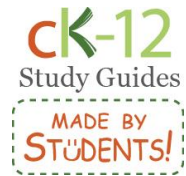


# Early Atmosphere and Oceans

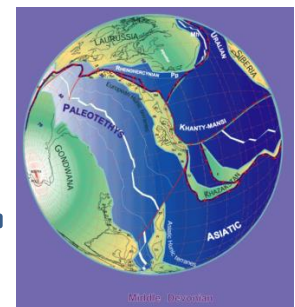
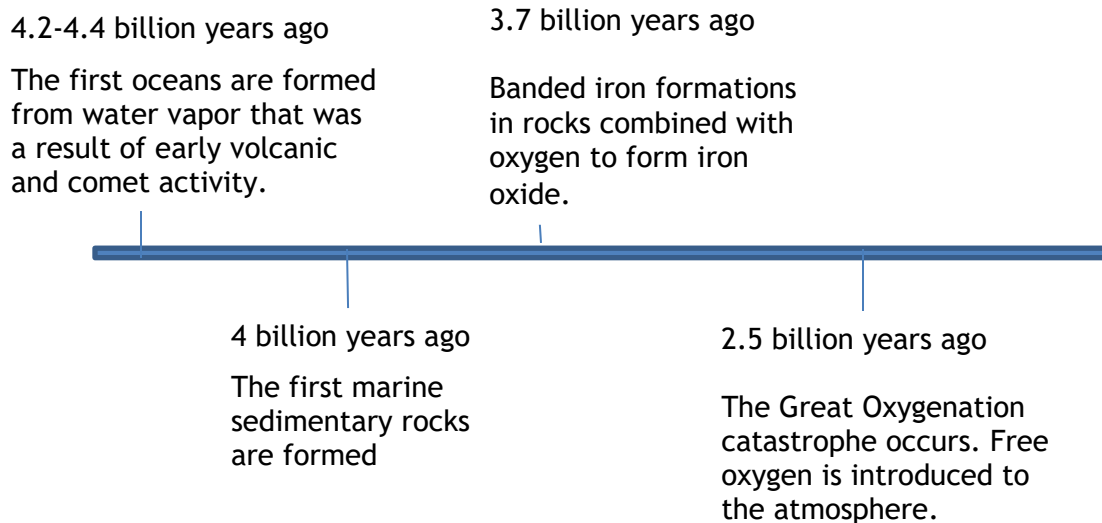


## Conditions of the Early Earth

- The first atmosphere consisted of hydrogen and helium, gasses predominantly found throughout the solar system
- When Earth was cool enough, water vapor from **outgassing** and comets condensed and rain began to fall (this initiated the water cycle).
- Outgassing brought gasses from the interior of the Earth to the surface.
- Impacts by asteroids and comets brought carbon dioxide, methane, ammonia, nitrogen, and other explosive substances.
- Precipitation collected over millions of years to form the first oceans.
- Dissolved minerals carried by stream runoff made the early oceans salty.
- 4 billion year old marine sedimentary rocks give evidence to a presence of an early ocean

### Study Tip

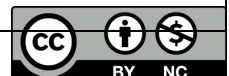
Earth's atmosphere can be divided into three stages, so try to memorize dates based on the events during each stage.



*Superocean during the mid-Devonian period approx. 4.1 million years ago*

## Early Atmosphere

Atmosphere	Description
First Atmosphere	<ul style="list-style-type: none"> <li>• Primarily made of hydrogen and helium</li> <li>• Outgassing was a source of water vapor, carbon dioxide, small amounts of nitrogen, and other gasses.</li> </ul>
Second Atmosphere	<ul style="list-style-type: none"> <li>• First atmosphere to stay with the planet</li> <li>• This atmosphere had lots of water vapor, carbon dioxide, nitrogen, and methane but almost no oxygen.</li> </ul>



Third Atmosphere	<ul style="list-style-type: none"><li>• The Great Oxygenation Event introduces free oxygen into the atmosphere and causes the extinction of many organisms</li><li>• <b>Banded-Iron formations</b> give evidence to an oxygen filled atmosphere 3.7 billion years ago</li><li>• Formation of Earth's ozone layer from excess oxygen produced by plants</li></ul>
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## Concept Check

- Describe the three stages in the development of Earth's atmosphere.
- What is the Great Oxygenation Event?
- How were Earth's early oceans created?

