Page No 356

Solution SAQ - 1

Air is composed of a mixture of gases such as nitrogen, oxygen and carbon dioxide. It also contains water vapours and suspended dust particles.

Solution SAQ - 2

Oxygen is required by all living beings for respiration and for burning materials. This is balanced by green plants. Green plants take in carbon dioxide and release oxygen during the process of photosynthesis.

Solution SAQ - 3

The atmosphere keeps the average temperature of the earth fairly steady during the day as the atmosphere prevents the sudden increase in temperature during the daylight hours and at night atmosphere slows down the escape of heat into the outer space.

Solution SAQ - 4

The movement of air from one region to another creates winds. When the solar radiations fall on the earth, some are absorbed and majority of these are reflected back by the land and water bodies. These reflected solar radiations heat up the atmosphere from below. As a result convection currents are set up in the air but since land gets heated faster than the water, the air above the land gets heated faster than the air over water bodies. During the day the air above the land gets heated and starts rising, creating a region of low pressure below. As a result the air over the sea moves into this region of low pressure and forms the wind.

Solution SAQ - 5

(i) Take a beaker full of water, a beaker full of soil and a closed bottle containing a thermometer.
(ii) Keep them in bright sunlight for three hours.
(iii) Now, measure the temperature of all three vessels and also take the temperature reading in shade at the same time.
(iv) You will observe that the temperature of the soil and sand is more than that of water in bright sunlight because sand and soil gets heated by solar radiations faster than the water.
(v) Therefore, land would become hot faster than the sea.
(vi) You will also observe that the temperature of air in shade is different from the temperature of soil, sand and water in bright sunlight because of the direct effect of radiations.

Solution SAQ - 6

When the solar radiations fall on the earth, some are absorbed and majority of these are reflected back or re-radiated by the land and water bodies. These reflected or re-radiated solar radiations heat the atmosphere from below. As a result convection currents are set up in the air.

Solution SAQ - 7

The factors that influence the movement of air are:
(i) Uneven heating of land at different parts of the earth.
(ii) Differences in heating and cooling of land and water bodies.
(iii) Vapourisation and condensation of water vapours.
(iv) Rotation of earth.
(v) Presence of high mountain ranges in the paths of wind.
(vi) Difference in topography over which the wind passes.

Solution SAQ - 8

When the water bodies get heated by solar radiations during the

day, a large amount of water evaporates and goes in the air. The air carrying water vapours also gets heated. This hot air rises up carrying water vapours with it. As the air rises, it expands and cools. This cooling causes the water vapour in the air to condense as tiny droplets which slowly grow bigger by the condensation of more water droplets and forms clouds. When the droplets have grown big and heavy, they fall down in the form of rain.

Solution SAQ - 9

(i) Take an empty plastic bottle.
(ii) Pour 5-10 ml water into it and close the bottle tightly with a cap.
(iii) Shake the bottle well and then place it in the sun for 10 minutes.
(iv) Now, open the cap of the bottle and allow some smoke from the lighted incense stick to enter the bottle.
(v) Quickly close the bottle tightly with the cap.
(vi) Press the bottle hard between your hands as much as possible.
(vii) After few seconds release the bottle. Press the bottle again as hard as you can.

This simple experiment replicates, on a very small scale, the happenings when air with a very high content of water vapour goes from a region of high pressure to a region of low pressure. When bottle containing water is kept in the sun, the water evaporates and air inside the bottle gets saturated with water vapour. When the bottle is pressed between your hands, the pressure inside becomes high and air inside the bottle moves in a region of low pressure. It expands and cools. The smoke particles act as 'nuclei' on which water vapours condense in the form of tiny droplets. When you release the pressure, the air inside the bottle becomes foggy. When bottle is again pressed, the fog will disappear. It is so because due to high pressure condensed water vapours will fall down and collect as water at the bottom of the bottle. When the experiment is repeated without smoke inside the bottle, one will not observe foggy air inside the bottle as smoke particles are absent and nothing is available in air to act as 'nucleus' for water vapours to condense as tiny droplets.

Solution SAQ - 10

The major components of air pollution are soot, fly ash, dust particles, smoke and some gases like sulphur dioxide, carbon monoxide, nitrogen oxide, ammonia etc.

