

Contrast Earth's early atmosphere with the atmosphere of Earth today.		
<i>High School</i>	<i>IB</i>	<i>College</i>
<p>Early Earth – ammonia (NH₃), hydrogen gas (H₂), water (H₂O), methane (CH₄)</p> <p>Today – nothing provided</p>	Nothing additional	Nothing additional
What simple organic molecules were found on early Earth?		
<i>High School</i>	<i>IB</i>	<i>College</i>
Methane (CH ₄)	Nothing additional	Nothing additional
Describe four processes needed for the spontaneous origin of life on Earth.		
<i>High School</i>	<i>IB</i>	<i>College</i>
Not clear	<ol style="list-style-type: none"> 1. Simple organic molecules need to be available 2. Simple organic molecules assemble into polymers 3. Polymers package into structures w/ a different internal chemistry than surroundings 4. Develop inheritance (a way to pass on genetic information) 	Nothing additional
Outline the experiments of Miller and Urey into the origin of organic compounds.		
<i>High School</i>	<i>IB</i>	<i>College</i>
Chamber of gases assumed in early atmosphere exposed to electric sparks (representing lightning). Produced a variety of organic compounds.	<p>Chamber gases were methane (CH₄), hydrogen (H₂) and ammonia (NH₃)</p> <p>Produced amino acids</p>	Nothing additional

Compare extraterrestrial origin and spontaneous origin of organic compounds.		
<i>High School</i> A meteorite landed on Earth with a mixture of organic compounds (which must therefore have formed in space)	<i>IB</i> Called the Murchison meteorite Contained amino acids	<i>College</i> Nothing additional
Discuss possible locations where conditions would have allowed the formation of organic compounds found in cells.		
<i>High School</i> Atmosphere Undersea hot springs Clay	<i>IB</i> Nothing additional	<i>College</i> Nothing additional
What are protocells and how are protocells thought to have arisen (AKA microspheres and coacervates)?		
<i>High School</i> Protocells: <ul style="list-style-type: none"> • Can grow • Can divide • Can take in substances from the surroundings • Have a spherical shape • Composed of proteins, amino acids and sugars • No heredity information (therefore no natural selection) Arisen: spontaneously in solutions of organic chemicals	<i>IB</i> Protocells: <ul style="list-style-type: none"> • Respond to environment • Simple reproduction • Basic metabolism 	<i>College</i> Nothing additional
Outline two properties of RNA that would have allowed it to play a role in the origin of life.		
<i>High School</i> Can act as an enzyme (called “ribozyme”) to promote a chemical reactions Can replicate itself	<i>IB</i> ← catalytic properties	<i>College</i> Nothing additional