

**Free Oxygen**  
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Today we enjoy having an atmosphere rich in free oxygen. Oxygen is required for us mammals, but our atmosphere has not always had the 21 percent oxygen level that we have now. The early atmosphere had almost no oxygen, and the oxygen level gradually built up over the past 4.5 billion years. There are implications for the age of the earth debate, which will be discussed below.

### **Archean**

The Archean Eon is the period of earth history from the formation of the earth, about 4.55 billion years ago, to about 2.5 billion years ago, or a period of roughly 2 billion years. During the Archean, the atmosphere contained less than 1% of our current level of free oxygen. This explains why there were no abundant life forms other than simple one-cell organisms during this time. The atmosphere was said to be “reducing.” Reduction is the donation of electrons to something, while oxidation is the “stealing” of electrons from something.

### **Proterozoic**

The Proterozoic Eon is the period of earth history from 2.5 billion years ago to about 543 million years ago. During this time, the amount of free oxygen increased from 1% up to about 10%. At the latter part of this eon, more life forms began appearing, no doubt due to the ability of the earth’s oxygen to support them.

### **Paleozoic Era**

The Paleozoic Era is from 543 million years ago to 248 million years ago. During this time, we see the Cambrian explosion of life, a time in which many new life forms appear in the fossil record (543-490 Ma). Oxygen levels reached their current levels about 400 million years ago, although some sources say this occurred 1.5 billion years ago.

### **How do we know this?**

There are several methods used to determine past oxygen levels. Evidence from the rock record, such as oxidized iron, gives an indication of past free oxygen. During the Archaean, we only have rocks that form in non-oxidizing environments. As time moves into the Proterozoic, we begin to see Banded Iron formation, alternating layers of iron-rich and iron-poor layers of rocks. In addition, red rock beds (contains continental

siliciclastic deposits) are never found in rocks older than 2.3 billion years. Red beds are red because of the highly oxidized mineral hematite.

We also get evidence from biology. The first life forms were anaerobic, known as Cyanobacteria, and they thrive only in low oxygen environments. As we examine younger and younger rocks, this changes to animals which are aerobic.

### **Why is this Important?**

According to young earth creationists, God created the atmosphere on Day Two of creation. For the record, so do old earth creationists, however, we believe God started the formation of the atmosphere during the time period specified by Day Two, thus we both use a literal reading of this passage.

The first life forms appear in the rock record, BEFORE there was significant levels of free oxygen in the atmosphere. These organisms, known as Cyanobacteria, appear about 3.5 billion years ago. Using the young earth reading of Genesis, the first living organisms (plants, which include these photosynthetic Cyanobacteria) were created on Day Three. How do we know there was no free oxygen 3.5 billion years ago? The lack of the Banded Iron formations, red rock beds, and other oxidized rocks gives ample evidence of this. If there were free oxygen, it would readily bond with iron and leave evidences of this process, but we don't see this in the rock record. Thus, the young earth model, which supposes six twenty-four hour days, does not agree with the rock record.

However, this early anaerobic atmosphere presents no problems with an old earth interpretation. Days are viewed as a set of events, and not as twenty-four hour periods. On Day Two, God performed events that eventually produced an atmosphere, and then He moved on to other creative works. There are two ways to view this. There was a definite start and end to day two, i.e. roughly from 4.5 billion years ago to 3.5 billion years ago, or 2) Day Two started 4 billion years ago, but ended when the atmosphere was fully developed sometime within the last 400 million years.

In the first method, God started it, and after it was running according to the laws of nature, He let it continue, closed out His creative work for that day, and moved on to Day Three. Using the second method, God is seen to have started the process, and let it develop while working on Days 3, 4, and 5. In this sense, the days of creation overlap each other, with later days beginning before earlier days are complete. Either way is acceptable and can work with a literal interpretation of Genesis.

### **Conclusion**

An anaerobic atmosphere after the development of the first life form is contrary to the order of creation if one takes the days of creation to mean six twenty-four hour days. However, it is perfectly consistent with a literal reading of Genesis when one considers the days of creation to be long periods of time.

Source Articles

Origins of the Earth's Atmosphere  
[http://www.ux1.eiu.edu/~cfjps/1400/atmos\\_origin.html](http://www.ux1.eiu.edu/~cfjps/1400/atmos_origin.html)

History of Earth

<http://www.mansfield.ohio-state.edu/~sabedon/biol1010.htm>

The Evolution of the Precambrian Atmosphere

[http://studentwebs.coloradocollege.edu/~e\\_gruen/](http://studentwebs.coloradocollege.edu/~e_gruen/)

The Geologic Time Scale

<http://www.geosociety.org/science/timescale/timescl.htm>