Origins of Life, Properties of Water and

Biochemistry Review 2015

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| **Essential Knowledge on These Topics:** * There are several hypotheses about the natural origin of life on Earth, each with supporting scientific evidence.
* Scientific evidence from many different disciplines supports models of the origin of life.
* Organisms must exchange matter with the environment in order to grow, reproduce and maintain organization.
* The subcomponents of biological molecules and their sequence determine the properties of that molecule.
* Interactions between molecules affect their structure and function.
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**Concepts You Should be Familiar With:**

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| evolutionabiogenesispolymerization RNA World common ancestry continental drift Miller-Urey Experiment  | polarityhydrogen bondingcovalent bondingdehydration synthesis (condensation)hydrolysis pH scale  |

**Vocabulary You Must Know:**

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| abiogenesis monomerspolymersprotobiont spheresLUCA (Last universal common ancestor)macromoleculespolar nonpolarhydrophobichydrophilicorganicinorganicprimary structure (of a protein) secondary structure (of a protein)tertiary structure (of a protein)quaternary structure (of a protein) | carbohydratemonosaccharidedisaccharidepolysaccharidelipid triglyceride fat phospholipidsaturated fatunsaturated fatproteinamino acidpeptide bonddenaturation nucleic acidnucleotide polypeptide  |

**Common Misconceptions Students Have About This Topic:**

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| **Misconception** | **Correct Statement** |
| Water is a universal solvent.  | Water is NOT a universal solvent; “universal” assumes that EVERYTHING can be dissolved by water. Water can dissolve other polar molecules, but cannot dissolve nonpolar molecules such as lipids.  |

**Math Formulas You Need to Understand, But Not Memorize:**

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| **None for this topic, specifically. But you can always be given a set of data and be asked to find a mean, median or mode of that data set. You could potentially be asked to interpret statistical significance of a set of data (i.e. looking at the standard error of the mean, or the standard deviation).** |

**Past Free Response Questions on This Topic:**

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| **Year** | **Topic**  |
| 2013 | Q5b: [Change in protein structure and function](http://media.collegeboard.com/digitalServices/pdf/ap/apcentral/ap13_frq_biology.pdf)[Scoring Guidelines](http://media.collegeboard.com/digitalServices/pdf/ap/apcentral/ap13_biology_scoring_guidelines.pdf) |
| 2009B | Q3: [Properties of water](http://apcentral.collegeboard.com/apc/public/repository/ap09_frq_biology_formb.pdf)[Scoring Guidelines](http://apcentral.collegeboard.com/apc/public/repository/ap09_biology_form_b_sgs.pdf) |
| 2009A | Q1: [Protein structure and bonding, function and abnormal hemoglobin](http://apcentral.collegeboard.com/apc/public/repository/ap09_frq_biology.pdf)[Scoring Guidelines](http://apcentral.collegeboard.com/apc/public/repository/ap09_biology_sgs.pdf) |
| 2003B | Q3: [Properties of water in living processes](http://apcentral.collegeboard.com/apc/public/repository/ap03_frq_biology_b_23085.pdf)[Scoring Guidelines](http://apcentral.collegeboard.com/apc/members/repository/ap03_sg_biology_b_26427.pdf) |
| 2002B | Q3: [Structure/function is influenced by polymers they are constructed of](http://apcentral.collegeboard.com/apc/public/repository/b_biology_frq_02_10377.pdf) [Scoring Guidelines](http://apcentral.collegeboard.com/apc/public/repository/b_sg_biology_02_11381.pdf) |

**Videos You Can Watch:**

Abiogenesis: <https://youtu.be/W3ceg--uQKM>

Origin of Life-Scientific Evidence: <https://youtu.be/SWY3FKbtEz8>

Polymers: <https://youtu.be/VigpwmH7E3M>

Water-A Polar Molecule: <https://youtu.be/iOOvX0jmhJ4>

Biological Molecules: <https://youtu.be/PYH63o10iTE>

Carbohydrates: <https://youtu.be/_zm_DyD6FJ0>

Lipids: <https://youtu.be/VGHD9e3yRIU>

Proteins: <https://youtu.be/2Jgb_DpaQhM>

Nucleic Acids: <https://youtu.be/NNASRkIU5Fw>

Crash Course--That’s Why Carbon Is a Tramp: <https://youtu.be/QnQe0xW_JY4>

Crash Course--Water-Liquid Awesome: <https://youtu.be/HVT3Y3_gHGg>

Crash Course--Biological Molecules-You Are What You Eat: <https://youtu.be/H8WJ2KENlK0>

**Practice Questions You Can Try:**

Learnerator: [The Origins of Life](http://www.learnerator.com/ap-biology/q/198/modern-versus-ancient-earth)

Learnerator: [Biochemistry and Cell Biology (first 17 questions)](http://www.learnerator.com/ap-biology/q/3253/carbohydrate-synthesis)

Water

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