

Earth's Atmosphere

Earth's atmosphere has changed through time. Compared to the Sun, whose composition is representative of the raw materials from which Earth and other planets in our solar system formed, Earth contains less of some volatile elements, such as nitrogen, argon, hydrogen, and helium. These elements were lost when the envelope of gases, or primary atmosphere, that surrounded early Earth, was stripped away by the solar wind or by meteorite impacts, or both. Little by little, the planet generated a new, secondary atmosphere by volcanic outgassing of volatile materials from its interior.

Volcanic outgassing continues to be the main process by which volatile materials are released from Earth—although it is now going on at a much slower rate. The main chemical constituent of volcanic gases (as much as 97 percent of volume) is water vapor, with varying amounts of nitrogen, carbon dioxide, and other gases. In fact, the total volume of volcanic gases released over the past 4 billion years or so is believed to account for the present composition of the atmosphere with one important exception: oxygen. Earth had virtually no oxygen in its atmosphere more than 4 billion years ago, but the atmosphere is now approximately 21 percent oxygen.

1. In paragraph 1, why does the author state that Earth has less nitrogen, argon, hydrogen, and helium than the Sun?

- ☐ To argue that these elements were once part of an early atmosphere, which disappeared
- ☐ To suggest that these elements were drawn into the Sun's atmosphere
- ☐ To provide evidence that Earth's original atmosphere came primarily from meteorites
- ☐ To support the claim that Earth's atmosphere would have changed even more if it had contained more volatile elements

2. The word "constituent" in the passage is closest in meaning to

- ☐ source
- ☐ equivalent
- ☐ component
- ☐ product

3. According to paragraph 2, the history of volcanic outgassing cannot explain which of the following?

- ☐ The lack of oxygen in the atmosphere 4 billion years ago
- ☐ The amount of water vapor in the atmosphere today
- ☐ The proportions of nitrogen and carbon dioxide in the atmosphere today
- ☐ The present abundance of oxygen in the atmosphere

ANS: ACD