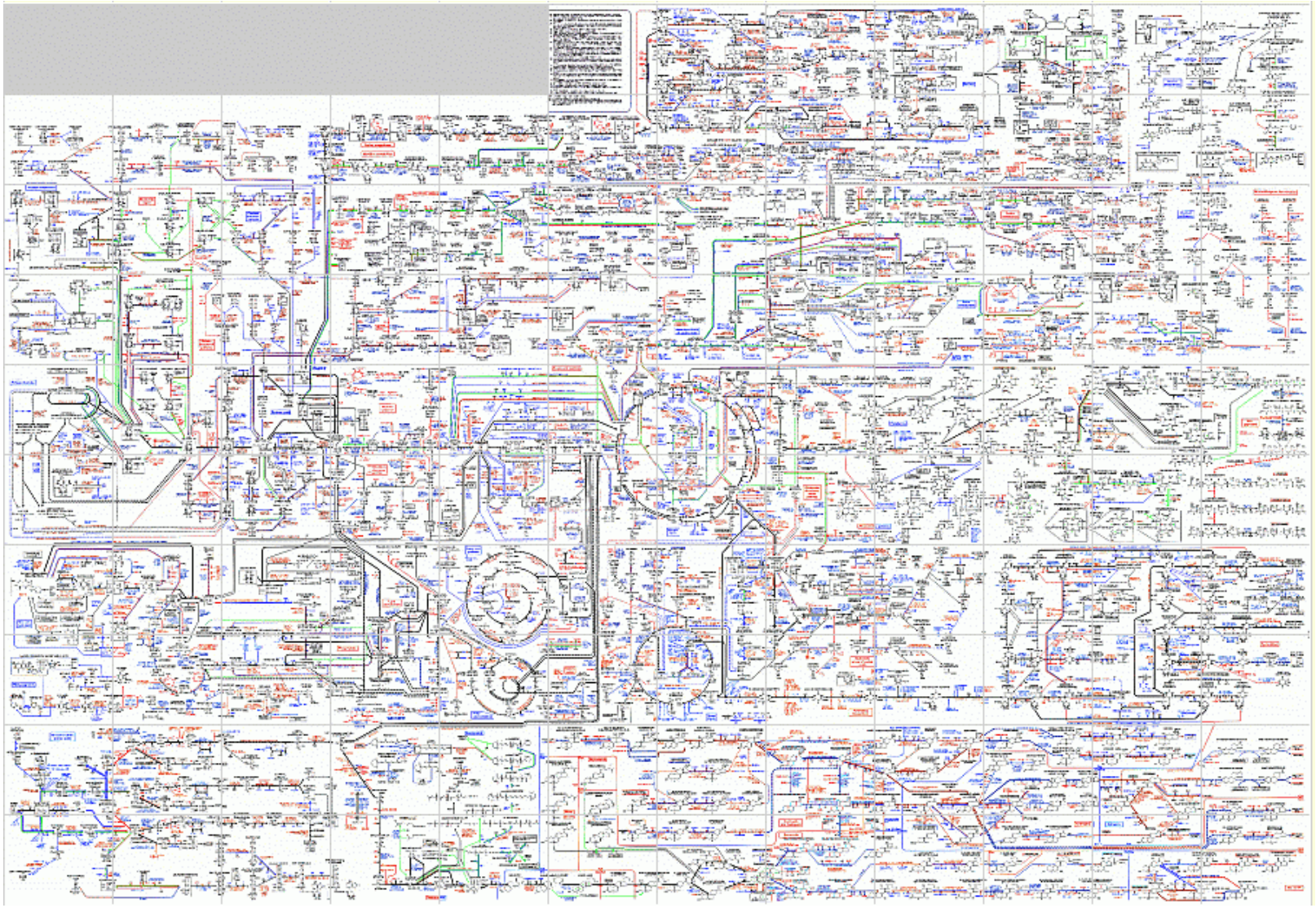
Why is pH important?



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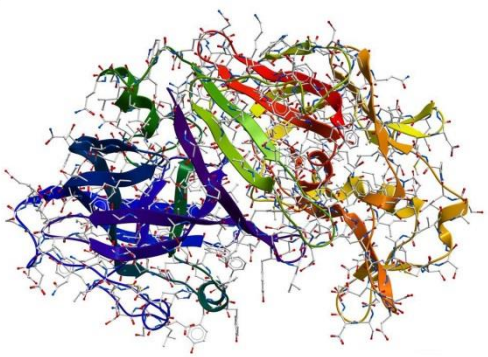
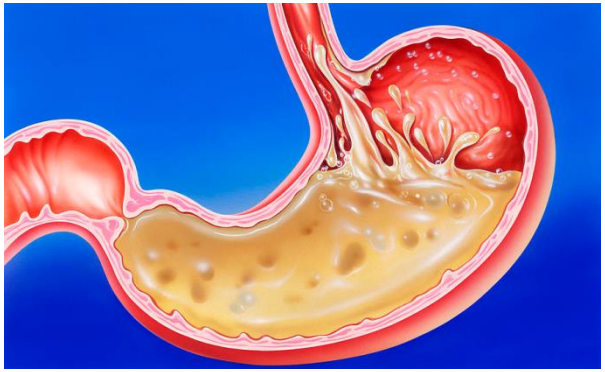


