

Chapter 14

Environmental Issues

(Assertion Reason Questions)

Directions: In the following questions, a statement of assertion is followed by a statement of reason.

Mark the correct choice as:

(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(c) If Assertion is true but Reason is false.

(d) If both Assertion and Reason are false.

Q.1. Assertion: Pollution is always caused by human activities.

Reason: Pollution is not different from contamination.

Q.2. Assertion: Through the use of catalytic converters, unburnt hydrocarbons are changed into carbon monoxide which in turn is changed into nitrogen oxides and water.

Reason: Motor vehicles equipped with catalytic converters should use leaded petrol to protect the catalyst from degradation.

Q.3. Assertion: Suspended particulate matter (SPM) is an important pollutant released by diesel vehicles.

Reason: Catalytic converters greatly reduce pollution caused by automobiles.

Q.4. Assertion: Bharat stage IV emission norms have been in place since April 2010, for 4 wheelers in 13 mega cities of India.

Reason: Green muffler scheme refers to the plantation of trees and shrubs along road sides and is effective to control noise pollution only.

Q.5. Assertion: Compressed natural gas (CNG) is natural gas under pressure and mainly composed of methane.

Reason: One of the advantages of using CNG as a fuel in automobiles is that it requires very less space for storage as compared to that of petrol or diesel.

Q.6. Assertion: Photochemical smog is mainly composed of nitrogen oxides, volatile organic compounds, ozone and peroxyacetyl nitrates.

Reason: Photochemical smog develops in cold weather conditions by the interaction of secondary pollutants.

Q.7. Assertion: Smog is commonly formed at places having low temperature and high pollution of aerosol.

Reason: It is very common in metropolis cities of India.

Q.8. Assertion: Methylmercury is a highly persistent kind of pollutant that accumulates in food chains.

Reason: Mercury pollution is responsible for Minamata disease.

Q.9. Assertion: Water pollutants are measured by BOD.

Reason: If BOD is more, the water is polluted.

Q.10. Assertion: Eutrophication shows increase in productivity in water.

Reason: With increasing eutrophication, the diversity of the phytoplankton increases.

Q.11. Assertion: Excess of nitrates in drinking water are harmful for infants.

Reason: Nitrates are responsible for blue baby syndrome. [AIIMS 2009]

Q.12. Assertion: Eutrophication shows increase in productivity in water.

Reason: With increasing eutrophication, the diversity of the phytoplankton increases. [AIIMS 2013, 2017]

Q.13. Assertion: There is a sharp decline in dissolved oxygen downstream from the point of sewage discharge.

Reason: Microorganisms involved in biodegradation of organic matter in the receiving water body consume a lot of oxygen.

Q.14. Assertion: Cultural eutrophication is nutrient enrichment of water bodies due to human activities like passage of sewage, industrial effluents etc.

Reason: The prime contaminants from sewage and industrial effluents are nitrates and phosphates, which act as plant nutrients and overstimulate the growth of algae.

Q.15. Assertion: Sewage, industrial effluents and waste waters are non points sources of water pollution.

Reason: Surface runoff is point source of water pollution.

-X-X-X-

ANSWER KEY

Q.1 : (d) Pollution may be defined as an undesirable change in physical, chemical or biological characteristics of air, water and land causing harmful effects on living organisms. Pollution can be natural or man made. Natural pollution includes volcanic eruptions, soil erosion, UV- rays, etc. Pollution is different from contamination. Contamination is the presence of harmful organisms causing disease.

Q.2 : (d) A catalytic converter is a vehicle emissions control device that converts toxic pollutants of the exhaust gas into less toxic pollutants by catalyzing a redox reaction. Catalytic converters, having expensive metals namely platinum, palladium and rhodium as catalysts, are fitted into automobiles for reducing emission of poisonous gases. Rhodium is used as reduction catalyst, palladium is used as an oxidation catalyst, and platinum is used both for oxidation and reduction. As the exhaust passes through the catalytic converter, unburnt hydrocarbons are converted into carbon dioxide and water, and carbon monoxide and nitric oxide are changed to carbon dioxide and nitrogen gas, respectively. Motor vehicles equipped with catalytic converter should use unleaded petrol because lead in the petrol inactivates the catalyst.

Q.3 : (b) SPM (Suspended Particulate Matter) is defined as particles floating in the air with a diameter below 10 μm . Studies have shown that high SPM concentrations

in the air can have a detrimental impact on respiratory organs. SPM generation from natural sources (e.g., volcanoes or dust storms) and human activities (vehicles, incinerators and industrial plants). Catalytic converters is a devices designed to reduce the amount of emissions from automobiles. The current (so-called threeway) systems use a heated metal catalyst to reduce the emissions of carbon monoxide (CO), hydrocarbons, and nitric oxide (NO), all of which contribute to the formation of photochemical smog.

