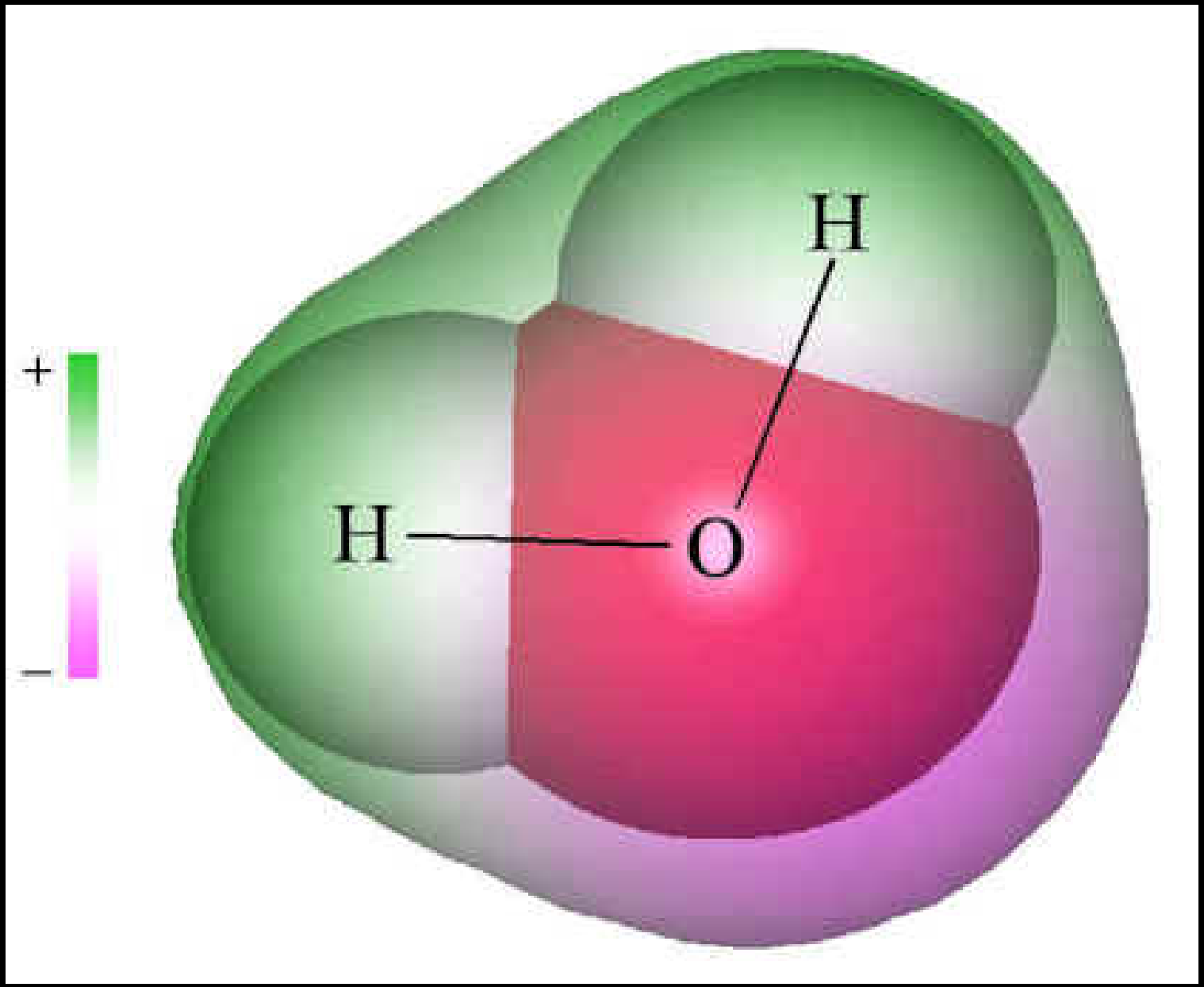
The contents of this presentation include:

- The Water Molecule
- Cohesion vs. Adhesion
- Solutions and Suspensions
- Acids, Bases and pH
- Get ready for some Chemistry FUN!

