

Grade-10, Science Unit plan- 6 (Non-STEM)

Deepika Jain, Sonali Verma, Upma Mahajan,					
Subject group and discipline		SCIENCE			
Unit Title	Matter and environment	MYP year	5 (Grade-10)	Unit Duration (Hours)	16 hours

Inquiry: Establishing the purpose of the unit.

Key concept	Related Concept(s)	Global Context
Change	Consequences,patterns	Globalization and sustainability

Statement of Inquiry

Sustainability must be at the center of all changes in patterns that lead to globalization.

Inquiry Questions

Factual Questions

- Name the functional group present in alcohols, ketones, aldehydes and carboxylic acids.
- Mention two examples each of alcohols, ketones, aldehydes and carboxylic acids.
- Reaction between _____ and _____ leads to the formation of esters.
- What are the characteristics of a good source of energy?
- What are the main constituents of CNG?
- Write the formula of ozone.

- What do different R's stand for in the 5R formula?

Conceptual Questions

- How ethene is formed from alcohol? Also mention the specific conditions required for this reaction to happen.
- What do you understand by the term esterification? Name the catalysts required in this reaction and what is its role?
- What are the environmental consequences of using detergents?
- How is increasing energy demand adversely affecting our environment ?
- Justify the statement that hydel power is a renewable source of energy.
- What are the implications of landfill fires on human life?
- Differentiate between biodegradable and non biodegradable wastes.

Debatable Questions

- Production of Alcohol should be banned.
- Hydrogen: A game changer in attaining energy independence.
- Animal industry : A leading cause of environmental problems.

Topics

CHAPTER 16- SOME IMPORTANT CARBON COMPOUNDS

- Organic compounds that impact human lives: Alcohols (ethanol), Carboxylic acid (ethanoic acid)\& their properties.
- Responsible production and consumption of soaps and detergents.

CHAPTER 17- SOURCES OF ENERGY

- Why do we need sources of energy?
- Expectations from a good source of energy.
- Conventional/non renewable sources of energy (fossil fuels, thermal power plant)
- Alternative sources of energy (bio-gas plant, solar energy, wind energy, hydro energy, Nuclear energy and Hydrogen as fuel)
- Environmental consequences due to non-judicial uses of energy sources.

CHAPTER 18- MOVING TOWARDS A SUSTAINABLE WORLD

- Conservation of forests for our future
- landfill fires
- Ways of water harvesting in old times [like bawli] in Delhi
- Human activities that affect the environment (example- industrialization, urbanization, microbeads/microplastics, e-waste production, mining activities, CFCs and Ozone)
- Waste management (biodegradable and non-biodegradable wastes)
- Five 'R's'

Objectives

Summative Assessment

Criterion A: Knowing and understanding**Students should be able to:**

- i. explain scientific knowledge
- ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations
- iii. analyze and evaluate information to make scientifically supported judgments.

Criterion B: Inquiry and Designing**Students should be able to -**

- i. explain a problem or question to be tested by a scientific investigation
- ii. formulate a testable hypothesis and explain it using scientific reasoning,
- iii. explain how to manipulate the variables and explain how data will be collected
- iv. design scientific investigation.

Criterion C: Processing and Evaluating**Students should be able to-**

- i. Present collected and transformed data
- ii. Interpret data and explain results using scientific reasoning
- iii. Evaluate the validity of a hypothesis based on the outcome of the scientific investigation
- iv. Evaluate the validity of the method

Outline of summative assessment task(s) including assessment criteria:

1. Develop a sustainable plan for generation and distribution of electric energy in houses and industries of your locality.
or
2. Suggest a plan for the efficient/sustainable disposal of biodegradable and nonbiodegradable waste products that are generally generated in your locality.
or
3. Compare and contrast the following practices:-
 - a) Traditional and modern use of Biomass fuel.
 - b) Conventional and non-conventional sources of energy.
4. Pick up three things from your home that are considered as hydrocarbons. Develop an infographic showing the group to which they belong (Whether it is an alkane,alkene, alkyne ,alcohol or a carboxylic acid) , structure,functional group,properties and at least three of its uses.

- v. Explain improvements or extensions to the method.

Criterion D: Reflecting on the impacts of science

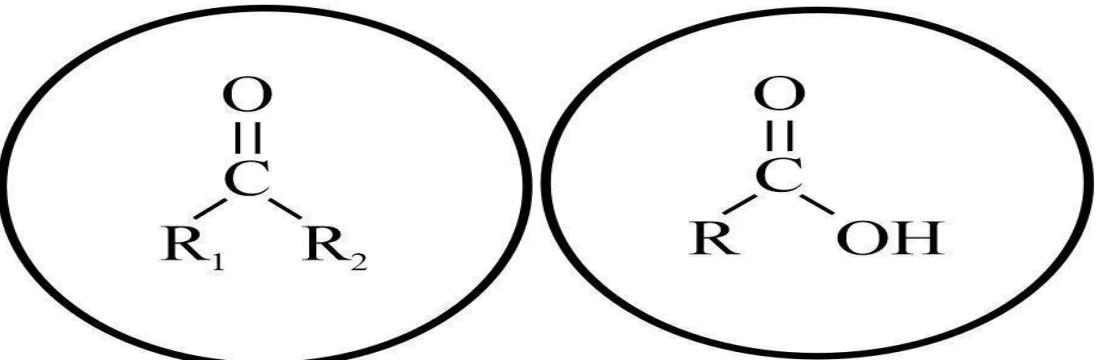
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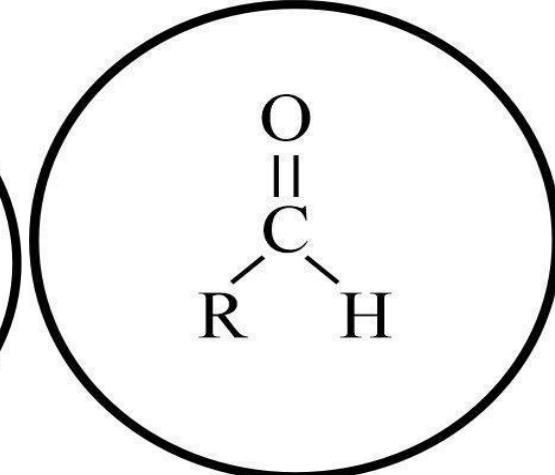
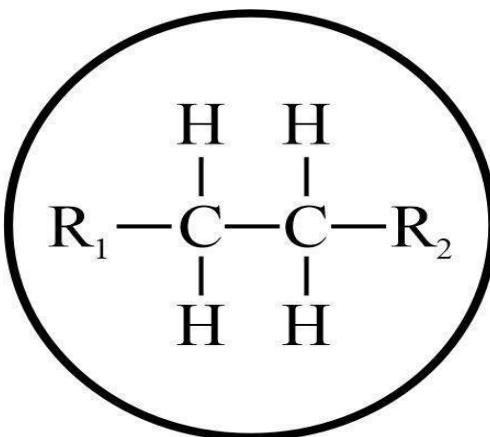
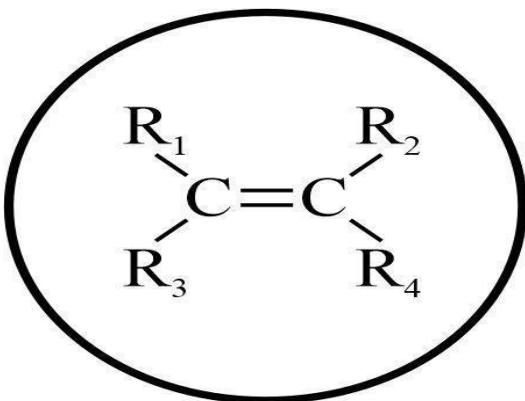
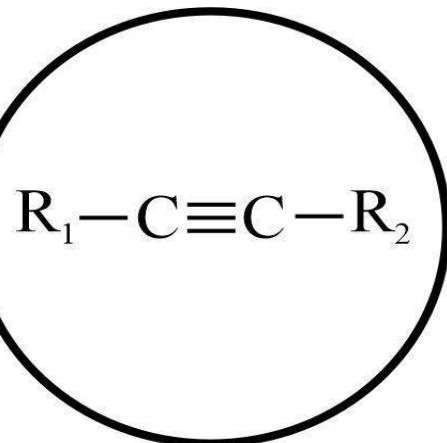
- i. explain the ways in which science is applied and used to address a specific problem or issue
- ii. discuss and evaluate the various implications of using science and its application to solve a specific problem or issue.
- iii. apply scientific language effectively.
- iv. document the work of others and sources of information used.

