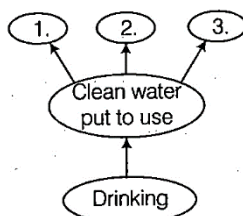


Wastewater Story

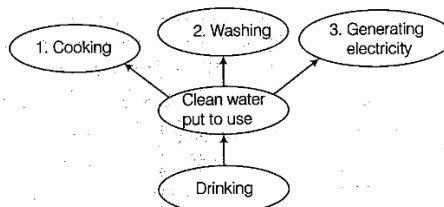
In text Questions

Page No. 220

1. Add the uses of water in the blank bubbles.



Ans. Uses of water in the bubbles:



2. Complete the table given below of the contaminant survey.

	Types of sewage	Point of origin	Substances which contaminate	Any other remark
1.	Sullage water	Kitchen		
2.	Foul waste	Toilets		
3.	Trade waste	Industrial and commercial organisations		

Ans. Given below is the table of contaminant survey explaining types of sewage with their point of origin and contaminate in them.

	Types of sewage	Point of origin	Substances which contaminate	Any other remark
1.	Sullage water	Kitchen	Cooking oils and fats. etc.	May clogs drains
2.	Foul waste	Toilets	Faeces and urine	Causes water and like dysentery, cholera, etc.
3.	Trade waste	Industrial and commercial organizations	Chemicals like paints, solvents, motor oil, etc.	Causes water and soil pollution

Page No. 223

3. With reference to the treatment of polluted water at home by aeration, filtration, chlorination processes answer the following questions.

(a) What changes did we observe in the appearance of liquid after aeration? Did aeration change the odour?

- (b) What is removed by the sand filter?
- (c) Does chlorine change the colour of treated water?
- (d) Do chlorine have an odour?

Ans. (a) Aerated water contains some suspended impurities and the foul odour of the polluted water disappears completely after aeration.
(b) Sand filter removes tiny suspended impurities.
(c) Chlorine makes the water clear and colourless.
(d) Yes, chlorine have a peculiar odour which is not worse than wastewater.

Page No. 224

4. How is water in a river is cleaned naturally?

Ans. River water is cleaned naturally by a process that is similar to wastewater treatment plant. As muddy water when flows through grass or weeds on its way to a stream, mud and solid particles get filtered out.
At the bottom of a lake or stream, microorganism brings chemical changes in the water. The natural filtration process removes pollution from the groundwater throughout the process making it clean and fit for drinking.

5. Why the Eucalyptus trees are planted along sewage ponds?

Ans. The Eucalyptus trees are planted along sewage ponds because these trees absorb all surplus wastewater rapidly and release pure water vapour into the atmosphere.

Page No. 225

6. How one can avoid the addition of the load in WWTP?

Ans. By following proper sanitation and house-keeping practices by creating less waste at an individual level, we can avoid the addition of the load in wastewater treatment plant.

Page No. 226

7. How sewage is disposed of in an aeroplane?

Ans. Aeroplanes have their closed waste sewage tanks, which suck the wastewater and collect it in their tanks. Once the aeroplane lands on the ground, the crew disposed of the sewage properly into airport sewage facility.



NCERT

Exercises

(Questions-Solutions)

Exercises

Page No. 228

1. Fill in the blanks.

(a) Cleaning of water is a process of removing

(b) Wastewater released by houses is called

(c) Dried is used as manure.

(d) Drains get blocked by and

Ans. (a) Cleaning of water is a process of removing pollutants.

(b) Wastewater released by houses is called sewage.

(c) Dried sludge is used as manure.

(d) Drains get blocked by solid food remains and oil and fats.

2. What is sewage? Explain why it is harmful to discharge untreated sewage into rivers or sea.

Ans. **Sewage** is the wastewater containing both liquid and solid wastes (suspended solid) produced by human activities from homes, industries, hospitals, offices, etc. Sewage contains various contaminants including disease causing bacteria and other microbes.

If an untreated sewage is discharged into rivers or sea then the water in the rivers or sea would get contaminated.

If this contaminated water is used for drinking, it can cause diseases such as cholera, typhoid, dysentery, etc. which may lead to death. That is why, it is harmful to discharge untreated sewage into rivers or sea.

3. Why should oils and fats not be released in the drain? Explain.

Ans. Oil and fats hardens and block the sewage pipes. In an open drain also, fats block porosity of soil which affects its water filtering efficiency. Therefore, it should not be released in the drain.

4. Describe the steps involved in getting clarified water from wastewater.

Ans. The steps involved in getting clarified water from wastewater are as follows:

(i) Use of an aerator to bubble air through wastewater. A mechanical stirrer or a mixer can also be used in place of the aerator. It helps in reducing bad odour of the wastewater.