The Water Molecule

- 2 Hydrogens and 1 Oxygen
- How many Protons in the nucleus of H?
  - 1!
- How many Protons in the nucleus of O?
  - 8!
- Which one has a stronger attraction of electrons?
  - Oxygen!
- So what does this all mean?
  - There is a difference in charge at each end of a water molecule

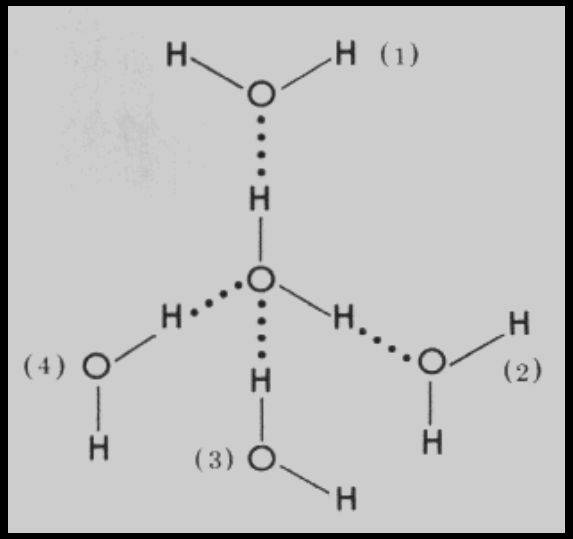

+
–
H
H
O

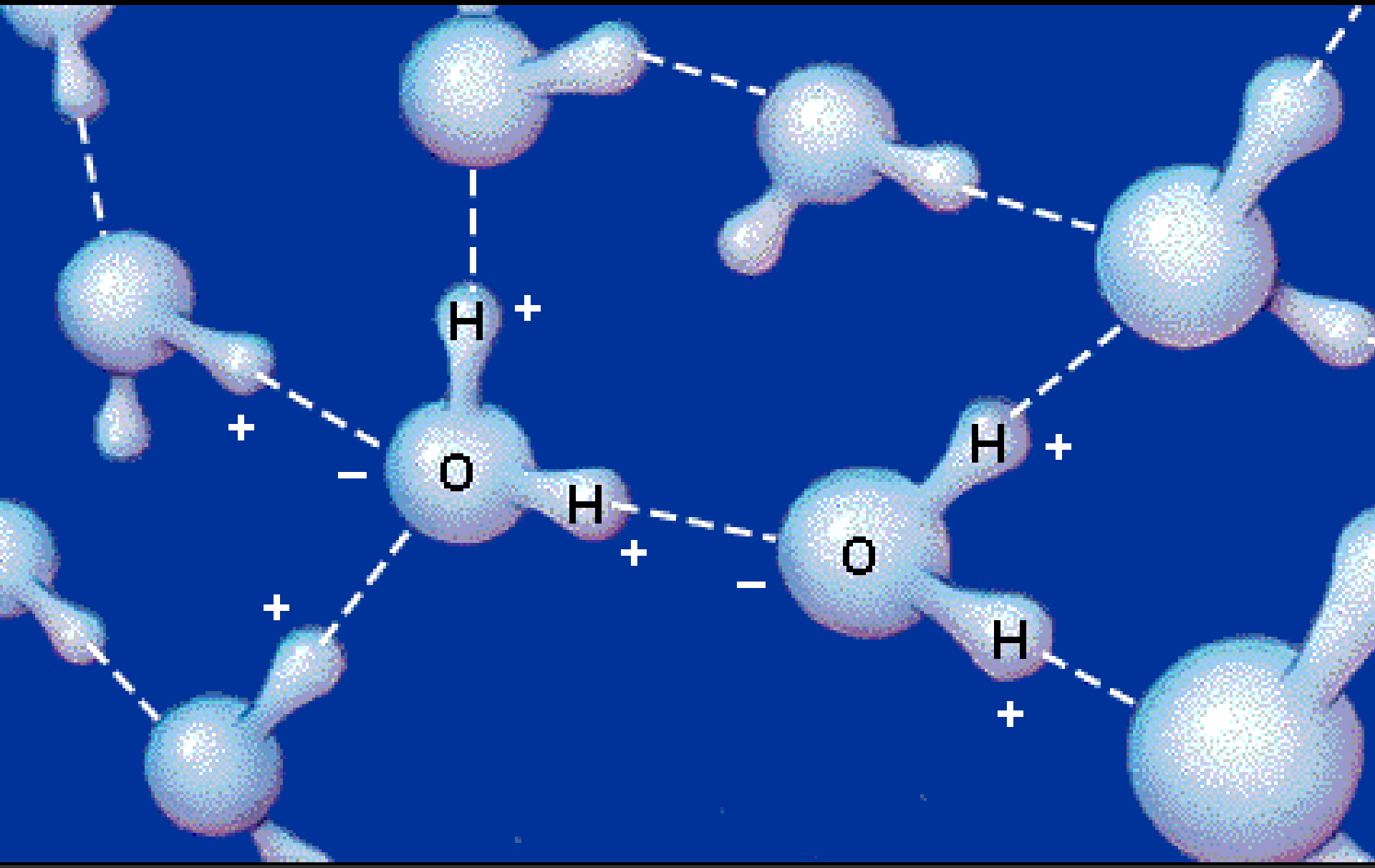
Water is a Polar Molecule

