

PSC2121 Exam IV Review

Chemical Formula and Equations H_2O_2

Molecular/Formula Mass (amu) - each element + total

% Composition

Gram Atomic/Molecular/Formula Mass

mass in gm \Rightarrow mole = Avogadro's Number $N_A = 6.02 \times 10^{23}$

like dozen

36 gm H_2O has how many molecules? atoms

Chemical Equations Reactants \rightarrow Products

Conservation of Mass

same # of atoms on each side

balance equation

Reaction Rates $A + B \rightarrow C$ $k_f[A][B]$

to increase rate:

powder - increase surface area

increase Temperature

activation energy

more high E collisions

increase concentration

better chance of finding partner

catalyst

enzyme - organic molecules

Equilibrium Reactions $A + B \rightleftharpoons C + D$

Dynamic Equilibrium

simultaneous forward and reverse reactions

$$K = \frac{k_f}{k_b} = \frac{[C][D]}{[A][B]}$$

Le Châtelier's Principle

$K = \text{constant}$

when stress imposed on an equilibrium system,

equilibrium shifts to minimize effect of the stress

Solutions

solvent - solute polar molecules

dilute - concentrated

Colloid

small particles, collections of molecules

remain suspended

Suspension

larger particles

eventually settle out

various combinations of solid, liquid, gas

identify:

pure air, salt water, brass,
paint, blood, milk, ink,
dental amalgam, soda water

ACIDS - excess H^+

BASES - excess OH^-

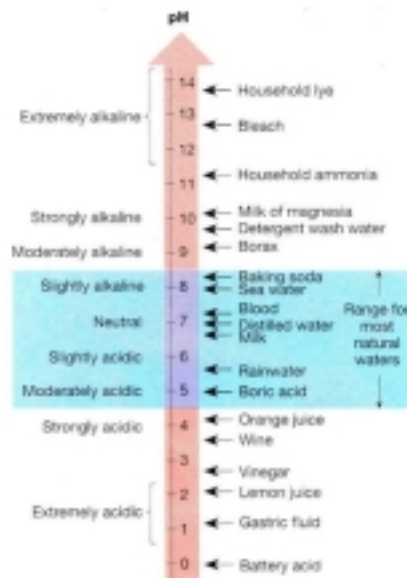
pH

$$[H^+][OH^-] = 10^{-14} \text{ mole}^2/\text{liter}^2$$

Base $pH > 7$ $[H^+] < [OH^-]$

Neutral $pH = 7$ $[H^+] = [OH^-] = 10^{-7} M$

Acid $pH < 7$ $[H^+] > [OH^-]$



EARTH $R \sim 6400 \text{ km}$

Crust O 47% Si 28% density 2.8 gm/cc

Mantle

Outer Core liquid iron + Ni

Inner Core solid iron + Ni $\sim 13 \text{ gm/cc}$

Vibrations - Earthquakes - **Seismograph**

Body Waves: P longitudinal - fast

S transverse - slow (not in liquid)

Surface Waves: L sideways

R elliptic

ROCK mixture of minerals

Igneous from molten magma

sedimentary deposits, contains fossils

metamorphic heat + pressure inside Earth

Volcanos - magma - lava

Plate Tectonics modern theory explains

Continental Drift 250 MYA **Pangea** **Panthalassa**

Laurasia in north **Gondwana** in south

Seafloor Spreading - Mid-Atlantic ridge

plate boundaries

divergent Mid-Atlantic ridge

convergent Himalayan mountains

transcurrent/transform San Andreas fault

Age of Earth 4.6 billion years

pre-Cambrian Eon from 3800 to 570 Million Years Ago

ended when 1st visible fossils found

OCEAN 71% of Earth's surface 1350 million km³

Pacific largest, 1/3 of Earth's surface

Atlantic growing, most coastline

average depth 4km, deepest 11.5 km in trenches

temperature 1-3°C worldwide below 2 km

seawater 3.5% salt NaCl

ions Cl⁻ 55% Na⁺ (31%)

Tides - Moon's gravity elongates Earth and oceans

2 high and 2 low tides each day

biggest Moon-Earth-Sun in line **Spring Tide**

lowest Moon-Earth-Sun right angle **Neap Tide**

ATMOSPHERE

Exosphere

500 km

Thermosphere

80 km

Mesosphere

50 km **Ionosphere** upward, ions reflect radio

Stratosphere - ozone layer

10 km

Troposphere - N₂ 78% O₂ 21% Ar 1%

Greenhouse Effect regulates surface temperature

CO₂ and H₂O transparent to visible radiation

block IR, trap heat

Ozone Layer 30 km, blocks harmful UV radiation

CFC's ChloroFluoroCarbons

with UV ⇒ free Cl

Cl + O₃ → ClO + O₂ transparent to UV

Wind from high to low pressure

warm air expands ⇒ low pressure

cool air contracts ⇒ high pressure

near shore: heat capacity of water 4× land

Day: land warmer, wind onshore, from sea, **sea breeze**

Night: land cooler, wind offshore, toward sea, **land breeze**