(ii) Then, the water is filtered through the layers of sand, fine grains and medium gravel. This filtration makes the wastewater clean from various types of pollutants. The water is filtered continuously until it becomes clear.

(iii) Then, disinfectant such as chlorine tablet is added to the filtrate and stirred to obtain completely clear and purified water.

The water in a river is cleaned naturally by processes that are similar to those adopted in a wastewater treatment plant.

5. What is sludge? Explain how it is treated.

Ans. Collected semi-solid wastes such as faeces that settle down during wastewater treatment are called sludge. The sludge is removed by using a scraper and then transferred to a tank where it is decomposed by anaerobic

bacteria to produce biogas. This biogas is used as a low cost fuel for heating, cooking, etc. Activated sludge produced by decomposition of bacteria is used as manure.

6. Untreated human excreta is a health hazard. Explain.

Ans. Human excreta may cause wafer pollution and soil pollution which can lead to a lot of health related problems. Water polluted with it contains disease causing bacteria which can spread epidemics and becomes the most common route for water-borne diseases like cholera, dysentery, typhoid, etc.

7. Name two chemicals used to disinfect water.

Ans. Two chemicals used to disinfect water are chlorine and ozone.

8. Explain the function of bar screens in a wastewater treatment plant.

Ans. In wastewater treatment plant, bar screen removes large solid objects from water. The wastewater is allowed to pass through bar screens so that large solid objects such as rags, napkins, cans, plastic bags, polythene, etc. present in wastewater can be removed under filtration process.

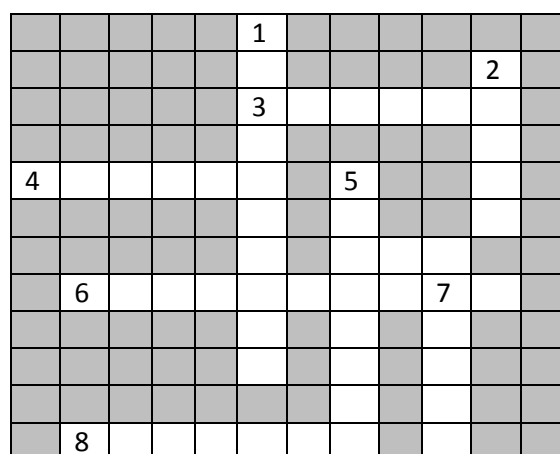
9. Explain the relationship between sanitation and disease.

Ans. Sanitation and disease are related to each other. As lack of sanitation can cause diseases. In our country, a large number of people even today do not have sewerage facilities and thus defecate in open fields, railway tracks, etc. The untreated human excreta thus pollute soil and water resources (including underground water). When this contaminated water is used for drinking, it can cause diseases such as cholera, typhoid, hepatitis, dysentery, etc. which may even lead to death.

10. Outline your role as an active citizen in relation to sanitation.

Ans. As an active citizen, we have many responsibilities regarding sanitation. These can be listed as follows:
 (i) To ensure that our surroundings are cleaned.
 (ii) To ensure that the sewerage system in our house is properly managed.
 (iii) If any leakage or any open drain in the sewerage system is present, then it should be reported to the municipality or the gram panchayats to insist that the open drain must be covered properly and several air and water-borne diseases can be prevented.

11. Complete the crossword.



Across

3. Liquid waste products

4. Solid waste extracted in sewage treatment
 6. A word related to hygiene
 8. Waste matter discharged from human body
- Down**
1. Used water
 2. A pipe carrying sewage
 5. Microorganism which causes cholera
 7. A chemical to disinfect water

Ans.

					1 W						
					A					2 S	
					3 S	E	W	A	G	E	
					T					W	
4 S	L	U	D	G	E		5 B			E	
					W		A			R	
					A		C				
	6 S	A	N	I	T	A	TT	I	7 O	N	
					E		E		Z		
					R		R		O		
							I		N		
	8 E	X	C	R	E	T	A		E		

Across

3. Liquid waste product — Sewage
 4. Solid waste extracted in sewage treatment — Sludge
 6. A word related to hygiene—Sanitation
 8. Waste matter discharged from human body — Excreta

Down

1. Used water — Wastewater
 2. A pipe carrying sewage —- Sewer
 5. Microorganism which causes cholera — Bacteria
 7. A chemical to disinfect water — Ozone

12. Study the following statements about ozone.

- (i) It is essential for breathing of living organisms.
 (ii) It is used to disinfect water.
 (iii) It absorbs ultraviolet rays.
 (iv) Its proportion in air is about 3%.

