CONCEPT: ABIOGENESIS

●*Abiogenesis* is the natural process of the _____ of life & describes how life arose from nonliving, simple molecules.

●Life originated in the oceans of Earth about 3.8 _____ years ago from nonbiological materials.

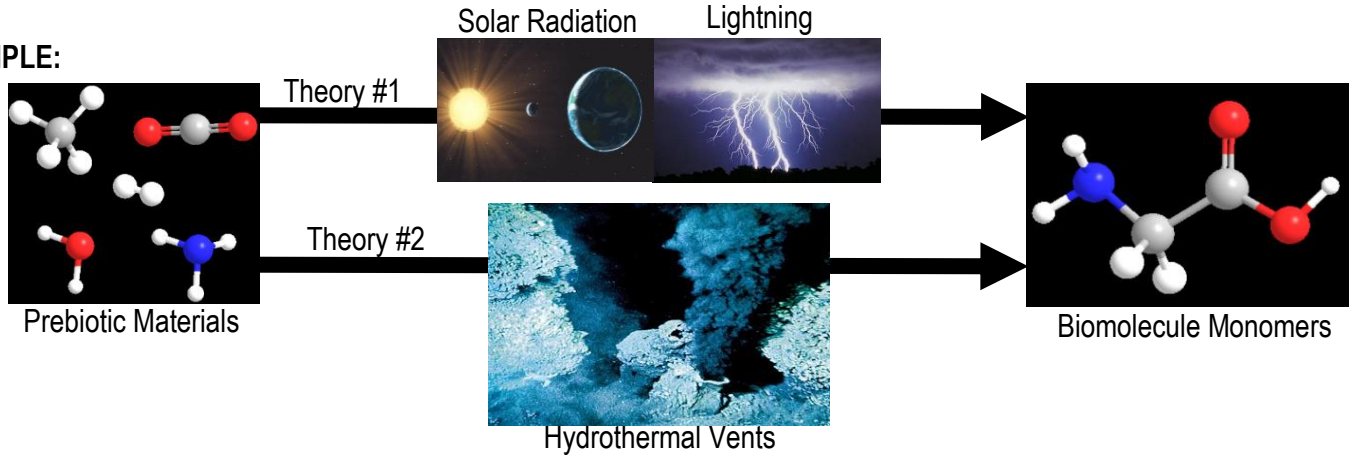
□ Nonbiological materials (or *prebiotic materials*): H_2, H_2O, NH_3, CO_2, CH_4.

●Atmospheric conversion theory: _____ & _____ converted prebiotics to simple *biomolecules*.

●Hydrothermal _____ theory: vents on the ocean floors converted prebiotics to biomolecule monomers.

Biomolecule Monomers

EXAMPLE:

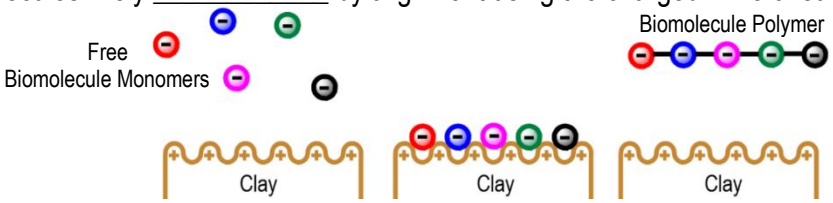


Biomolecule Polymers

●*Question:* So how did more complex biomolecules begin to form if living cells were not around yet to produce them?

●The first biomolecules likely _____ by alignment using the charged mineral surface of objects such as clay.

EXAMPLE:



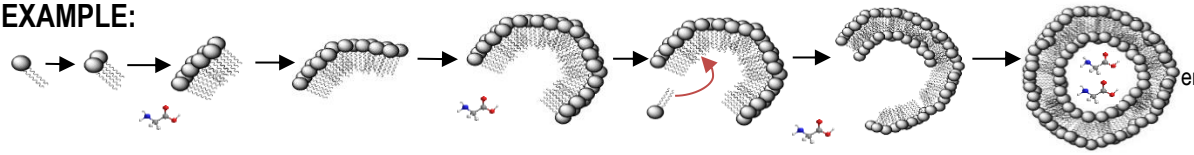
*Experimental evidence shows RNA & other polymers can polymerize in this fashion.

Membranes & Protocells

● Membrane formation *enclosed* molecules & *prevented them from diffusing away*, increasing likelihood of interactions.

□ _____ formed via the hydrophobic effect, an important step for abiogenesis.

EXAMPLE:

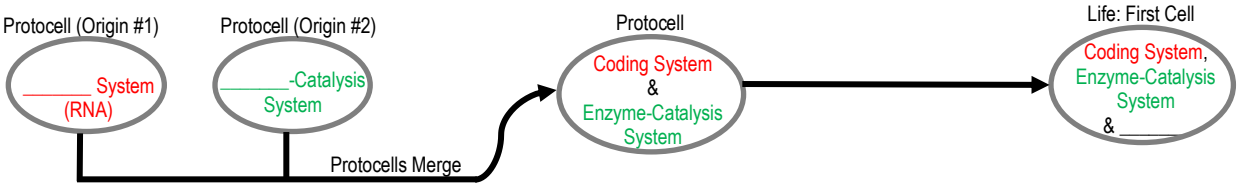


*Pool of biomolecules enclosed in lipid membrane (**protocell**).

●*Double Origin Theory*: a *coding* system & *enzyme-catalysis* developed in _____ protocells & later combined.

●_____, not DNA, was likely the *first coding material* because of its encoding & catalytic abilities.

EXAMPLE:



CONCEPT: ABIOGENESIS

PRACTICE: Which of the following is not a popular theory for how biomolecule monomers first originated on Earth?

a) Previously assembled biomolecules likely arrived on Earth via an asteroid.
b) The sun and lightning energized the conversion of prebiotics to biomolecules.
c) Hydrothermal vents on ocean floors energized the conversion of prebiotics to biomolecules.

PRACTICE: Which theory relates to abiogenesis?

a) Endosymbiotic theory
b) Double Origin Theory
c) Cell Theory
d) Big Bang Theory

PRACTICE: A) What molecule was likely the first genetic/coding material? Why?

a) Protein
b) RNA
c) DNA
d) Carbohydrates