- Polar Molecule: an uneven distribution of electrons.
- Negative Pole is near the O because the electrons (-) spend more time around the Oxygen end
- Positive Pole is near the H

Hydrogen Bonding

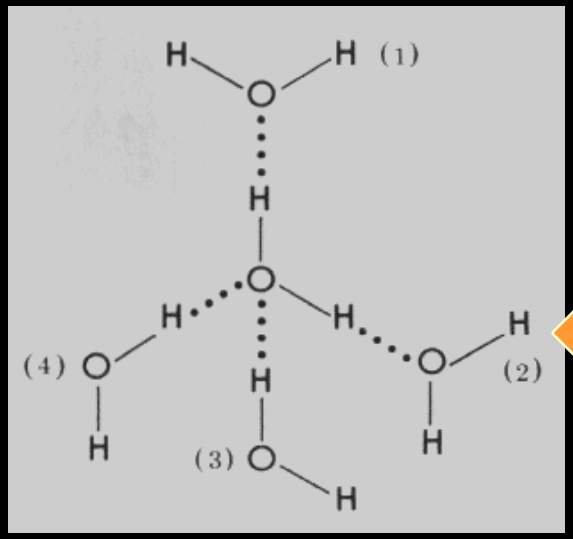
- The partial (+) and (-) charges cause molecules of water to attract each other.
- Not as strong as covalent or ionic bonds, but they are the strongest bonds that form between molecules.