- Enzymes work within narrow pH ranges



- Antacids regulate stomach pH

- Oxygen carrying capacity of the blood is determine by pH (pH 7.4)

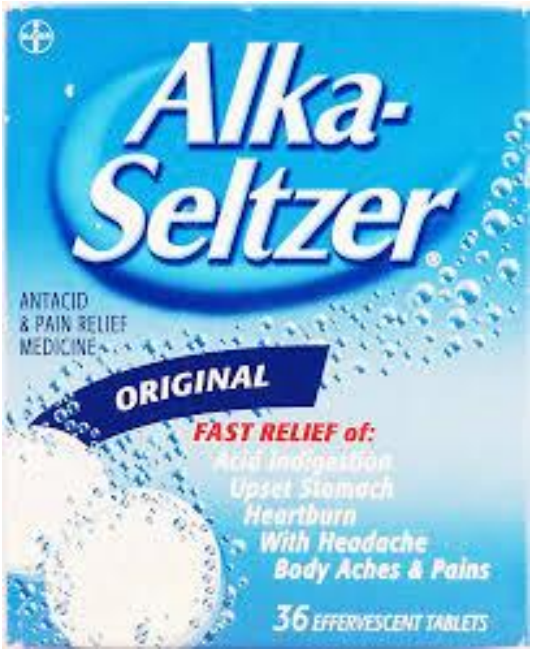
- Kidneys maintain pH of body fluids using buffers

- Amphibians, plants, coral reefs, bacteria, and all ECOSYSTEMS rely on maintaining a certain pH range

Alka-seltzer

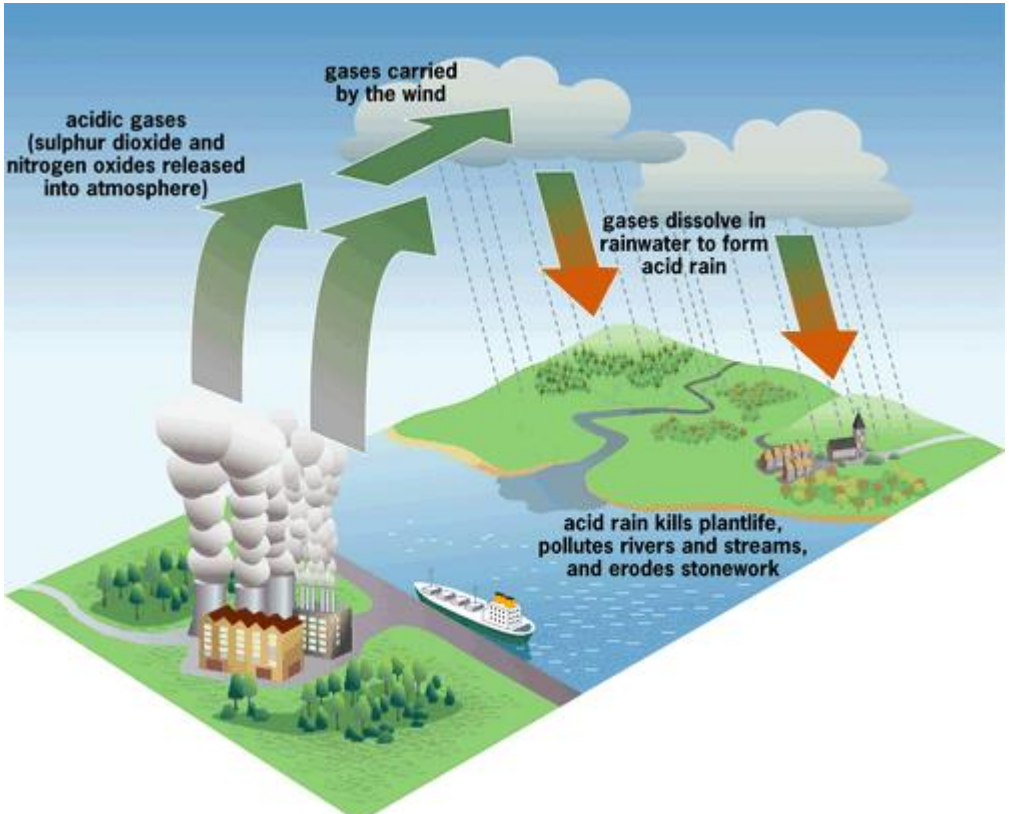
- What do you think the pH of Alka-seltzer is?