Which of these statements are correct?

- (a) (i), (ii) and (iii) (b) (ii) and (iii)
 (c) (i) and (iv) (d) All of these

Ans. (b) Ozone is used as a water disinfectant. It absorbs harmful ultraviolet rays of the sun.



NCERT

Exemplar

(Problems-Solutions)

Multiple Choice Questions

1. Which of the following is wastewater?

- (a) Water trickling from a damaged tap
- (b) Water coming out of a shower
- (c) Water flowing in a river
- (d) Water coming out of a laundry

Ans. (d) Water coming out of a laundry is wastewater.

2. Sewage is mainly a

- (a) liquid waste
- (b) solid waste
- (c) gaseous waste
- (d) mixture of solid and gas

Ans. (a) Sewage is mainly a liquid waste.

3. Which of the following is/are products of wastewater treatment?

- (a) Biogas
- (b) Sludge
- (c) Both biogas and sludge
- (d) Aerator

Ans. (c) Biogas and sludge both are the products of wastewater treatment.

4. Open drain system is a breeding place for which of the following?

- (a) Flies
- (b) Mosquitoes
- (c) Organisms which cause diseases
- (d) All of the above

Ans. (d) Open drain system is a breeding place for flies, mosquitoes and organisms which cause diseases.

5. Water polluted by various human activities causes a number of water-borne diseases. Which of the following is not a water-borne disease?

- (a) Cholera
- (b) Typhoid
- (c) Asthma
- (d) Dysentery

Ans. (c) Asthma is not a water-borne disease. It is caused by polluted air.

6. Pick from the following one chemical used to disinfect water.

- (a) Chlorine
- (b) Washing soda
- (c) Silica
- (d) Coal

Ans. (a) Chlorine is the chemical used as water disinfectant,

7. The system of a network of pipes used for taking away wastewater from homes or public buildings to the treatment plant is known as
 (a) sewers
 (b) sewerage
 (c) transport system
 (d) treatment plant
- Ans.** (b) The system of a network of pipes used for taking away wastewater from homes or public buildings to the treatment plant is known as sewerage.
8. Which of the following is a part of inorganic impurities of the sewage?
 (a) Pesticides (b) Urea
 (c) Phosphates (d) Vegetable waste
- Ans.** (c) Phosphate is an inorganic impurity of the sewage.
9. In a filtration plant, water is filtered using layers of
 (a) sand and clay
 (b) clay and fine gravel
 (c) sand and fine gravel
 (d) sand, fine gravel and medium gravel
- Ans.** (d) In a filtration plant, water is filtered using layers of sand, fine gravel and medium gravel.
10. Which of the following are not a source of wastewater?
 (a) Sewers (b) Homes
 (c) Industries (d) Hospitals
- Ans.** (a) Sewers are not considered as sources of wastewater. Homes, industries and hospitals are considered as a source of wastewater.

Very Short Answer Type Questions

11. Why is open drain a concern?
- Ans.** Open drain is a big concern for the society because they create unhygienic conditions and flies, mosquitoes and other insects breed can spread a number of diseases.
12. State whether the following statements are True or False. In case a statement is false, write the correct statement.
 (a) Sewage is a solid waste which causes water pollution and soil pollution.
 (b) Used water is wastewater.
 (c) Wastewater could be reused.
 (d) Where underground sewerage systems and refuse disposal systems are not available, the high cost on-site sanitation system can be adopted.
- Ans.** (a) False, sewage is a liquid waste which causes water pollution and soil pollution.
 (b) True
 (c) True
 (d) False, where underground sewerage systems and refuse disposal systems are not available, the low cost on-site sanitation system can be adopted.

Short Answer Type Questions

13. Name two inorganic impurities present in sewage.

Ans. Inorganic impurities present in sewage are nitrates and phosphates.

14. Animal waste, oil and urea are some of the organic impurities present in sewage. Name two more organic impurities present in sewage.

Ans. Fruits and vegetable wastes, pesticides and herbicides are organic impurities present in sewage other than animal waste, oil and urea.

15. Name two alternative arrangements for sewage disposal where there is no sewerage system.

Ans. The two alternative arrangements for sewage disposal, where there is no sewerage system are as below:
(i) Septic tanks
(ii) Composting pits

16. A man travelling in a train threw an empty packet of food on the platform. Do you think this is a proper waste disposal method? Elaborate.

Ans. No, one must always put the waste in a nearby dustbin or carry it to the litter home and dispose it in dustbins there. Waste, not properly disposed may enter into the drains and choke them. It also makes public places dirty and unhygienic.