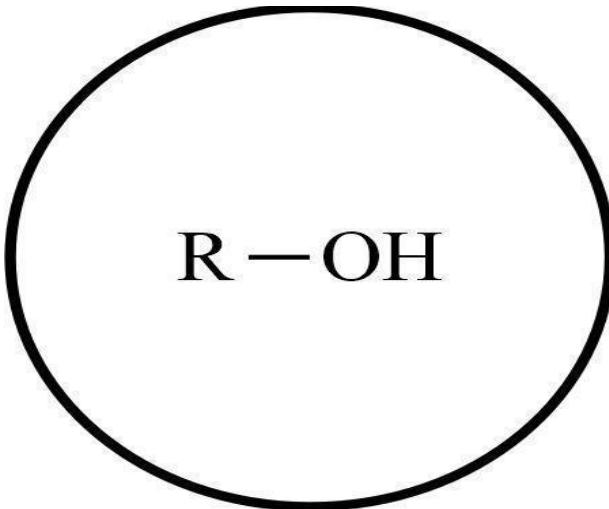
Approaches to Learning (ATL)

- **Research Skills-** Make connections between scientific research and related moral, ethical, social, economic, political, cultural or environmental factors.
- **Thinking Skills-** Interpret data gained from scientific investigations.
- **Self-Management Skills-** Students will improve their self-management skills by learning about judicious consumption of resources.
- **Social skills-** Practice giving feedback on the design of experimental methods.
- **Communication skills-** Use appropriate visual representation of data based on purpose and audience.

Action: Teaching and learning through inquiry

Content	Teaching-Learning Process
<p>CHAPTER 16- SOME IMPORTANT CARBON COMPOUNDS</p> <ul style="list-style-type: none"> - Organic compounds that impact human lives: Alcohols (ethanol), Carboxylic acid (ethanoic acid)& their properties. - 	<p>Suggested Task 16.1</p> <p>Quick Recall Activity</p> <p>Think scientifically</p> <p>Infographic</p> <p>An infographic showing different functional groups which the learners have studied in the previous unit can be shown to the students and they would be provoked to identify them all.</p> <div style="text-align: center;">  <p>The diagram consists of two separate ovals. The left oval contains a chemical structure of a carbonyl compound: a central carbon atom (C) is double-bonded to an oxygen atom (O) above it, and single-bonded to two other groups, R₁ and R₂, below it. The right oval contains a chemical structure of a carboxyl group: a central carbon atom (C) is double-bonded to an oxygen atom (O) above it, and single-bonded to an OH group below it, also to the left of the C=O bond.</p> </div>





The facilitator will bring the attention of learners towards the -OH group i.e. alcohol. The learners will be made to put some yeast into some grapes and observe the changes ,which have occurred after a week or so. The facilitator could then bring the attention of the learners towards the composition and properties of alcohol. He/She will guide the learners to explore and discuss what they know about Alcohols as the learners might have a fairly good idea of alcohol and its consumption by people.

<https://www.thehindu.com/news/national/other-states/suspected-hooch-kills-10-in-dry-bihar-during-holi/article65243046.ece>

The learners would then be compelled to find out the reason behind these deaths. The objective would be to guide the learners towards the composition and properties of alcohols.

Extended learning

Find out about the origin of the word ‘Alcohol’

Suggested Task 16.2:

Being scientific

Let's hone our observation skills

(a)Sensory engagement

Honing the observation skills of students

A sample of Ethyl alcohol from the laboratory can be given to the group of learners in china dishes. The learners can then be asked to use their sense of touch ,smell and sight to find out the properties of ethyl alcohol(touch, smell and test it for its solubility in water). The learners can then be guided to make a table and write down their observations. **CAUTION:** The facilitator will tell the learners to be cautious about handling this pure ethyl alcohol as it is quite lethal.

Hypothesis building and analyzing

(b)i) Form a hypothesis if all the alcohols are equally soluble in water.

ii) Test different types of alcohols (long chained and short chained) for their solubility in water.

iii) Analyze and infer whether all different types of alcohols are soluble in water or not.

Suggested Task 16.3(a): Think scientifically

Hypothesis building and analyzing

In order to apprise the students of the chemical properties of ethanol, the facilitator will demonstrate the students the following chemical reactions:

a) Reaction with sodium metal.

