#CRESTInnovator

CREST Science Olympiad (CSO)
Worksheet for
Class 8

Topic

Pollution of Air and Water

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Worksheet on Pollution of Air and Water

1. **Students conducted an experiment comparing the effectiveness of chlorine and ultraviolet (UV) radiation in disinfecting water samples contaminated with bacteria. They measured bacterial counts before and after treatment. Analyse the potential advantages and limitations of using UV radiation for water disinfection compared to chlorine.**

   a. UV radiation is less effective than chlorine in killing bacteria due to its shorter wavelength.
   b. UV radiation can treat large water volumes quickly but may not remove chemical pollutants.
   c. Chlorine treatment requires longer exposure times but can remove chemical pollutants.
   d. UV radiation is only effective for surface water treatment but not groundwater.

2. **A city has a high level of suspended particulate matter (SPM) in the air due to increased construction activities. Analyse the potential consequences of this elevated SPM level on both human health and the environment.**

   a. Increased carbon dioxide emissions and ozone depletion.
   b. Improved air quality and reduced greenhouse gas emissions.
   c. Respiratory diseases in humans and interference with photosynthesis.
   d. Decreased acid rain formation and enhanced plant growth.

3. **In the following question, you will find an assertion and a reason. Select the appropriate option that applies.**

   Assertion: Water scarcity can have serious socio-economic consequences, including reduced agricultural productivity.
   Reason: Water scarcity limits irrigation availability for crops, leading to decreased yields and food insecurity.

   a. Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
   b. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
   c. Assertion is true, but Reason is false.
   d. Assertion is false, but Reason is true.

4. **Match the following pollutants with their primary source.**

	Column I		**Column II**
1.	Sulphur Dioxide (SO_2)	A.	Vehicle emissions
2.	Nitrogen Dioxide (NO_2)	B.	Industrial processes
3.	Suspended Particulate Matter (SPM)	C.	Refrigerators and aerosols
4.	CFCs	D.	Incomplete burning of fossil fuels

   a. 1:C, 2:B, 3:D, 4:A
   b. 1:B, 2:A, 3:D, 4:C
   c. 1:D, 2:A, 3:B 4:C
   d. 1:A, 2:B, 3:D 4:C

5. **In a city heavily reliant on coal-fired power plants, the air quality is deteriorating, and respiratory diseases are becoming more prevalent. Explain the role of sulphur dioxide (SO_2) emissions from these power plants in causing both poor air quality and health issues.**

   a. SO_2 reacts with ozone, leading to droughts and skin cancer.
   b. SO_2 enhances plant growth, causing allergies and asthma.
   c. SO_2 combines with water vapour, causing acid rain and lung issues.
   d. SO_2 absorbs carbon dioxide, leading to smog and heart diseases.

Answer Key

1. b - UV radiation is advantageous because it can disinfect large volumes of water quickly without the need for chemicals. It offers rapid and continuous treatment, making it suitable for treating water in water treatment plants and other applications. However, UV radiation primarily targets microorganisms and does not remove chemical pollutants or contaminants present in the water. It doesn't alter the chemical composition of the water.

2. c - High levels of SPM can have adverse effects on human health, particularly respiratory health. The fine particles in SPM can be inhaled deep into the lungs, leading to respiratory issues such as asthma, bronchitis, and other respiratory diseases. Additionally, these particles can also contribute to cardiovascular problems. Moreover, elevated SPM levels can interfere with photosynthesis in plants by blocking sunlight, which can affect plant growth and ecosystem health.

3. a - The assertion is true because water scarcity can indeed lead to serious socio-economic consequences, including reduced agricultural productivity. The reason is also true because water scarcity limits the availability of water for irrigation, resulting in decreased crop yields and food insecurity. In this case, the reason provides the correct explanation for why water scarcity affects agricultural productivity and contributes to food insecurity.

4. b -
   Sulphur Dioxide (SO_2): Industrial Processes
   Nitrogen Dioxide (NO_2): Vehicle Emissions
   Suspended Particulate Matter (SPM): Burning Fossil Fuels
   CFCs: Refrigerators and Aerosols

5. c - SO_2 emissions from coal-fired power plants can combine with water vapour in the atmosphere to form sulphuric acid. This sulphuric acid can then mix with rainwater, forming acid rain. Acid rain is detrimental to aquatic ecosystems, soil quality, and plant health. Additionally, when inhaled, sulphur dioxide can lead to respiratory issues such as lung irritation and exacerbation of existing respiratory diseases.

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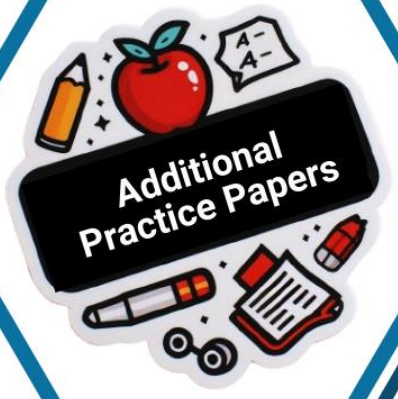

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