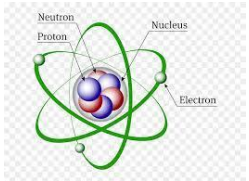
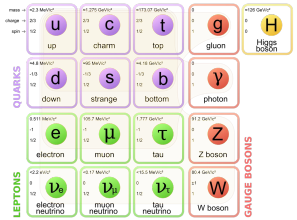
Slide 1

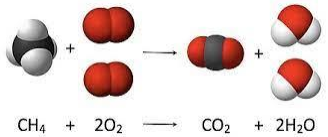
SCIENCE

PARTICLE PHYSICS

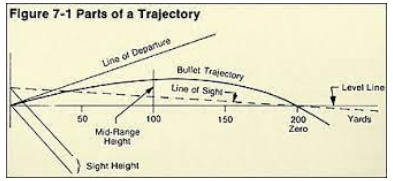


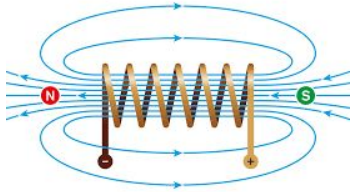


CHEMISTRY



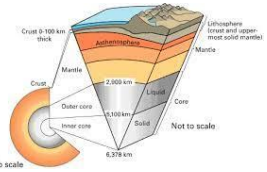
PHYSICS

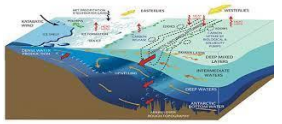




BIOLOGY

GEOLOGY OCEANOGRAPHY





ASTROPHYSICS

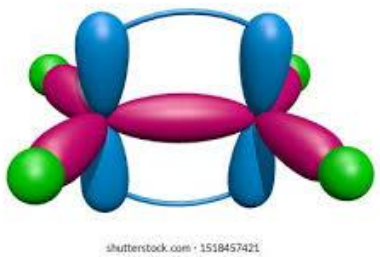
Slide 2

SCIENCE

PHYSICS

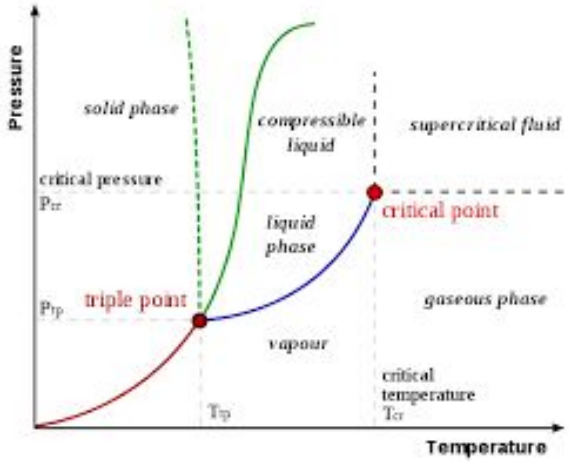
CHEMISTRY

BIOLOGY

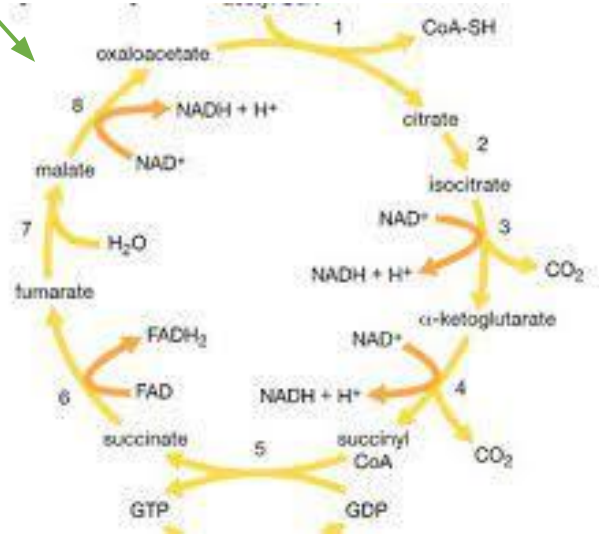


PHYSICAL CHEMISTRY

- BONDS
- RXN MECHANISM



THERMODYNAMICS

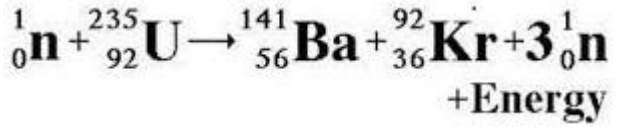


- Study of how new substance(s) is/are formed from old substance(s)
- A substance is something that is made up of two or more atoms.
- A substance is a molecule.

