NCERT SOLUTIONS

CLASS - 11th

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Subject : Geography

Chapter : 2

Chapter Name : The Origin and Evolution of the Earth

Q1 Multiple choice questions.

(i) Which one of the following figures represents the age of the earth?

(a) 4.6 million years (c) 4.6 billion years

(b) 13.7 billion years (d) 13.7 trillion years

(ii) Which one of the following has the longest duration?

(a) Eons (c) Era

(b) Period (d) Epoch

(iii) Which one of the following is not related to the formation or modification of the present atmosphere?

(a) Solar winds (c) Degassing

(b) Differentiation (d) Photosynthesis

(iv) Which one of the following represents the inner planets?

(a) Planets between the sun and the earth (c) Planets in gaseous state

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(b) Planets between the sun and the belt of asteroids (d) Planets without satellite(s)

(v) Life on the earth appeared around how many years before the present?

(a) 13.7 billion (c) 4.6 billion

(b) 3.8 million (d) 3.8 billion

Answer.

(i) (c) 4.6 billion years

(ii) (a) Eons

(iii) (b) Differentiation

(iv) (b) Planets between the sun and the belt of asteroids

(v) (d) 3.8 billion

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Q2 Answer the following questions in about 30 words

(i)Why are the terrestrial planets rocky?

(ii) What is the basic difference in the arguments related to the origin of the earth given by : (a) Kant and Laplace (b) Chamberlain and Moulton 2019-2020

(iii)What is meant by the process of differentiation?

(iv)What was the nature of the earth surface initially?

(v)What were the gases which initially formed the earth's atmosphere?

Answer.

(i) The terrestrial planets are rocky because of the following 3 reasons-

→ Due to the close proximity of the Parent stat it was too warm for the gases to condense to solid particles

→ The intense solar wind near the sun blew off lots of gases and dust from the terrestrial planets.

→ The gravity of the terrestrial planets were too low to hold the escaping gases.

(ii) (a) Kant and Laplace- Kant proposed the Nebular Hypothesis which was later revised by Laplace in 1796. They proposed that the Earth and the other planets were formed out of a cloud of dispersed particles.

(b) Chamberlain and Moulton- stated that a wandering star passed close enough to the sun,a cigar- shaped material separated from the solar surface. As the passing star moved away, the material separated from the sun, continued to revolve around the sun and it slowly condensed into planets.

(iii) The process of differentiation is the process by which Earth forming material got separated into different layers. The denser material sank to the centre and the less denser material rose to the surface. Thus from the surface to the central parts, there are layers like the crust, mantle, outer core and inner core. From the crust to the core, the density of the material keeps on increasing.

(iv) Initially the planet earth was a barren, rocky and hot object with a thin atmosphere of hydrogen and helium.

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Page : 20 , Block Name: Very Short Answer

(v) Hydrogen and helium were the gases which were initially formed; consisting the earth's surface. During the cooling of the earth, gases and water vapour were released from the interior solid earth. This started the evolution of the present atmosphere.

Page : 20 , Block Name : Very Short Answer

Q3 Answer the following questions in about 150 words

(i)Write an explanatory note on the 'Big Bang Theory'.

(ii) List the stages in the evolution of the earth and explain each stage in brief.

Answer.

(i) The 'Big bang Theory' is also known as expanding universe hypothesis. Edwin Hubble, in 1920, proposed that the universe is expanding. It is accepted that the explosion took place 13.7 billion years ago before the present. The distance between the galaxies is also found to be increasing and thereby, the universe is considered to be expanding.

Various stages in the development of the universe according to the Big Bang theory are :

Initially all matter in the universe existed in one place as a singular atom in the form of a ' Tiny Ball'. This singular atom had unimaginable small volume, infinite small volume and infinite density.

At the Big bang the "tiny ball" exploded violently. This led to a huge expansion. The expansion continues even to the present day. After the explosion, energy was released that was converted to matter after which there was a rapid expansion within fractions of a second after the bang. Due to this; expansion has slowed down.

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Within 300,000 years from the Big bang, the temperature dropped to 4,500k (Kelvin) and gave rise to atomic matter. The universe became transparent.

(ii) There are three stages in the evolution of the present atmosphere. Stage I: The earth was mostly in a volatile state during its primordial stage. Due to gradual increase in density the temperature inside has increased. As a result, the material inside started getting separated depending on their densities.

This allowed heavier materials (like iron) to sink towards the centre of the earth and the lighter ones to move towards the surface. With passage of time it cooled further and solidified and condensed into a smaller size which later led to the development of the outer surface in the form of a crust.

During the formation of the moon, due to the giant impact, the earth was further heated up. It is through the process of differentiation that the earth forming material got separated into different layers. Starting from the surface to the central parts, there are layers like the crust, mantle, outer core and inner core

Stage II:

The early atmosphere, with hydrogen and helium, is supposed to have been stripped off as a result of the solar winds. During the cooling of the earth, gases and water vapour were released from the interior solid earth. This marked the beginning of the evolution of the present atmosphere. The process through which the gases were outpoured from the interior is called *degassing*. As the earth cooled, the water vapour released started getting condensed. The carbon dioxide in the atmosphere got dissolved in rainwater and the temperature further decreased causing more condensation and more rains. The rainwater falling onto the surface got collected in the depressions to give rise to oceans.Life was confined to the oceans for a long time. Oceans began to have the contribution of oxygen through the process of *photosynthesis*.

Stage III: The last phase in the evolution of the earth relates to the origin and evolution of life. It is undoubtedly clear that initially the earth or even the atmosphere of the earth was not

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conducive for the development of life. This assemblage was such that they could duplicate themselves converting inanimate matter into living substance.

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