Solution SAQ - 11

When fossil fuels such as coal and petroleum products are burnt, they produce oxides of nitrogen and sulphur. On dissolving in rain these oxides form nitric acid and sulphuric acid respectively. This causes acid rain. These acids wash down into the soil and make it highly acidic, thus, affecting the growth of plants and ultimately the forest growth. It also affects the surface of buildings by eroding the stone and brick works.

Solution SAQ - 12

Smog is a photochemical haze caused by the action of solar ultra violet radiation on atmosphere polluted with primary pollutants such as hydrocarbons and oxides of nitrogen from automobile exhaust. It reduces visibility and is highly suffocating and toxic to humans, animals and plants.

Solution SAQ - 13

Effects of air pollution on human beings:
(i) Suspended particulate matter causes asthma, bronchitis and allergic cold.
(ii) Pollutant gases cause irritation in eyes, throat and lungs. Heart related diseases tend to increase.
(iii) Hydrocarbon vapours not only damage the internal organs but also cause cancer.

Solution SAQ - 14

In coastal areas, during daytime, there is a regular flow of cool air from the sea towards the land. At night, there is a reverse flow of air from land to sea. This happens because during the daytime, land gets heated faster than water.

Solution SAQ - 15
The atmosphere keeps the average temperature of the earth fairly steady during the day as the atmosphere prevents the sudden increase in temperature during the daylight hours and at night atmosphere slows down the escape of heat into the outer space.
Solution SAQ - 16
Atmosphere is divided into five distinct layers: Troposphere, stratosphere, mesosphere, thermosphere and exosphere.
i. Troposphere is the lowest region of atmosphere which contains air and is subject of differential heating. It extends from the surface of the earth upto 8-20 kms. Many important climatic events such as cloud formation, lightning, thundering etc all takes place in the troposphere.
ii. The Stratosphere extends from the top of the troposphere up to around 31 miles (50 km) above the Earth's surface. In this region the temperature increases with height. Heat is produced due to the formation of ozone.
iii. The mesosphere extends from the top of the stratosphere to about 53 miles (85 km) above the earth. The gases, including the oxygen molecules, continue to become thinner and thinner with height.
iv. Above the mesosphere the thermosphere extends up to near 375 miles (600 km) above the earth. This layer is known as the upper atmosphere. As such, incoming high energy ultraviolet and x-ray radiation from the sun, absorbed by the molecules in this layer, causes a large temperature increase.
v. Exosphere exists above the thermosphere.
Solution SAQ - 17
Air pollution is of two main types:
Natural: It is the pollution caused by nature. It includes forest fires, dust storms, pollen etc.
Human made: It is the pollution caused by human activities. It includes burning of fossil fuels in industries, vehicles and thermoelectric plants, gaseous emission from industries, mining, processing and stone crushing.
Solution SAQ - 18
When the water bodies get heated by solar radiations during the day, a large amount of water evaporates and goes in the air. The air carrying water vapours also gets heated. This hot air rises up carrying water vapours with it. As the air rises it expands and cools. This cooling causes the water vapours in the air to condense as tiny droplets which slowly grow bigger by the condensation of more water droplets and forms clouds.
Solution SAQ - 19
Global warming: An increase in the carbon dioxide content in the atmosphere leads to global warming. The global warming is quite dangerous as it tends to melt polar ice and glaciers existing on mountains, rise in the water level of the oceans and submerge several coastal areas and islands. This could further lead to floods.
Solution SAQ - 20
Ozone depletion is caused by certain chemicals called ozone depleting substances. They include chlorofluoro carbons, methyl bromide, nitrogen oxides and chlorine.
Effects of ozone depletion:
(i) Skin cancer.
(ii) Damage of eyes.
(iii) Damage of immune system.
(iv) Decreased crop yields.
Solution SAQ - 21
When fossil fuels such as coal and petroleum products are burnt, they produce oxides of nitrogen and sulphur. On dissolving in rain these oxides form nitric acid and sulphuric acid respectively. This causes acid rain. These acids wash down into the soil and make it highly acidic, thus, affecting the growth of plants and ultimately the forest growth. It also affects the surface of buildings by eroding the

