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**IDX G9 CHEMISTRY S STUDY GUIDE**

**By Felix**

**Chapter 3**

-Scientific Measurements

**-**a measurement refers to a quantity that has both a number and a unit.

-Scientific Notation

-mx10n

-m: coefficient (1<m<10)

-n: exponent (the times that the decimal point be moved to result m-integer)

-positive exponent: move decimal place rightwards

-negative exponent: move decimal place leftwards

-Scientific notation calculations

-addition and subtraction: move decimal points so that exponents are same)

-e.g. (5.4x103) + (0.80x104) = (5.4x103) + (8.0x103) =13.4x103=1.34x104

-multiplication and division: add/subtract the exponents

-e.g. (2.1x103) x (4.0x107) = 8.4x10-4

-e.g. 3.0x105/6.0x102 = (3.0/6.0) x 105-2 = 5.0x102

-Accuracy: measure of the closeness of a measurement to its truth value.

-Precision: measure of how close a measurement is to another.

-For example:

-Four of five repetitions of a measurement were numerically identical, and the fifth varied from the others in value by less than 1% - Precision

-Eight measurements were spread over a wide range - Precision

- A single measurement is within 1% of the correct value – Accuracy

-Error: the difference between the experimental value and the accepted value

-Percent error is calculated by the formula: 1error1 (absolute value)/accepted value times 100%.

-Significant digits: all the digits of a measurement that are known, plus the last digit that is estimated.

-How to determine how many SF:

-If the decimal point is present, start counting the first nonzero number from left to right till the end.

-If decimal point is absent, start counting the first nonzero number from right to left till the end.

-e.g. 43x109 – 2 significant figures

-e.g. 0.00428377 – 6 significant figures

-Rounding in calculations

-addition and subtraction: result has the same number of decimal places as the measurement with the least decimal place.

-e.g. 313-1.2x103 = -887 = -900 (final result)

-multiplication and division: result has the same number of SF as the measurement with the least SF

-e.g. 3.983x3.5 = 13.9405 = 14 (final result)

-Units of Measurement

-All metric units are based on multiples of 10

-Seven Base SI (Internation system) units

-mass-kilogram, kg

-length-meters, m

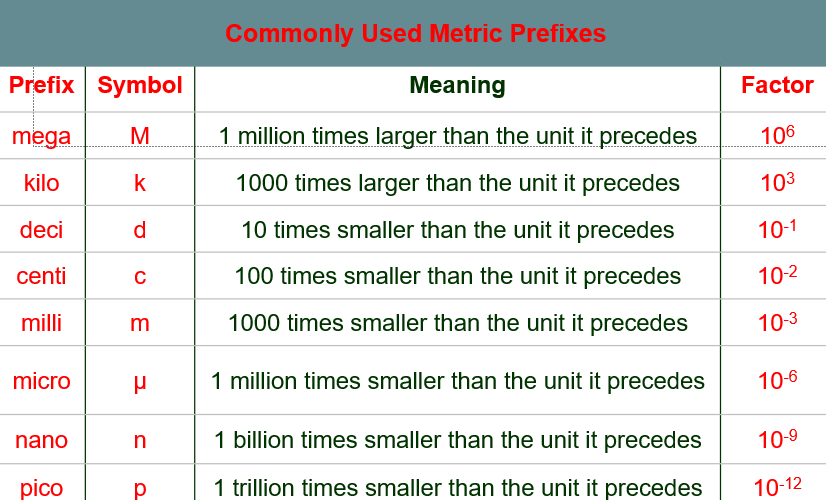
-time-second, s

-amount of substance-mole, mol

-temperature-kelvin, K

-electric current-ampere, A

-luminous intensity-candela, Cd



-Units of Volume

-1L=1000mL=1dm3

-1mL=1cm3

-Units of Energy

-K=C+273

-C=K-273

-to be more accurate wise 273.15

-0K is known as absolute zero.