Q.4 : (c) Bharat stage emission standards are emission standards issued by the Government of India to regulate the emission of air pollutants from internal combustion of engine equipments of motor vehicles. Bharat Stage IV norms have been in place for 4-wheelers in 13 mega cities of India since April 2010. Green muffler or green belt vegetation is rows of trees and shrubs grown and maintained to serve as noise absorbers. It also reduces air pollution because the trees and shrubs absorb pollution gases and cause settling of suspended particulate matter.

Q.5 : (c) Compressed natural gas (CNG), made by compressing natural gas mainly composed of methane, CH₄, it is a better fuel than petrol or diesel as its combustion produces fewer undesirable gases than petrol or diesel. The cost and placement of fuel storage tanks is the major barrier to wider adoption of CNG as a fuel. CNG vehicles require a great amount of space for fuel storage than conventional gasoline powered vehicles. Laying down pipelines to deliver CNG through distribution points/ pumps is another difficulty faced in switching over to CNG as an automobile fuel.

Q.6 : (c)

Q.7 : (a) Smog is a kind of air pollution, originally named for the mixture of smoke and fog in the air. It is very common in metropolitan cities. Classical smog occurs in cool humid climate. It is a mixture of smoke, fog and sulphur dioxide.

Q.8 : (b) Mercury pollution has been responsible for several deaths in Sweden and Japan and has caused the Minamata disease in Japan, chlor alkali plants seem to be chief sources of mercury containing effluents. Mercury is persistent in water it gets changed into water soluble dimethyl form [(CH₃)₂Hg] and enters the food chain accompanied by biological or ecological amplification.

Q.9 : (a) Water pollutants are commonly measured by their main common denominator, called BOD (Biochemical Oxygen Demand), i.e., the amount of free oxygen absorbed by extraneous substances from water. If water is polluted, it will consume more oxygen, thereby enhancing the BOD of water.

Q.10 : (b) Eutrophication is a natural process which literally means well nourished or enriched. It is a natural state in many lakes and ponds which have a rich supply of nutrients. Eutrophication become excessive, however when abnormally high amount of nutrient from sewage, fertilizers, animal wastage and detergent, enter streams and lakes causing excessive growth or blooms of microorganisms. With increasing eutrophication, the diversity of the phytoplankton community of a lake increases and the lake finally becomes dominated by blue – green algae.

Q.11 : (a) Excess of nitrates in drinking water are harmful for human health and may be fatal for infants. Excessive use of fertilizers often leads to accumulations of nitrates in water. In infants, excess nitrate reacts with haemoglobin to form nonfunctional methaemoglobin that impairs oxygen transport. This condition is termed as methaemoglobinemia or blue baby syndrome. This disease can damage respiratory and vascular systems and even cause suffocation.

Q.12 : (a) Eutrophication is a gradual increase in biological productivity of an aquatic ecosystem with time. Direct and indirect ecological impacts of nutrient enrichment include increased primary productivity, increased phytoplankton biomass, reduction in water clarity, increased incidences of low oxygen events (hypoxia and anoxia), and changes in the trophic structure, and trophodynamics of phytoplankton, zooplankton, and benthic communities.

Q.13 : (a) Domestic sewage is rich in biodegradable organic matter and the decomposition of this organic matter by microorganisms requires oxygen. Microorganisms involved in biodegradation of organic matter in the receiving water body consume a lot of oxygen, and as a result there is a sharp decline in dissolved oxygen downstream from the point of sewage discharge. If sewage quantity is large, the whole of dissolved oxygen may be consumed leaving nothing for respiration for fish and other clean water organisms. They, therefore, get killed. However, as sewage is decomposed, there is a gradual rise in dissolved oxygen downstream. Fish and other clean water organisms reappear indicating the recovery of river from sewage discharge.

Q.14 : (a) Cultural or accelerated eutrophication is nutrient enrichment of water bodies due to human activities like passage of sewage, industrial effluents and run off from fertilized fields rich in nitrates and phosphates. Nutrients present in sewage, agriculture wastes and fertilizers cause dense growth of plants and planktonic algae. Soon planktonic algae increase in number and impart a characteristic colouration to water depending upon the pigments present in them. The excess growth of planktonic algae that causes colouration of water is called algal bloom.

Q.15 : (a) Point source of water pollution is caused by discharge of effluents at one point. Nonpoint source of water pollution is caused by discharge of pollutants over a wide area. Sewage, industrial effluents and waste waters are point source pollutants while surface runoff is a nonpoint source pollutant.