Review 04

Neutrons and isotopes

Isotopes have differing numbers of neutrons for the same element
"normal" "heavy/light" radioactive

Water

☆ Due to its cohesiveness, has "magical" properties
- one water molecule hydrogen bonds to as many as four other water molecules at a time
- results in very unique characteristics for water, such as
  - ➪surface tension
  - ➪high heat capacity
  - ➪unexpectedly high melting and boiling points
  - ➪ice floating rather than sinking
  - ➪adhesion to other polar substances

☆ Acts as SOLVENT into which *polar substances* dissolve
- solute must be polar; able to attract water molecules due to complete or partial charges = hydrophilic
- non-polar solute *will not* dissolve into water; doesn't attract water molecules due to non-polar nature = hydrophobic

☆ Dissociates

$$H\text{-}O\text{-}H \leftrightarrows H^+ + {}^-OH$$

- # water molecules in pure water dissociated reflects the mid-point of the pH scale
- pH is measure of concentration of H^+ in a solution; = $-\log_{10}[H^+]$
  - < 7 is acidic; lower the number, greater the H^+ conc.
  - > 7 is alkaline; greater the number, lower the H^+ conc.
  - = 7 is neutral (= amount of dissociation of pure water)
- ACID = substance which releases H^+ into a solution; lowers pH
  e.g. Acetic Acid; Hydrochloric Acid
- BASE = substance which removes H^+ from a solution; raises pH
  e.g. Sodium Hydroxide
- BUFFERS = substances that resist changes in pH
  - ✔ living systems heavily buffered to maintain proper pH