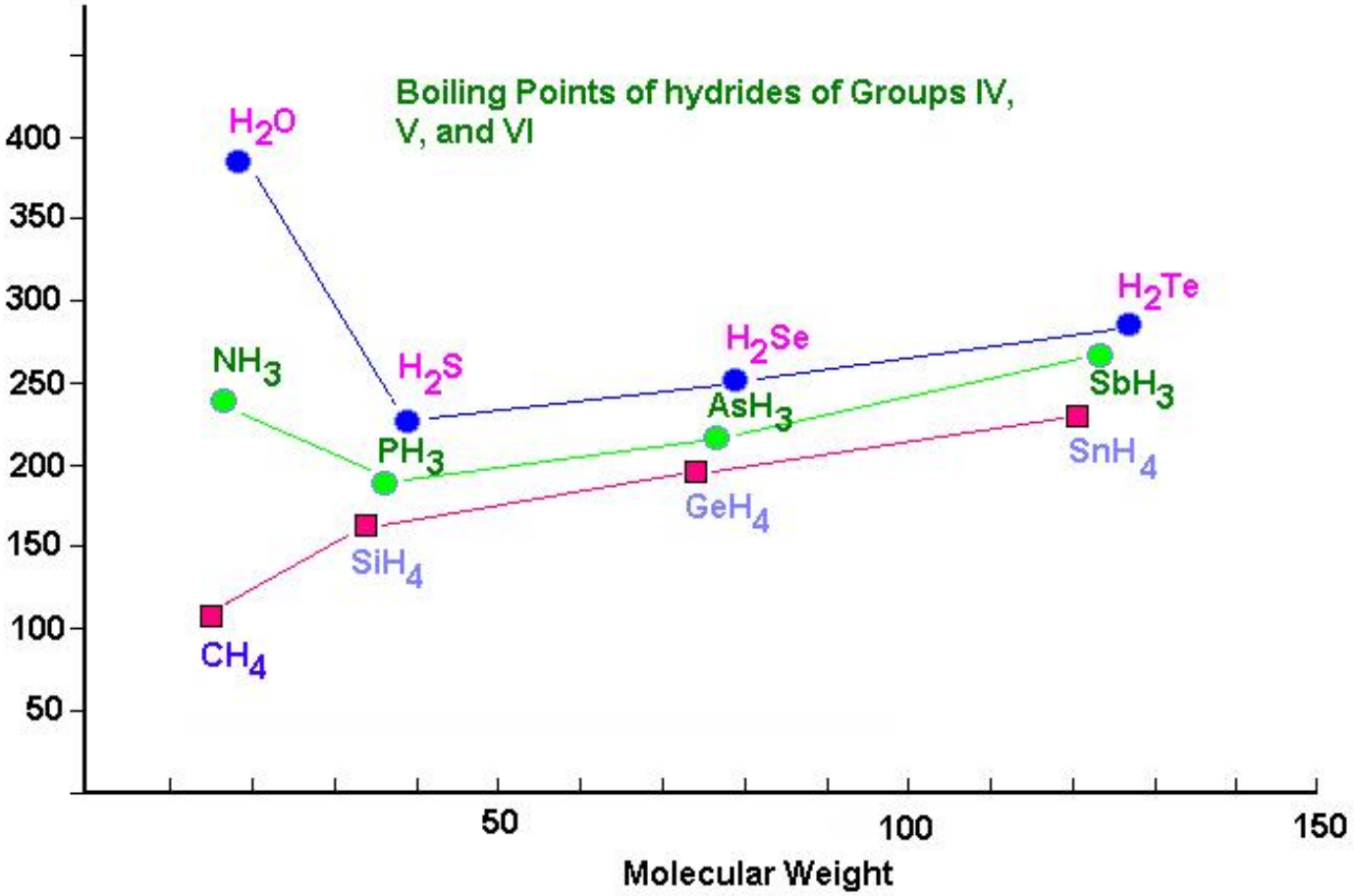


Cohesion vs. Adhesion

- Cohesion: attraction between molecules of the same substance…Water.
- Adhesion: attraction between molecules of different substances…Water and glass.



cohesion!!


Boiling Points of hydrides of Groups IV, V, and VI
H_2O
H_2S
H_2Se
H_2Te
NH_3
PH_3
AsH_3
SbH_3
CH_4
SiH_4
GeH_4
SnH_4
400
350
300
250
200
150
100
50
50
100
150
Molecular Weight

Why is the Boiling Point of Water so much greater than molecules of equal or greater molecular weight?

More energy is required to break up the extra hydrogen bonds as well as the covalent bonds formed between hydrogen and oxygen. That's why the boiling point of water is so high because it takes more heat to break the bonds.