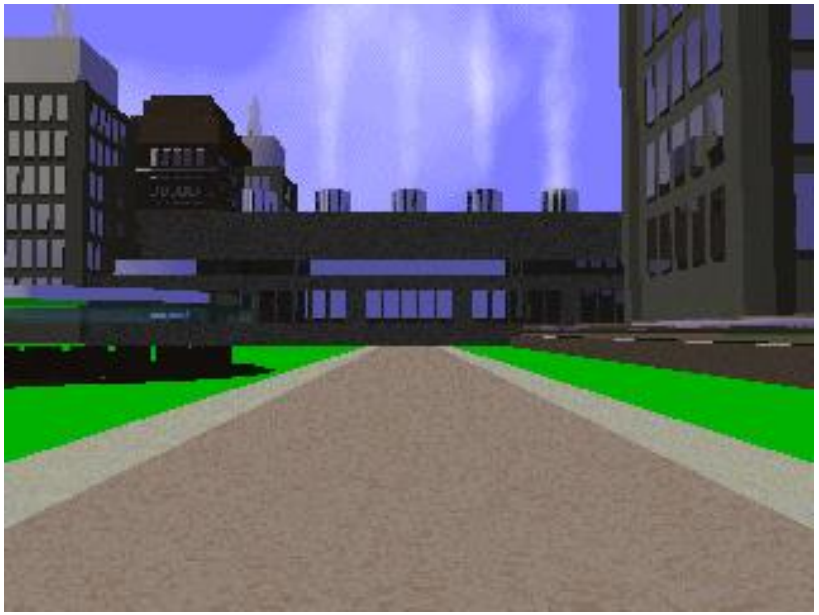
- You don't want to neutralize you stomach…just make it LESS acidic…name is misleading