The learners will be asked to observe the demonstration, write their observations and test for the presence of gas emanated during this reaction.

Suitable video can be shown in this regard.

b) Dehydration of ethanol.

A suitable video of the above reaction can be shown by the facilitator to the students. A series of questions can follow in order to synthesize the learnings from the video.

<p>Responsible production and consumption of soaps and detergents.</p>	<p>The questions can be:</p> <ol style="list-style-type: none"> 1. What are the necessary conditions for the above reaction to occur?. 2. What is the end product of dehydration of ethanol? 3. What is the role of concentrated sulphuric acid in this reaction? <p>Suggested Task 16.3(b): After studying about the properties of alcohols ,the learners can be asked to conduct an investigation on the commercial utility of alcohols. What are different industries and purposes for which alcohols are used.</p> <p>Extended learning</p> <p>Sanitisers were extensively used during the pandemic to disinfect hands. What is the main ingredient in sanitiser which causes disinfection. Recall your experience of using a hand sanitiser and its effect on the surface of your skin. Find out if all the alcohols have the same impact on the skin surface. Find out the names of some skin friendly alcohols.</p> <p>Suggested Task 16.4: Talk scientifically</p> <p>Quick Response Activity</p> <p>The facilitator can pose a quick response activity as to mention the ingredients that the learners know are used to make their favorite chowmein. Hence the chemical nature of vinegar can be discussed which will lead to the chemical name and general name ie ethanoic acid and acetic acid.</p> <p>Suggested Task 16.5: Work scientifically</p> <p>More about acids</p> <p>Recall that mineral acids like hydrochloric acid, sulfuric acids have low pH. The facilitator will encourage the learners to find out the pH of acetic acid and ask the learners to write down their observations. Also ask them to compare the pH of acetic acid with mineral acids. What did they infer?</p>
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Encourage them to find out more about the physical properties of acetic acid by themselves. (Hint: What do they know about glacial acetic acid)

Learners can be made to follow this video to find out more about acetic acid.

<https://www.youtube.com/watch?v=Nce1xOIVRQc>

**Suggested Task 16.6: Think scientifically Work scientifically
Fruity smelling compounds**

The facilitator under his/her supervision can make the learners conduct the following activity:

Pour 1 ml ethanol, 1 mL glacial acetic acid and a few drops of concentrated sulfuric acid in a test tube. Put this test tube in a warm water bath for some 5 minutes. Pour this mixture into another beaker containing 50 ml of water and smell the resulting mixture. Following questions can proceed to guide the observation by the learners.

CHAPTER 17- SOURCES OF ENERGY

- Why do we need sources of energy?
- Expectations from a good source of energy.

- Conventional/non renewable sources of energy (fossil fuels, thermal power plant)
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1. What kind of smell emanated from this experimental setup?
2. Have you experienced this smell somewhere else? If yes, name those things?
3. Do you know the name of the compound so formed?

The facilitator will then summarize the activity by writing the formation of ester in a chemical equation form.

Suggested Task 16.7: Soap formation Work scientifically
Soap formation

Alternative sources of energy (bio-gas plant, solar energy, wind energy,	<p>By asking popular soap brand names and also asking their favorite soap, the facilitator will bring the attention of the learners to the fact that hydrocarbons are indeed used in the manufacture of soap. A simple soap formation activity can be conducted by the students under the supervision of their facilitator. Given below are the steps of soap formation</p> <p>Material Required: A 20 percent sodium hydroxide solution, castor oil/mustard oil, common salt, filter paper, blue and red litmus papers, glass rods, beakers, bunsen burner, tripod stand, wire gauze etc.</p> <ol style="list-style-type: none"> 1. Take 20 mL vegetable/mustard oil in a beaker. 2. Add 30 mL of 20 percent NaOH solution to the oil and stir it with a clean glass rod. 3. Touch the beaker from outside. Record your observations. 4. Put this beaker on a bunsen burner and heat it with constant stirring till a thick paste is formed. 5. Allow the set-up to cool. 6. Now add 5 to 10 gm of common salt to this mixture and stir it continuously till the soap begins to sit. 7. You can add color and perfume of your choice. 8. Leave this mixture for 24 hours and then cut it into desired shapes. <p>The facilitator would further ask the students to test the pH of different soap brands and comment upon their nature.</p> <p>The facilitator will sum up the activity by writing down the saponification reaction on the board. The learners can also be encouraged to find out the purpose behind adding common salt to the above procedure.</p> <p>The facilitator can encourage students to find out any other method also that is employed in making soap.</p> <p>Suggested Task 16.8: Think scientifically</p>
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	<p>Quiz time !!!</p> <p>Students will now be asked to recall the reaction between an acid and a base that they know from inorganic chemistry. Let them make an assumption on the nature of the salt that is made by the reaction of ethanoic acid with a base viz NaOH. Lead the discussion by guiding the thought process and summarize by encouraging the students to write down the equation on their own.</p> <p>Suggested Task 16.9: Being scientific Compare and contrast</p> <p>The facilitator would ignite the thinking process of the learners and they would be asked to discuss in their groups how they can differentiate chemically between carboxylic acids and alcohols and conduct that test in their laboratories also.</p> <p>Suggested Task 16.10: Work scientifically Survey time</p> <p>Learners can be encouraged to carry out a survey in their own as well as neighboring households and find out what different types of soaps and detergents are used by them and ask the following questions from the surveyees:</p> <ol style="list-style-type: none"> 1. How do you differentiate between soaps and detergents.. 2. For what purpose each of them is used? 3. Do they work differently with hard and soft water(test yourself) 4. Which one has a better cleansing action? 5. How do soaps and detergents affect the environment? <p>The findings of the survey will motivate the learners to find out the reason behind the following facts:</p> <ol style="list-style-type: none"> 1. Detergents have a stronger cleansing action. 2. Detergents work well with hard water also.
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Environmental consequences due to non-judicial uses of energy sources.	<p>3. Detergents are not environment friendly.</p> <p>From elemental carbon to sources of energy:</p> <p>Students can be asked to give examples of amorphous forms of carbon. They can then be asked to enumerate their usages, this will help in directing the students towards sources of energy as carbon in its amorphous form is a prime source of energy.</p> <p>SOURCES OF ENERGY</p> <p>Suggested Task 17..1 Think scientifically</p> <p>Need based analysis</p> <ul style="list-style-type: none"> ● A dialogue can be initiated upon the prevalent sources of energy in our country to meet various requirements. Students can be asked to represent the same in the form of a pie chart or a bar graph. ● Through this the idea of renewable and non renewable sources of energy can be developed and that we are running short of non renewable sources of energy like coal and petroleum which can be a cause of crisis in the near future. <p>Now ask them the following compelling questions :-</p> <ol style="list-style-type: none"> 1. What are the characteristics of a good source of energy or a good fuel? 2. Name any three renewable and non-renewable sources of energy. 3. What are the differences between renewable and non-renewable sources of energy? 4. What are the disadvantages of using fossil fuels? 5. Why are we searching for alternate sources of energy? <p>Suggested Task 17.2 Talk scientifically</p> <p>Family discussion</p> <p>Tell the students to enquire from their grand-parents or other elders –</p>
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<p>CHAPTER 18- MOVING TOWARDS A SUSTAINABLE WORLD</p> <p>- Conservation of forests for our future</p>	<p>(a) How did they go to school? (b) How did they get water for their daily needs when they were young? (c) What means of entertainment did they use?</p> <p>compelling question:- Tell them to compare the above answers with how they do these tasks now. Ask them if they find any difference? If yes, in which case more energy from external sources is consumed.</p> <p>Practice question:-</p> <ol style="list-style-type: none"> 1. What are the environmental consequences of the increasing demand for energy? 2. What steps would you suggest to yourself and your classmates to reduce energy consumption? <p>Suggested Task 17.3 Being scientific</p> <p>Survey time</p> <ul style="list-style-type: none"> • Tell the students to conduct a survey (rural and urban) and find out how biomass (tree branches, dung cakes, husk, palm oil, etc.) has been used as a fuel conventionally and non conventionally. • Students may analyze and draw inferences regarding pros and cons of both conventional and non conventional usage of biomass fuels. <p>Compelling questions:-</p> <ol style="list-style-type: none"> 1. Students can be asked to look for the global perspective on how biomass is being used non conventionally in different parts of the world.
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- landfill fires