17. Why should we not throw

(a) used tea leaves into sink?

(b) cooking oil and fats down the drain?

Ans. (a) We should not throw used tea leaves into sink because it may choke the drain-pipe of the sink.
(b) We should not throw cooking oil and fats down the drain as it can harden and block the drain-pipes.

18. Match the items of Column I with the items of

	Column I		Column II
(a)	Inorganic impurities	(i)	Phosphorus and nitrogen
(b)	Organic impurities	(ii)	Nitrates and phosphates
(c)	Nutrients	(iii)	Cholera and typhoid
(d)	Bacteria	(iv)	Pesticides and herbicides

Ans. The correct matching of Column I with Column II with reference to sewage is given as below:

	Column I		Column II
(a)	Inorganic impurities	(ii)	Nitrates and phosphates
(b)	Organic impurities	(iv)	Pesticides and herbicides
(c)	Nutrients	(i)	Phosphorus and nitrogen
(d)	Bacteria	(iii)	Cholera and typhoid

19. Given below is a jumbled sequence of the processes involved in a wastewater treatment plant. Arrange them in their correct sequence.

(a) Sludge is scraped out and skimmer removes and floating grease.

(b) Water is made to settle in a large tank with a slope in the middle.

(c) Large objects like plastic bags are removed by passing wastewater through bar screens.

(d) Sand, grit and pebbles are made to settle by decreasing the speed of incoming wastewater.

(e) Wastewater enters a grit and sand removal tank.

Ans. The correct sequence of wastewater treatment in treatment plant is as below:
 Step I. Large objects like plastic bags are removed by passing wastewater through bar screens.
 Step II. Wastewater enters a grit and sand removal tank.
 Step III. Sand, grit and pebbles are made to settle by decreasing the speed of incoming wastewater.
 Step IV. Water is made to settle in a large tank with a slope in the middle.
 Step V. Sludge is scrapped out and skimmer removes the floating grease.

20. Three statements are provided here which define the terms:

(a) sludge (b) sewage and (c) wastewater

Pick out the correct definition for each of these terms.

(a) The settled solids that are removed in wastewater treatment with a scraper.

(b) Water from kitchen used for washing dishes.

(c) Wastewater released from homes, industries, hospitals and other public buildings.

Ans. (a) The settled solids that are removed in wastewater treatment with a scraper is sludge.
 (b) Water from kitchen used for washing dishes is wastewater.
 (c) Wastewater released from homes, industries, hospitals and other public buildings is sewage.

21. A mixture (x) in water contains suspended solids, organic impurities, inorganic impurities (a), nutrients (b), disease causing bacteria and other microbes. Give names for (x), (a) and (b).

Ans. A mixture of sewage (x) in water contains suspended solids, organic impurities, inorganic impurities like nitrates, phosphates and metals (a), nutrients like phosphorus and nitrogen (b), disease causing bacteria and other microbes.

Long Answer Type Questions

22. What are the different types of inorganic and organic impurities generally present in sewage?

Ans. The different types of inorganic and organic impurities present in sewage are as below:
 (i) Inorganic impurities - nitrates, phosphates and metals.
 (ii) Organic impurities - fruit and vegetable wastes, oil, urea, human faeces, animal waste, pesticides and herbicides.

23. The terms sewage, sewers and sewerage are interlinked with each other. Can you explain, how?

Ans. The terms like sewage, sewers and sewerage are interlinked with each other because sewage is a mixture of wastewater coming out of homes and other places. Sewers are pipes which carry sewage and sewerage is a network of sewage carrying pipes.

24. Fill in the blanks in the following statements using words given in the box.

air, handpumps, cholera, water, large, ground

A very number of our people defecate in the open. It may cause pollution and soil pollution. Both the surface water and water get polluted. water is the source for wells, tubewells and Thus, it becomes the most common route for borne diseases like dysentery, etc.

Ans. A very large number of our people defecate in the open. It may cause water pollution and soil pollution. Both the surface water and ground water get polluted. Ground water is the source for wells, tubewells and handpumps. Thus, it becomes the most common route for water-borne diseases like cholera, dysentery, etc.

25. Think and suggest some ways to minimize waste and pollutants at their source, taking your home as an example.

Ans. We can minimize waste and pollutants entering the water and create less wastewater by taking following few steps at home:

- (i) By not throwing used tea leaves, solid food remains, etc. in the drain. We should throw it in the dustbin.
- (ii) By not throwing chemicals like medicines, paints, insecticides, etc. in the drain as they increase the pollution load of the sewage.