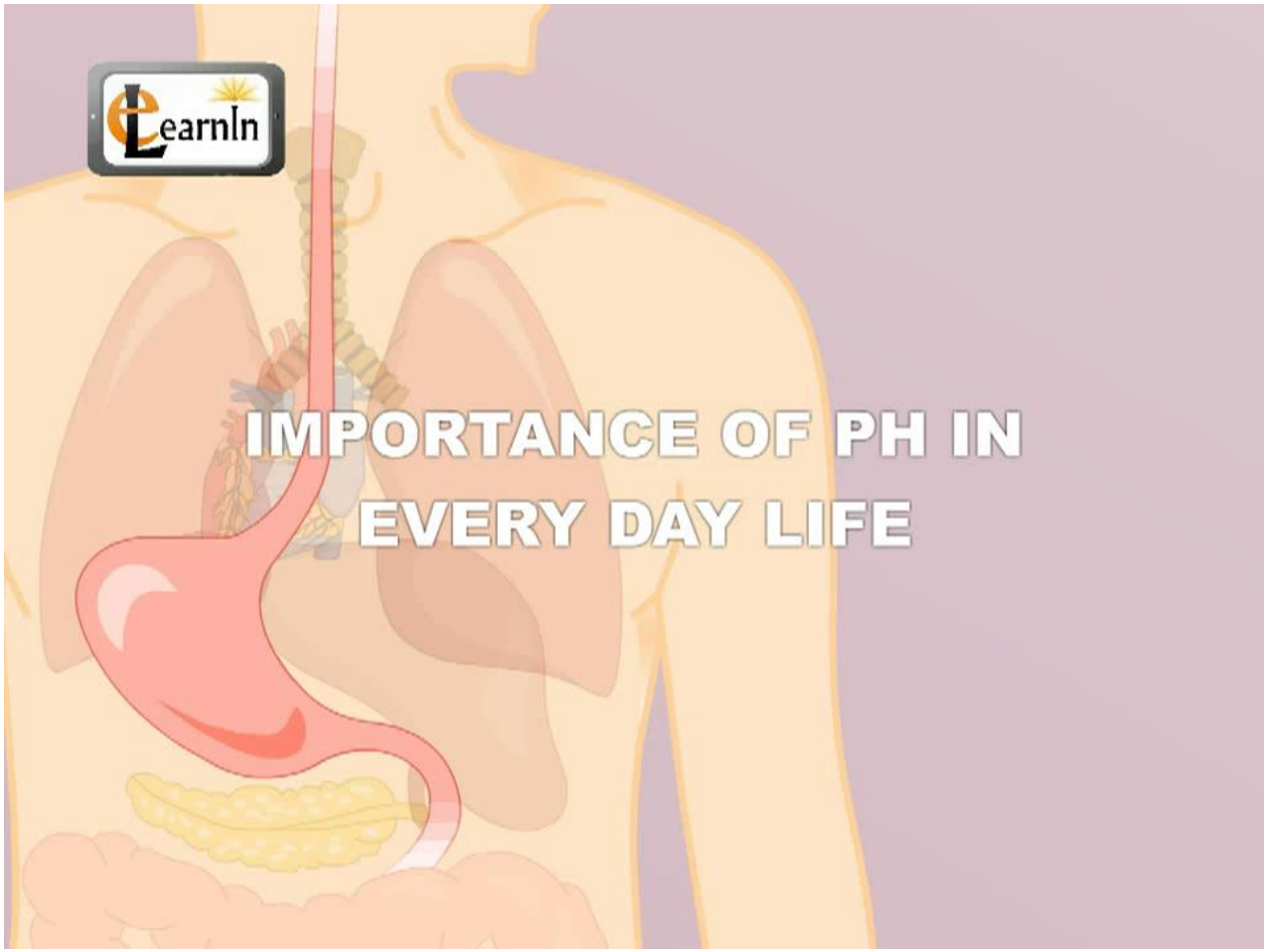
Why is pH important? – acid rain

- Rain has pH around 5.6
- Acid rain pH as low as 2.0





Why is pH important?

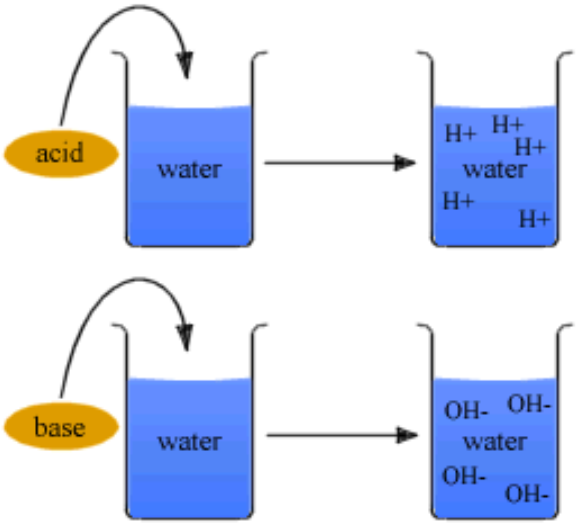


Acids

- Increases the hydrogen ion (H+) concentration of a solution
- Sour
- Conducts electricity

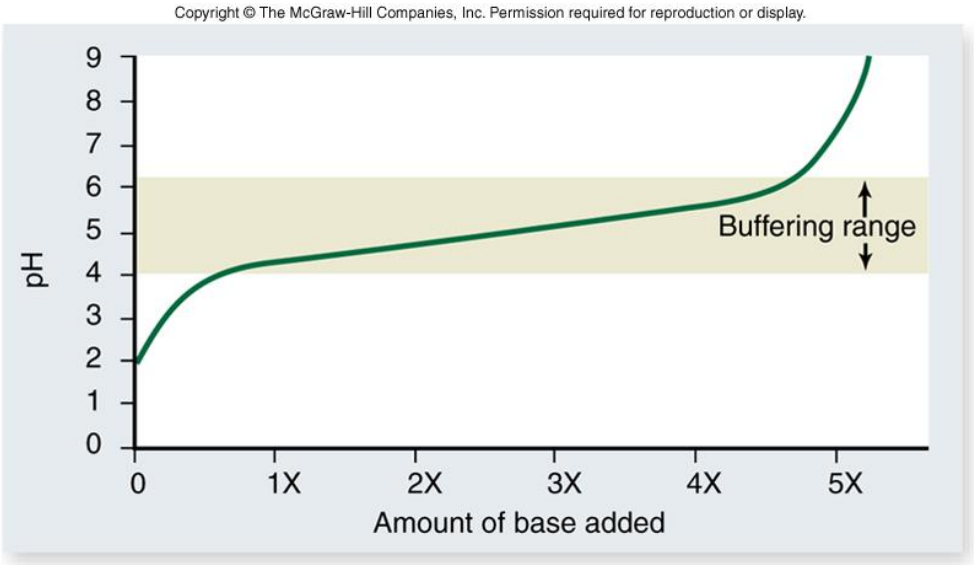
Base

- Decreases the hydrogen ion (H+) concentration of a solution by forming (OH-) ions
- Bitter
- Conducts electricity



Buffers

- Contain a conjugate acid and base that maintains the pH within certain limits by accepting or donating H+ ions to solution.



http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/buffer12.swf

Lab Today

- Test the pH of multiple solutions
- This is due Today
- Two classes from now is the TEST
- Will get all materials back next class to study for test