- In the context of piped natural gas (PNG) replacing liquified petroleum gas (LPG) in big cities like Delhi, students can be asked to do a survey and prepare a report on how PNG has affected the efficiency of the usage of natural gas.

Practice questions:-

1. What are the advantages of using biogas as a household fuel?
2. What are the major differences between LPG and CNG?
3. What are the advantages of replacing LPG with PNG?

Suggested Task 17.4 Work scientifically

Report writing

Students can be asked to work on a viable model in which sewage can be used to produce biogas in urban settings. Students may read the case study of the **Okhla sewage treatment plant** from the internet **or if possible arrange a field visit to Okhla sewage treatment plant** to get more information on this. Next day tell them to share their understanding about the topic.

Suggested Task 17.5 Being scientific

My wind farm

Students can be asked to consider a situation when they wish to set up a wind farm with their friends and answer the following questions:

1. What support would you seek from the government in the form of economic subsidies and infrastructural requirements.
2. What do you think will be the ideal place to set up such a farm?
3. Can you set up a wind farm in your locality?
4. What are the other requirements and challenges that you must consider while setting up a wind farm?

Write a report centered around the above points.

Suggested Task 17.6 Talk scientifically

Triangular debate

- Divide the class in three groups and assign three topics to them as given below:-
group 1. power generation through hydro power
group 2. power generation through thermal power
group 3. power generation through nuclear energy
tell them to collect information regarding the mechanism.
- Students may conduct an internet or library search on National Thermal Power Corporation, National Hydro-Power Corporation and Department of Atomic Energy to find out the information.
- **Next day, Organize a triangular debate among three groups** on advantages and disadvantages of generating electricity through **Thermal power plant, Hydro power plant and Nuclear power plant**.

Suggested Task 17.7 Think scientifically School terrace visit

- i) Arrange a visit with due permission
 - Arrange a visit with due permission from the competent authority to the terrace of your school/neighboring school where solar panels have been installed.
 - Show them the given electricity bill and ask them the meaning of **SOLAR NET METERING** mentioned on it.

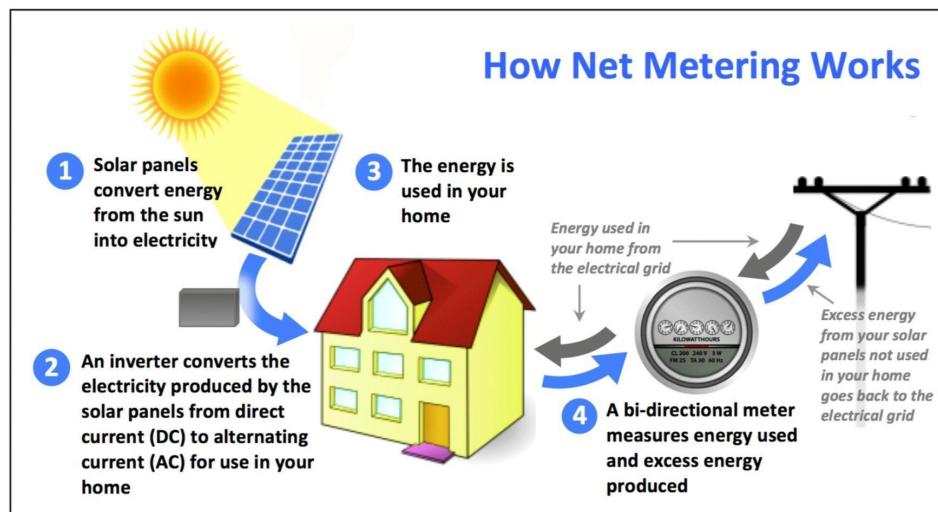
- Ways of water harvesting in old times [like bawli] in Delhi

