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Q57

Consider the following statements: 1. The Earth's magnetic field has reversed every few hundred thousand years. 2. When the Earth was created more than 4000 million years ago, there was 54% oxygen and no carbon dioxide. 3. When living organisms originated, they modified the early atmosphere of the Earth. Which of the statements given above is/are correct? (a) 1 only (b) 2 and 3 only (c) 1 and 3 only (d) 1, 2 and 3 Official key: C.

UPSC Civil Services Prelims 2018 · General Studies · 2 marks · Geography

Physical, Indian and world geography - Prelims GS Paper I.

Explanation**(a)**

(a) 1 only. Geomagnetic reversals every few hundred thousand years are recorded in seafloor stripes and lava, so statement 1 is true, but statement 3 is also true: early life altered the atmosphere, notably by oxygenic photosynthesis. Stopping at 1 is incomplete. This option is not the key.

(b)

(b) 2 and 3 only. Statement 2 is false: the early Earth did not start with 54% oxygen and zero carbon dioxide; the Hadean-Archean air was rich in CO₂ and other volcanic gases, with free oxygen scarce. Statement 3 is true, but it cannot rescue 2. This option is not the key.

(c) Official key

(c) 1 and 3 only. Magnetic polarity has flipped on a 10⁵-year scale. When life appeared it changed the air-most famously the Great Oxidation. Statement 2's 54% oxygen / no CO₂ picture is geochemically wrong. Hence 1 and 3. This option is the official key.

(d)

(d) 1, 2 and 3. Statement 2 is incorrect, so all three cannot be right. This option is not the key.

Summary

Official key is (c) 1 and 3 only. Palaeomagnetism shows reversals on timescales of a few hundred thousand years. Living organisms, especially cyanobacteria, transformed the **early atmosphere** by adding oxygen and drawing down carbon gases. The claim that the newborn Earth already had 54% oxygen and no carbon dioxide contradicts that history. Statement 2 therefore drops out, leaving 1 and 3.

Related possible facts

These can be asked in a future Prelims paper.

Brunhes-Matuyama

Last major reversal about 780,000 years ago

Great Oxidation Event

Around 2.4 billion years ago; free oxygen rises

Early atmosphere

CO₂, N₂, H₂O, reducing gases; little free O₂

Vine-Matthews

Seafloor magnetic stripes record reversals

Banded iron formations

Geological marker of rising oxygen

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