stone and brick works.
Solution SAQ - 22
Rainwater harvesting is a technique used to capture and store rain water by making special water harvesting structures so that there is an increase in the recharge of underground water resources.
Solution SAQ - 23
Climate is the average weather of an area. It represents the general pattern of atmospheric or weather conditions, seasonal variations and weather extremes, in a region over an extended period, say 50 years or 100 years. For example, desert areas have a hot climate whereas snowbound mountains have a cold climate.
Solution SAQ - 24
The short term changes in the properties of the troposphere forms the weather. The weather changes take place everyday. It tells us about the temperature, rain, cloud and sunshine of an area.
Solution SAQ - 25
CFC's are chlorofluoro carbons which deplete the ozone layer. They are rich in chlorine, fluorine and carbon.
Effects of chlorofluoro carbons:
(i) Skin cancer.
(ii) Damage of eyes.
(iii) Damage of immune system.
(iv) Decreased crop yields.
Solution SAQ - 26
Break down of bigger rocks into smaller mineral particles is called weathering. It is of 3 types:
(i) Physical weathering: Various climatic factors such as temperature, wind, rain water, ice, snow, glaciers and running water contribute to physical weathering. Water and high temperature cause corrosive humidity and bring about unequal expansion and contraction of rocks, facilitating their break down.
(ii) Chemical weathering: It involves a variety of chemical processes, such as hydrolysis, hydration, oxidation and reduction. The breakdown of complex compounds by the carbonic acids present in water and acidic substances derived from the decomposition of organic matter in soil, are examples of chemical weathering.
(iii) Biological weathering: Is done by living organisms such as lichens and bryophytes. They create small crevices which deepen to form cracks in the rocks. Cracks gradually widen and cause slow fragmentation and eventually pulverisation of rocks.
Solution SAQ - 27
The removal and transportation of the top layer of soil from its original position to another place, under the effect of strong winds and fast running rainwater is called soil erosion. Soil erosion can be prevented by :
(i) Intensive cropping
(ii) Sowing grasses and planting xerophytes.
(iii) Terrace farming.
(iv) Contour bunding.
Solution SAQ - 28
Biological weathering: Is done by living organisms such as lichens and bryophytes. Lichens growing on rock surface extract minerals from the rocks. This creates small crevices at places where a thin layer of soil builds up. Mosses grow over these crevices causing deepening of crevices and results in the buildup of more soil inside them. The roots of short lived herbs also passes into them and the cracks gradually widen and cause slow fragmentation and eventually pulverisation of rocks.
Solution SAQ - 29
Water is replenished in the seas by the means of water or hydrological cycle. We know that the oceans or seas are the largest global reservoir of water. Water evaporates from these reservoirs in large quantities and helps in the formation of clouds. The winds blows the clouds over to the lands where after getting cooled enough, the water in clouds falls on the earth or directly over the

seas as rain and hail. Some water from rain and melting snow soaks into the ground, but most of it flows in rivers and returns directly to the seas.

Solution SAQ - 30

Nitrogen fixation is the process of fixing free nitrogen into compounds. This takes place by the following means:

(a) Certain blue-green algae and bacteria can fix atmospheric nitrogen.

(b) Nitrogen fixing bacteria found in the nodules of roots of legumes such as gram, bean, pulses etc. fix atmospheric nitrogen into nitrogen containing compounds.

(c) Lightning also helps in the formation of nitrogen containing compounds.

Solution SAQ - 31

Nitrogen exists as free nitrogen in the atmosphere. This free nitrogen is fixed into compounds of ammonia and nitrates. Most of the organisms cannot utilise nitrogen as molecular nitrogen. Plants take compounds containing nitrogen from the soil. From plants nitrogen passes into the food web. Decay of dead plants, animals and excreta causes return of nitrogen compounds to the soil. Denitrifying bacteria cause liberation of free nitrogen in the atmosphere.