- Human activities that affect the environment

Unit	Current Meter Detail		Removed Meter Detail		Units Consumed [(A-B) x MF] + [(C-D) x MF]	(देश रियो एन राइट्रा) Due Date: 14-DEC-2022 Total Amount Payable ₹ 150.00																																																								
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Important Message <p>* Dear Customer - Opt through Online Modes and get instant acknowledgement. Pw Note - if you have already opted for eBilling subsidy through any of the modes and have the acknowledgement, no further action confirmation is required.</p> <p>* In case of power cut or connection failure, the bill amount will be Rs 10/- differential amount shall be adjusted in your next bill.</p> <p>* In view of many Covid cases and for your safety, Tata Power-DDL advises you to avoid visit to our Customer Care Centers. Please eval our online services at www.tatapower-ddl.com or TPDOL Connect App or call 19124</p> <p>* For any help related to Online registration of New Connection request, please contact @ 24x7 helpline number-19124 or What's App No-7303485201 or Live Chat with our Executives at www.tatapower-ddl.com or TPDOL Connect App.</p> <p>* Make your cheque/DD payable to "Tata Power Delhi Distribution Limited CA No. 60026509012". Please mention full name and phone number of drawee while making payment through cheque. Cheque should be Availabe on 20/12/2022.</p> <p>* The Connection shall be liable to be disconnected on non-payment of all payable dues including arrears, after notice as per section 56(1) of the Electricity Act,2003 read with chapter VI of DERC (Supply Code and Rules).</p> <p>* Power Purchase Adjustment Cost (PPAC) is being levied on Energy & Fixed Charges as - Provisional PPAC @ 8.75% from 26.07.22 and Differential PPAC @ 5.50% from 01.04.21 & 2% from 10.06.22 onwards</p> <p>* Nearest Payment Centres (i) TPDOL Payment Centre, Near Shakti Apartment, Rohini Sector-9, Delhi</p>																																																														
Consumption History <table border="1"> <thead> <tr> <th>Billing Period</th> <th>Days</th> <th>Units</th> <th>Bill Basis</th> <th>Current Demand</th> <th>Subsidy</th> <th>Provisional Bill Refund</th> <th>Total Amount Payable</th> </tr> </thead> <tbody> <tr><td>24/09/22-23/10/22</td><td>30</td><td>314</td><td>Actual</td><td>1627.95</td><td>-780.16</td><td>0.00</td><td>850.00</td></tr> <tr><td>24/08/22-23/09/22</td><td>31</td><td>647</td><td>Actual</td><td>4383.09</td><td>0.00</td><td>0.00</td><td>4380.00</td></tr> <tr><td>21/07/22-23/08/22</td><td>34</td><td>707</td><td>Actual</td><td>4823.06</td><td>0.00</td><td>0.00</td><td>4820.00</td></tr> <tr><td>18/06/22-20/07/22</td><td>33</td><td>778</td><td>Actual</td><td>5491.58</td><td>0.00</td><td>0.00</td><td>5550.00</td></tr> <tr><td>17/05/22-17/06/22</td><td>32</td><td>572</td><td>Actual</td><td>3610.18</td><td>0.00</td><td>0.00</td><td>3630.00</td></tr> <tr><td>14/04/22-16/05/22</td><td>33</td><td>722</td><td>Actual</td><td>4843.09</td><td>0.00</td><td>0.00</td><td>4840.00</td></tr> </tbody> </table>							Billing Period	Days	Units	Bill Basis	Current Demand	Subsidy	Provisional Bill Refund	Total Amount Payable	24/09/22-23/10/22	30	314	Actual	1627.95	-780.16	0.00	850.00	24/08/22-23/09/22	31	647	Actual	4383.09	0.00	0.00	4380.00	21/07/22-23/08/22	34	707	Actual	4823.06	0.00	0.00	4820.00	18/06/22-20/07/22	33	778	Actual	5491.58	0.00	0.00	5550.00	17/05/22-17/06/22	32	572	Actual	3610.18	0.00	0.00	3630.00	14/04/22-16/05/22	33	722	Actual	4843.09	0.00	0.00	4840.00
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Net Current Demand	Subsidy	Arrears (included in Total Amount Payable)	Provisional Bill Refund	Adjustments	LPSC	Total Amount Payable																																																								
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<p>Congratulations!!! We acknowledge you as a GREEN Consumer for opting digital mode of payment/ Solar Net Metering</p> <p>Details for payment through NEFT/RTGS - Beneficiary name : TPDOLXXXXXX (Where XXXXXXXXX denotes your 11 digit CA number); IFSC code - HDFC0000240</p> <p>Water is at home when the meter reader visited? Send us your reading along with photographs using Self-reading link in TATA POWER-DDL Connect App or on WhatsApp.</p> <p>MOVE TO ELECTRIC VEHICLES FOR A BETTER TOMORROW 96675 58009</p>																																																														

Next day tell them to share their findings in the class and after that teacher can explain them the concept of SOLAR NET METERING

(example-
industrialization,
urbanization,
microbeads/microplastics,
e-waste production,
mining activities, CFCs
and Ozone)



- Tell the students to prepare a **Project Report** on the comparison of solar panels with the other non conventional sources of energy, highlighting their advantages and limitations.

Suggested Task 17.8 Work scientifically

Experiment time

- Take
- Take two conical flasks or beakers and paint one white and the other black.
- Fill both with water and cover it.
- Place them in direct sunlight for an hour.
- Touch them and check, which one is hotter?
- Tell them to measure the temperature of the water in the two containers with a thermometer.
- Tell them to think of ways in which this finding could be used in their daily life. After that, tell them to share their ideas in the class along with their group .

Practice questions:-

1. What are the advantages and limitations of using a solar cooker?
2. What is the significance of black color coating in solar heating devices?

Suggested Task 17.9 Talk scientifically

Analyze to infer

- Students may be told to analyze the information about various energy sources used in their surroundings.
- Tell them to discuss with their group how each one affects the environment and analyze the merits and demerits of each source and select the best source of energy on the basis of discussion within the group.
- Now tell them to share their findings about the best source of energy in front of the class.

Suggested Task 17.10: Green hydrogen

Green hydrogen

Green hydrogen is the one produced with no harmful **green-house gas emissions**. Green hydrogen is made by electrolysis of water using clean electricity from renewable energy sources, such as solar or wind power. We use this green energy to carry out electrochemical reactions(electrolysis) to dissociate water into its components of hydrogen and oxygen, emitting zero-carbon dioxide in the process.

- Tell the students to suggest some more ideas of producing green Hydrogen.
- tell them to search the internet and explore about:-

- Blue Hydrogen
- Black and Brown hydrogen
- Pink hydrogen
- White Hydrogen

Next day, tell them to discuss their findings with their group members, prepare a presentation and after that tell them to present in front of the class.