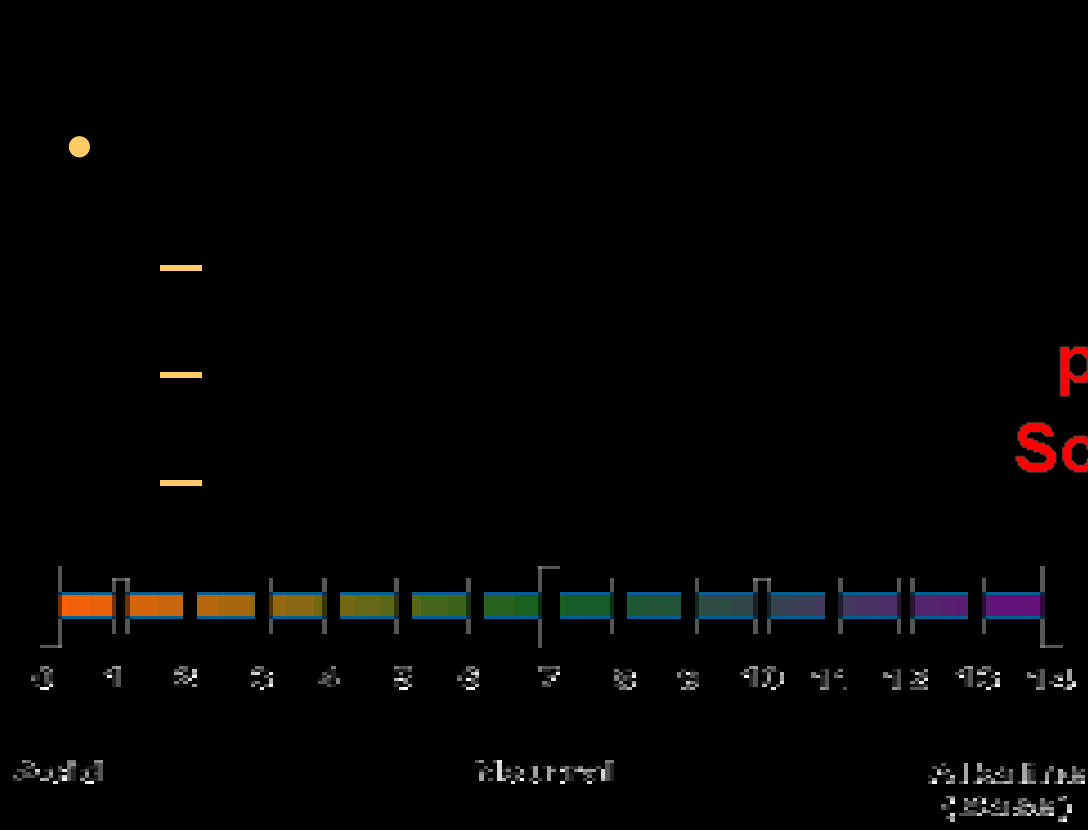
WOW!

Solutions and Suspensions

- Mixture:
- a material composed of two or more elements or compounds that are PHYSICALLY mixed together but not CHEMICALLY combined.
- Solution:
  - Salt Water
    - Salt = Solute
    - Water = Solvent
- Suspension:
  - Dirty Water
    - Dirt is suspended in the water but not dissolved.

Acids, Bases and pH

- A water molecule can react to form ions
  - $H_20 \rightleftharpoons H^+ + OH^-$
  - Water $\rightleftharpoons$ Hydrogen ion + Hydroxide ion