Solution SAQ - 32

Carbon is an important constituent of organic compounds found in all living beings in the form of carbohydrates, fats, proteins and nucleic acids. Carbon is trapped in the surrounding air and water in the form of carbon dioxide. The consumers devour the organic carbon compounds that producers manufacture. Through respiration, both consumers and producers return carbon to the non-living environment in the form of carbon dioxide. Some carbon accumulates in wood for many years and is eventually returned to the atmosphere by fires or through consumption and respiration by fungi, bacteria and other detrivores. Volcanic eruption also releases carbon dioxide to the atmosphere.

Solution SAQ - 33

The dangers of global warming are:

(i) It leads to the melting of polar ice caps and rise in sea level.

(ii) Increase in the temperature of the earth due to green house effect will cause a change in weather and precipitation patterns on the earth.

(iii) It leads to methane burp which is caused by the melting of methane hydrates in permafrost and on sea floor.

Solution SAQ - 34

Carbon dioxide concentration in atmosphere is rising primarily because of two reasons: (i) Deforestation and (ii) Increased combustion of fossil fuels.

As trees take in carbon dioxide from air and release oxygen back into the air, it helps in maintaining the desired levels of oxygen and carbon dioxide in the atmosphere. But due to deforestation, trees are being cut down and this is leading to the increase in carbon dioxide levels.

The increased combustion of fossil fuels also leads to the release of enormous amounts of carbon dioxide in the atmosphere.

Solution SAQ - 35

Ozone layer is called ozone umbrella/shield because it filters out the harmful, high energy ultra violet radiations coming from the sun.

Solution SAQ - 36

In 1985, Farmen found that ozone layer had thinned out over Antarctica. It was called an ozone hole.

Effects of widening of ozone hole are:

(i) Skin cancer.

(ii) Damage of eyes.

(iii) Damage of immune system.

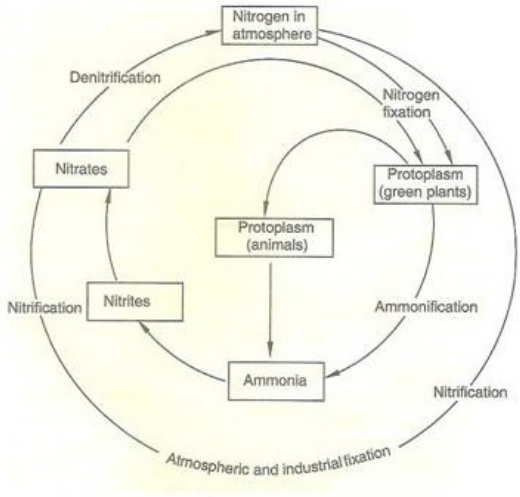
(iv) Decreased crop yields.

Solution SAQ - 37

Water is one of the most important physical components which is essential for the survival of live on earth. Ocean is the biggest storehouse of water. Water on evaporation forms clouds and which after condensation falls down as rain. After rain, it passes through rivers and gets collected again in the ocean. The circulation of water in this manner is called water cycle. The cycle is also performed through living beings in the processes like absorption and transpiration of water by plants and drinking by animals. Animals lose water during respiration and evaporation, perspiration and excretion.

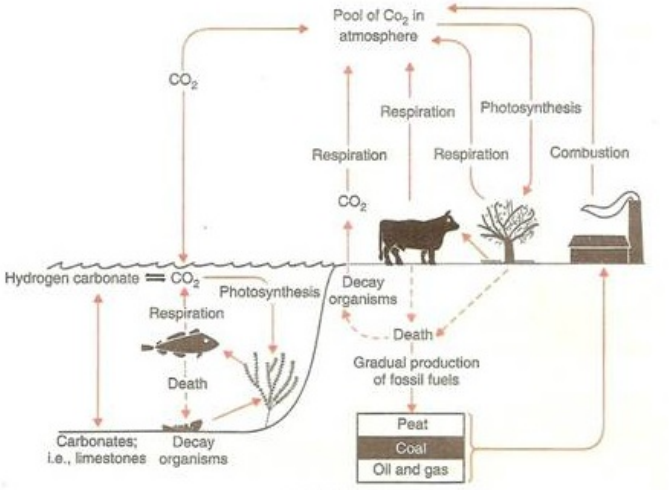
Solution SAQ - 38

(i) Nitrogen cycle



Nitrogen cycle

(ii) Carbon cycle



Carbon cycle.

********** END **********