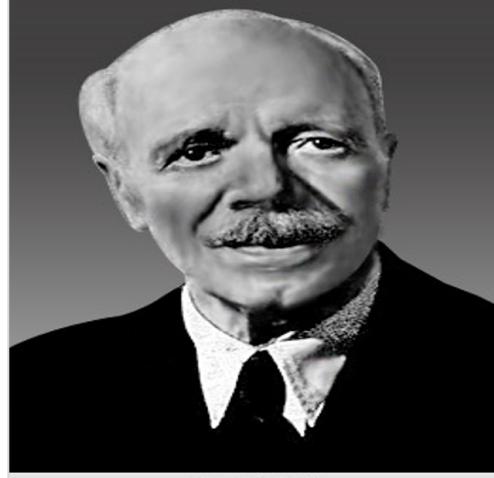
Compelling questions:-

1. Quote two examples where humans are using Hydrogen as a fuel.
2. What are the advantages and disadvantages of using Hydrogen as a fuel?

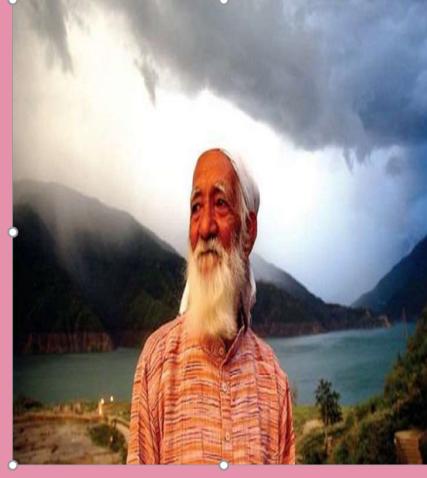
Suggested Task 18.1

Conservation of forests for our future

Conservation of forests for our future



Jim Corbett



Sunderlal Bahuguna



Jadav payeng

Learners will be shown this pic of activists who have contributed significantly for forest conservation. The facilitator will ask the learners to search more about the work done by them in this field and make a report based on their findings. The learners will then be guided to discuss in their group and also suggest their own unique strategies for conservation of forests..

Suggested Task 18.2

The menace caused by landfill fires

[https://www.hindustantimes.com/india-news/massive-inferno-at-bhalswa-landfill-i
n-north-delhi-4th-landfill-fire-in-a-month-101650992868377.html](https://www.hindustantimes.com/india-news/massive-inferno-at-bhalswa-landfill-in-north-delhi-4th-landfill-fire-in-a-month-101650992868377.html)

The facilitator will prompt the learners to go through the above article of a popular daily Newspaper and the images given below.





The learners will then be divided into groups. A total of 4 groups can be made with each group given a specific task. These tasks are:

Group A: What is a landfill? What are the various landfill sites in Delhi? Show them on the map of Delhi.

Group B: What objective does a landfill site achieve? Can you suggest any alternative to them?

Group C: Give reasons behind landfill fires?

Group D: What are the consequences of landfill fires, especially in the context of a thickly populated metropolis like Delhi.

Let all the groups do their presentations and the facilitator can then summarize the environmental consequences of landfill fires.

Suggested Task 18.3

Water conservation

Facilitator can make arrangement for the learners to go through this article from Center For Science and Environment, India

<https://www.cseindia.org/traditional-water-harvesting-systems-683>

The learners can also be encouraged to consult the internet, library, people around them and find out different traditional methods that have been used in India for water harvesting. Baoli System (stepwell) can be studied by visiting (optional) Agrasen Baoli or some other baoli in the locality and finding out various interesting historical, scientific and mathematical facts related to it. Learners can record their findings in the form of a picture chart. These charts can be put in the corridors of the school and a gallery walk can be arranged.

If the learners have visited The Agrasen Baoli in Delhi, they can paste those pictures also in their chart.

While synthesizing, the facilitator will emphasize the importance of harvesting water and its utmost utility in the present circumstances and scenario as well.

Suggested Task 18.4

Human activities that affect the environment

To develop an understanding of the topics given below following tasks can be performed by the team of the facilitator and the learners.

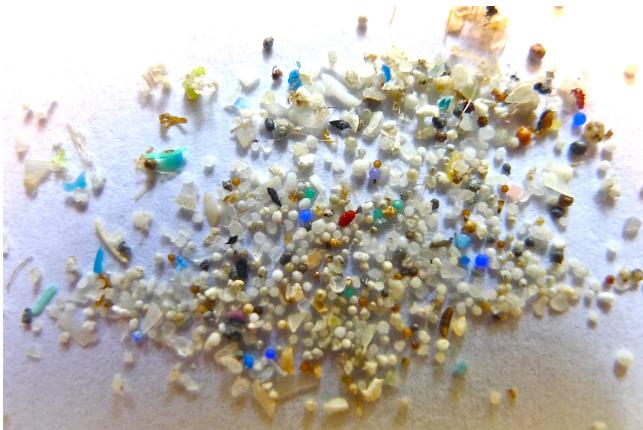
- (a) Let the students revisit chapters in their history books on industrialisation and find out how industrialisation is a factor behind the rise of urbanization. The students will then be encouraged to find out what are the environmental implications of industrialisation and urbanization. They can make group presentations on smart boards on their findings.
- (b) Case study on Microbeads and plastics.

(Following case study has been adopted from the booklet “**माध्यमिक विज्ञान में सतत विकास लक्ष्यों को एकीकृत करने के लिए केस स्टडीज़**” published by the SCERT, Delhi)

The learners would be made to study the case given below and answer the associated questions to develop an understanding of impact of microbeads/microplastics on environment:

Microplastics and microbeads

मोहित अपने मित्र शोभित के साथ बाज़ार जाता है आज की पार्टी के लिए कुछ सामान खरीदने। आज वह अपनी मित्र मनीषा के प्रमोशन की पार्टी मना रहे हैं। Supermarket में घूमते हुए मोहित ने सोचा कुछ व्यक्तिगत सामान भी खरीद लूं। उसने कुछ फेस वॉश और फेस स्क्रब उठाकर अपनी कार्ट में डाल लिए। शोभित, जो कि एक विज्ञान के अध्यापक उन्होंने मोहित से कहा कि इन कॉस्मेटिक्स के सामान में प्लास्टिक के माइक्रोबीड्स होते हैं जो कि सेहत व वातावरण के लिए अत्यंत हानिकारक है। मोहित ने अपने मित्र की बात मानकर सामान वापस काउंटर पर रख दिया किंतु साथ में शोभित से यह भी कहा कि घर जाकर मुझे विस्तार से समझाइएगा।



कछ समय बाद दोनों मोहित के घर पहुंच जाते हैं और थोड़ी ही देर में मनीषा भी वहां पहुंच जाती है।