Examples of chemical change:

- Iron rusting
- Wood burning
- Food metabolizing

- Compare to physical change
  - Classical physics
    - Bonds are not being made or broken
    - No new substance is formed
    - Ice ⇒ Water ⇒ Steam
  - Nuclear physics
    - Bonds are not being made or broken
    - New elements are formed



New substances are made by:

- Breaking old bonds

and/or

- Making bonds

New bonds are made by sharing or exchanging electrons.

Old bonds are broken by separating electrons in a bond.

Therefore:

Making and breaking bonds requires keeping track of electrons.

Chemistry is the science of following **electrons**.

Nuclei are NOT engaged.

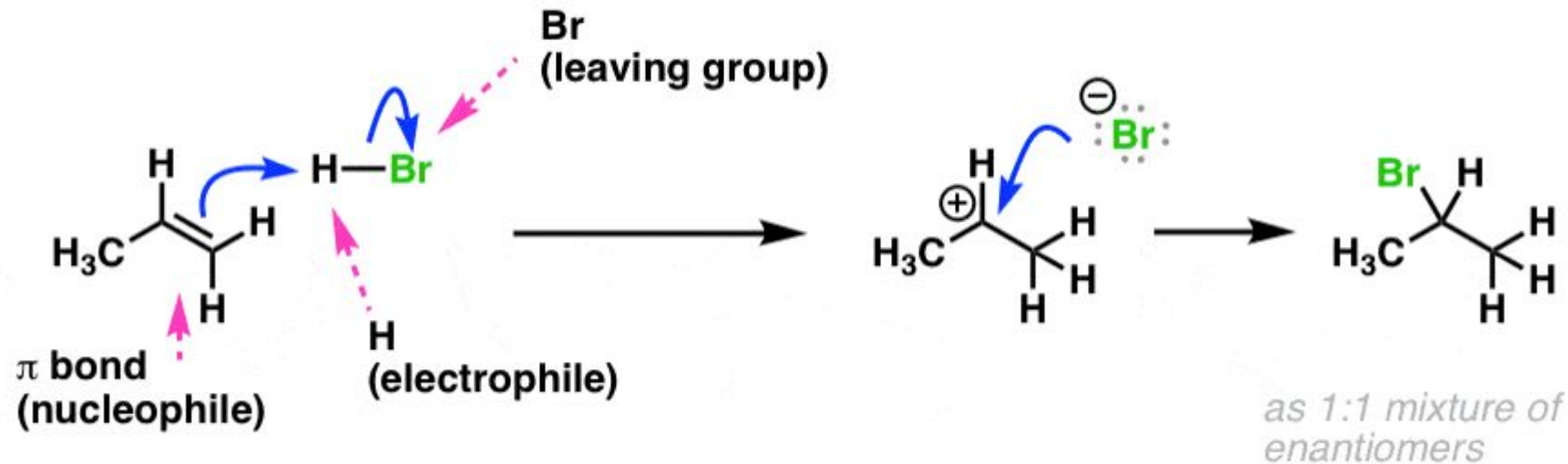
Nuclei consist of protons and neutrons.

Protons tell a chemist how many electrons a neutral atom has, and whether the atom has a charge because it is missing electron(s) or has additional electron(s).

Neutrons help a chemist calculate the molecular weight of a substance.

Slide 8

In "stepwise" alkene addition mechanisms, the arrows clearly show the role of each component in the reaction



Slide 9

LUMO (Lowest Unoccupied Molecular Orbital)

HOMO (Highest Occupied Molecular Orbital)