-Density

-formula: Density = mass/volume

-Conversion Factors: ratio of equivalent measurements

-smaller unit is associated with larger number

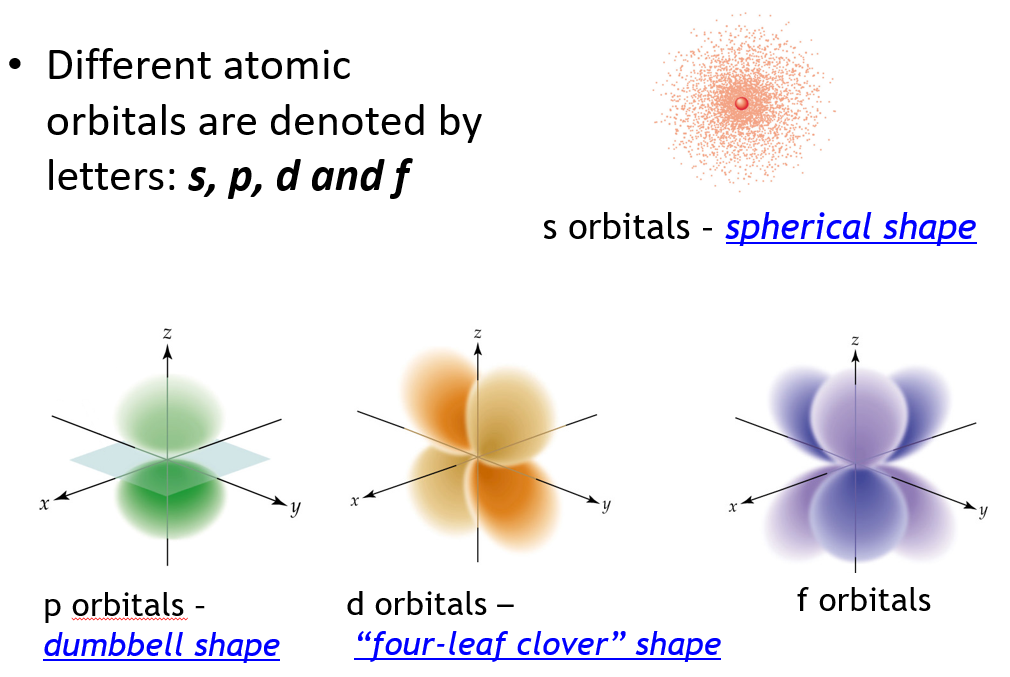
-larger unit is associated with smaller number

-they are undefined quantities therefore they have an unlimited number of SF

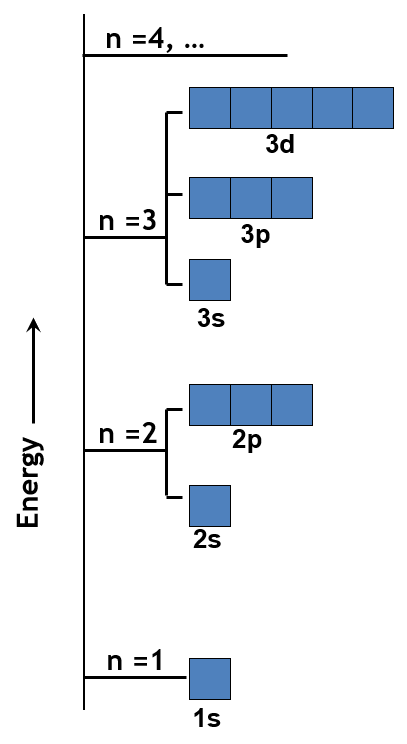
-Dimensional analysis: a way to analyze and solve problems using the units of the measurement

-e.g. expressing 750 nanometers into meter-750 nanometer x 1m/10^9 nm= (7.50x10-7) m

**Chapter 5(After midterms)**

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-The principal quantum number, n, always equal the number of sublevels within that principal energy level.



-Each energy level (n) consists of n2 orbitals

-each orbital can contain at most 2 electrons

-therefore, the maximum of electrons an energy level can hold is given by 2n2.

-Electron arrangement in atoms

-the way in which electrons are arranged in various orbitals around the nuclei of atoms are called electron configurations.

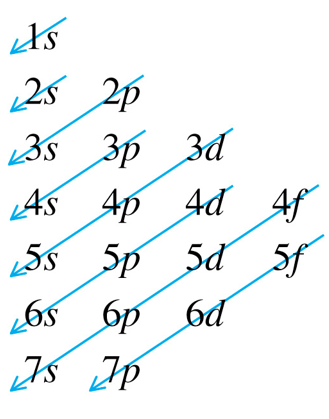
-electron configuration is the most stable arrangement of the electrons, indicating the ground state of an atom.

-Four rules/principles

-Aufbau Principle

-electrons occupy the orbitals of lowest energy first

-Energy ranking:



-Pauli Exclusion Principle

-an atomic orbital may describe at most two electrons with the opposite spin.

-Spin is a quantum mechanical property of electrons that are either clockwise

or counterclockwise.

-When electrons with opposite spins occupy an orbital, that orbital is said to be paired.

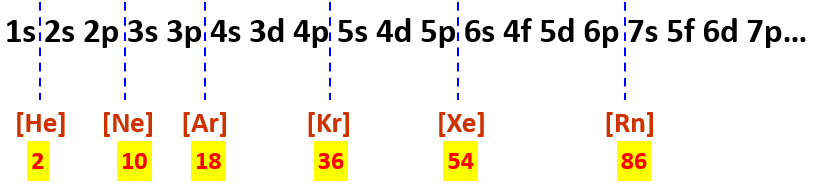
-Hund’s rule

-electrons occupy orbitals of the same energy in a way that makes the number of electrons with the same spin direction as large as possible.

-e.g. three electrons would occupy three orbitals with equal energy

-Condensed Electron Configurations

-the electron configuration of the nearest noble-gas element (last element of each horizontal period) of lower atomic number is represented by its chemical symbol in brackets.



-exceptional electron configurations

-Chromium and Copper

-their electron configuration will be:

-Cr 1*s*22*s*22*p*63*s*23*p*63*d*54*s*1

-Cu 1*s*22*s*22*p*63*s*23*p*63*d*104*s*1