pH Scale

0

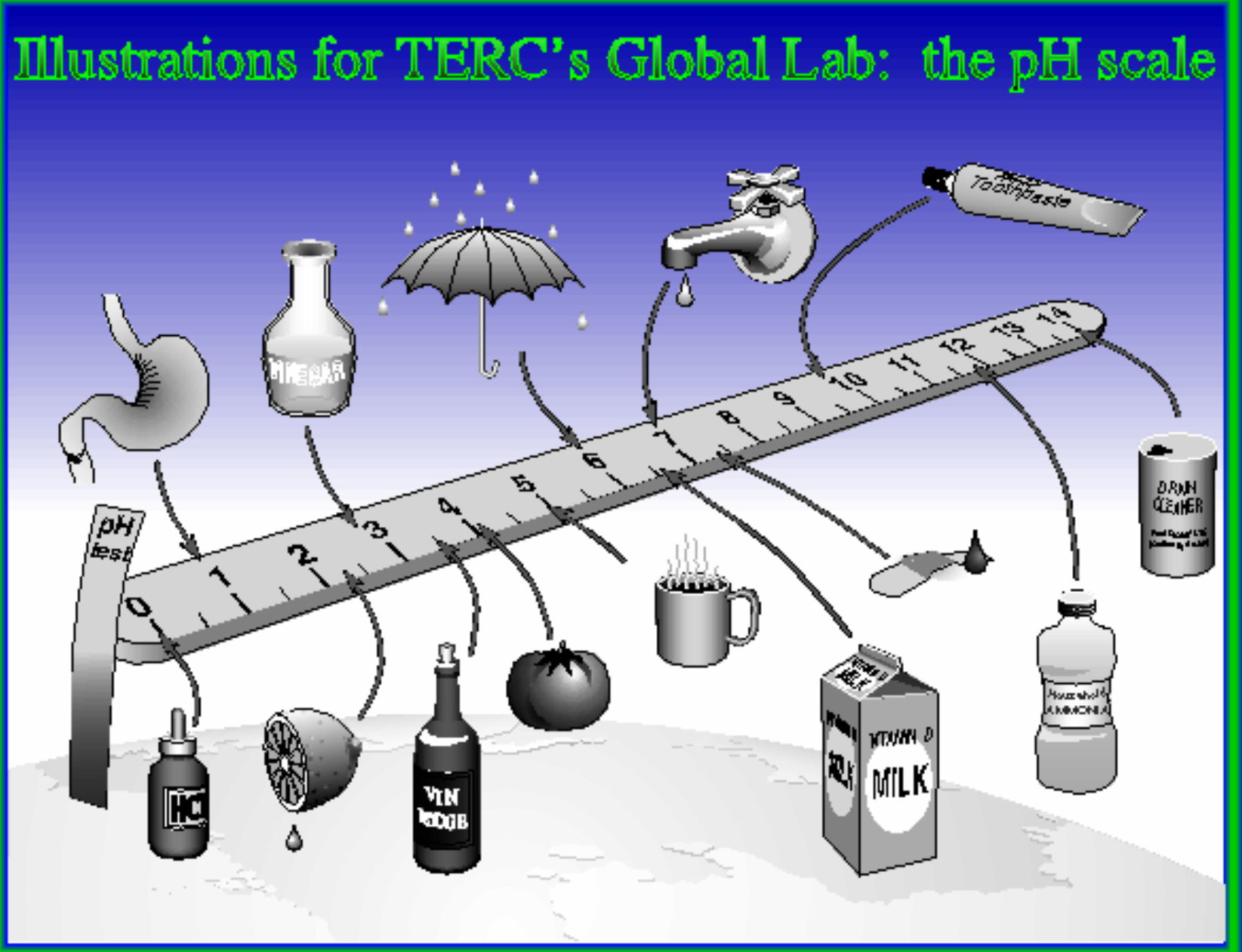
Increasing Acidity

7 - Neutral

Increasing Alkalinity

14

Illustrations for TERC's Global Lab: the pH scale



pH SCALE

Brook trout can't live when pH is below 4.7.

Acids and Bases

- Acids:
  - Any compound that forms H^+ ions in solution.
  - Acidic Solutions contain higher concentrations of H^+ ions than pure water and have pH values below 7.
- Bases:
  - Any compound that produces hydroxide ions (OH^- ions) in solution.
  - Basic, or alkaline, solutions contain lower concentrations of H^+ than pure water and have pH values above 7.

Buffers

- Used to control the pH level of solutions.
- Play a large role in maintaining the appropriate pH in the cells of your body…Homeostasis!
- They are weak acids or bases that react to prevent sudden changes in pH.