मनीषा को बहुत भूख लगी है इसीलिए वह फटाफट कुछ खाने का फ्रिज में से निकालकर माइक्रोवेव में डालकर गर्म करने लगती है तो शोभित एकदम से उसको रोक लेता है और कहता

है कि इस प्लेट में खाना गरम मत करो। मनीषा हैरान होकर कहती है यह तो माइक्रोवेव सेफ प्लास्टिक है तो इसमें खाना गर्म करने में क्या बुराई? शोभित बताता है की वर्ष 2021 में नेचर जर्नल में छपे एक रिसर्च आर्टिकल के अनुसार हम जब भी माइक्रोवेव में कुछ प्लास्टिक गर्म करते हैं तो छोटे-छोटे प्लास्टिक के टुकड़े जिन्हें माइक्रोप्लास्टिक्स कहा जाता है वह खाने में चले जाते हैं उन्होंने यह भी बताया कि वैज्ञानिक Dunzhu li के अनुसार जब हम बच्चों की प्लास्टिक की बोतल के अंदर भी गर्म पानी डालकर बेबी फूड को हिलाते हैं तो माइक्रोप्लास्टिक्स उस खाने में चले जाते हैं।

शोभित - " मोहित! जो मार्केट में मैं तुमको माइक्रोबीड्स के बारे में बता रहा था वह भी माइक्रोप्लास्टिक्स का ही एक रूप है!"

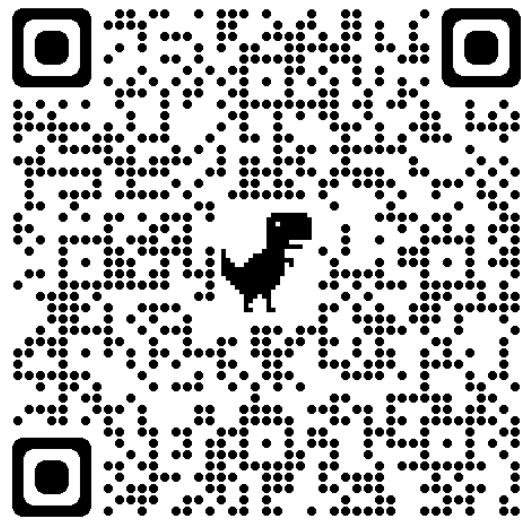
मोहित व मनीषा (एक साथ) - " तो विस्तार से बताओ दोस्त! "

शोभित - " समुद्री जैव वैज्ञानिक रिचर्ड थॉमसन (University of Plymouth, UK)के अनुसार जो plastic के टुकड़े 5mm से कम साइज के होते हैं वह माइक्रोप्लास्टिक्स कहे जा सकते हैं। बहुत ही हैरानी की बात है कि यह माइक्रोप्लास्टिक्स अंटार्टिका, आर्कटिक और यहां तक की माउंट एवरेस्ट की चोटी पर भी मिलते हैं। उनके अनुसार यह माइक्रोप्लास्टिक आजकल आपके खाने के नमक पीने के पानी और हर तरह के खाने में मिलते हैं।



Red microplastic fibres wrap around a *Temora* copepod, a species of zooplankton. Credit: Plymouth Marine Laboratory

नीचे दिए QR code से आप ऊपर दिए गए चित्र का GIF देख सकते हैं



रुकें व सोचें

1. Microplastics किन-किन वस्तुओं से आ सकते हैं?
2. कॉस्मेटिक्स में मिलने वाले Microplastics जल के साथ धुल कर कहां चले जाएंगे?
3. यदि इन Microplastics को मछलियां निगल लेती हैं तो क्या होगा?
4. आर्कटिक और अंटार्टिका में तो आबादी ही नहीं है तो वहां यह माइक्रोप्लास्टिक्स कैसे पहुंचे होंगे?
5. अगर हमें प्लास्टिक के बर्तनों में वस्तुएं माइक्रोवेव में गर्म नहीं करनी चाहिए तो इसका क्या विकल्प है?

मनीषा - "इस स्टडी के बारे में थोड़ा और बताओ शोभित! काफी interesting लग रही है।

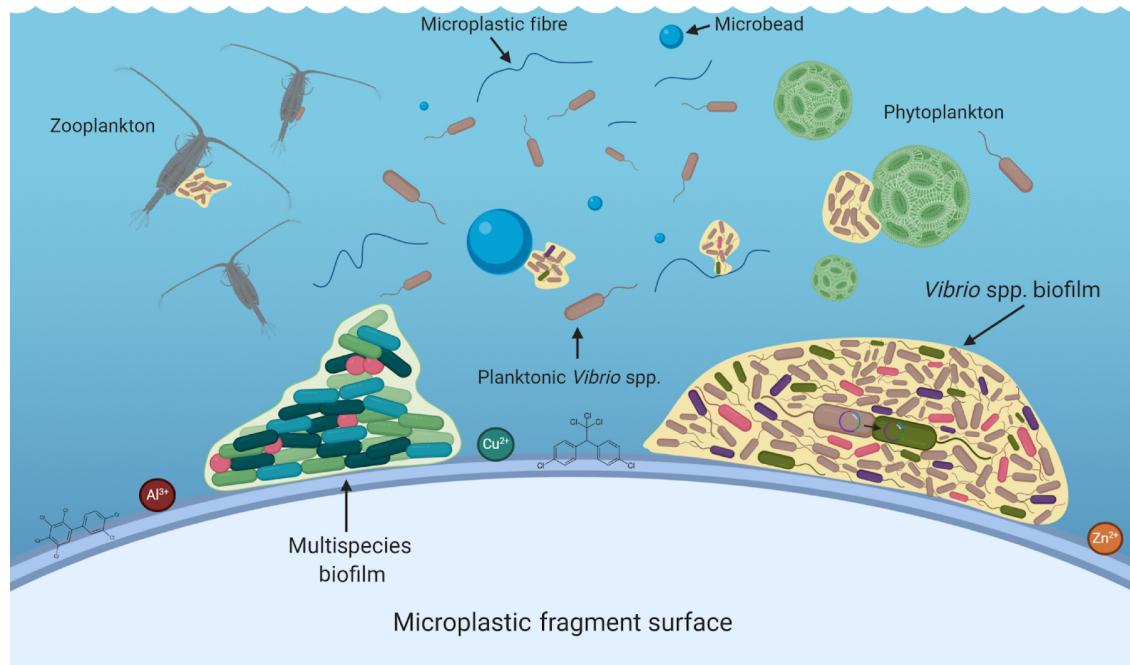
शोभित - "कुछ वैज्ञानिक मानते हैं कि इन microplastics पर कुछ ज़हरीले रसायन

अवशोषित हो जाते हैं और जब इन microplastics को समट्री जीव अथवा सूक्ष्मजीव निकल लेते हैं तो उनके शरीर का उपचयन गड़बड़ा जाता है जिसके कारण उनकी प्रजनन शक्ति व जीवन पर बहुत प्रभाव पड़ता है। 2017 में की गई एक रिसर्च में ऑस्ट्रेलियन researchers ने

- Waste management
(biodegradable and
non-biodegradable wastes)

- Five 'R's'

यह पता लगाया कि माइक्रो प्लास्टिक के धागे सूक्ष्मजीवों पर बहुत प्रभाव डालते हैं, उनके लार्वा लगभग आधे बनते हैं तथा गया साइज में बहुत छोटे होते हैं। यह भी देखा गया है कि इन सूक्ष्मजीवों शारीरिक गठन बदल जाता है। 2019 में की गई एक और रिसर्च के मुताबिक Pacific mole crabs इन फाइबर्स के कारण छोटा जीवन जीते हैं। एक और रिसर्च के मुताबिक इन microplastics के प्रदूषण का प्रभाव गहरे समुद्र में अधिक गंभीर है क्योंकि वहां पहुंचने वाले प्लास्टिक वह कर कहीं और नहीं जा सकते तथा वहां की सफाई करना भी मुमकिन नहीं है।



मोहित - "क्या हम मनुष्यों पर भी इन माइक्रोप्लास्टिक्स का कुछ प्रभाव पड़ रहा है?"
शोभित - "मनुष्य पर इन माइक्रोप्लास्टिक्स के प्रभाव को लेकर काफी रिसर्च चल रहे हैं हालांकि अभी ठोस रूप से कछ भी सिद्ध नहीं किया गया है किंतु यह माना जाता है कि जब भी कोई बाहरी वस्तु हमारी शरीर में आती है तो हमारा शरीर उसके विरुद्ध कार्य करने लगता है तो

माइक्रोप्लास्टिक्स के साथ भी ऐसा ही होता होगा। एक और बात जिस प्रकार वायु में मिलने वाले SPM (suspended particulate matter) हमारे फेफड़ों में जमकर सूजन पैदा कर देते हैं और कैंसर का कारण भी बनते हैं, उसी प्रकार यह माइक्रोप्लास्टिक्स भी हमारे रक्त में जा सकते हैं, फेफड़ों में जमकर हमारी श्वसन तंत्र को नुकसान पहुंचा सकते हैं। ना सिर्फ यह है, हमारी अंतः स्रावी प्रणाली के द्वारा निकलने वाले रसायन जिन्हें हम हारमोंस के नाम से जानते हैं उनके उत्पादन में भी गड़बड़ी आ सकती है जिसके कारण पूरा अंतः स्रावी तंत्र असंतुलित हो सकता है। ऐसा भी सोचा जाता है जी यह माइक्रोप्लास्टिक्स हमारे शरीर के पुस्तकों में इकट्ठे होकर नुकसान पहुंचा सकते हैं। चूहों पर की गई एक स्टडी में पाया गया है कि 5 माइक्रोमीटर से छोटे माइक्रोप्लास्टिक्स उनकी आंतों में और यकृत में इकट्ठे हो जाते हैं जिसके कारण बहुत सी विकृतियां उत्पन्न हो सकती हैं। आजकल एक और तरीके के प्लास्टिक के विषय में भी रिसर्च की जा रही है। इन्हें Nanoplastics कहा जाता है जो कि 1 माइक्रोमीटर से भी छोटे होते हैं।

सोचो और उत्तर दो:

1. Nanoplastics व उनके प्रभावों के विषय में पता लगाओ।
2. Mariana trench जोकि पृथ्वी की सबसे गहरी समुद्री trench है, वहां से इन माइक्रोप्लास्टिक्स को साफ करना क्यों असंभव है?
3. इन microplastics से हम अपना बचाव किस प्रकार कर सकते हैं?
4. Microplastics के संपर्क में आने से कैंसर की संभावना कैसे बढ़ जाती है?

मनीषा – "तुम्हारी बातें सुनकर मुझे लग रहा है कि हमें भी समुद्री जीवन को बचाने के लिए अपने जीवन शैली में कुछ बदलाव लाने चाहिए जैसे कि सिंगल यूज प्लास्टिक का प्रयोग कम कर दें, प्लास्टिक का पुनः पुनर्चक्रण, microbeads वाले cosmetics का प्रयोग करना छोड़ दें, सभी लोगों में जागरूकता फैलाएं, ocean drives के माध्यम से समुद्री प्रदूषण को कम करने में मदद करें।"

मोहित- " वाह मनीषा! तुमने तो बहुत ही अच्छे सुझाव दिए हैं। मैंने अभी-अभी इंटरनेट पर एक रिसर्च article में देखा कि यूरोपियन यूनियन ने कुछ निर्देशों के पालन कीजिए एक रणनीति बनाई है इसके बारे में चर्चा करते हैं।

तीनों नीचे दिए टेबल के विषय में चर्चा करने लगते हैं.....

	EU Directives	Date	Objective	EU Country Participation
	Bio-based, biodegradable, and compostable plastics	First announced 11 December 2019, published action plan on 11 March 2020	The EU will address the sourcing, labelling, and use of bio-based plastics, and the use of biodegradable and compostable plastics	Denmark
	Global action on plastics	Adopted December 2020, UNEA5.2 will take place from 28 February to 4 March 2022	The EU is paving way for a global agreement on plastics, to support the global shift towards a circular economy	Germany
	Microplastics	The first and second stakeholder meetings held September and November 2021, respectively.	The EU aims to address the growing volume of microplastics in the environment	Netherlands, Austria, Belgium, Sweden, Luxembourg
	Plastic bags	Amendment to the Packaging and Packaging Waste Directive (94/62/EC)	EU rules on plastic bags to address the unsustainable consumption and use of lightweight plastic carrier bags	Ireland, Denmark, France
	Plastic packaging	Entry into force on 31 December 1994. 30 September 2020–6 January 2021 was an open public consultation on the review of requirements for packaging and other measures to prevent packaging waste	EU rules on packaging and packaging waste cover all materials, including plastics	Netherlands
	Plastic waste shipments	Entry into force on 1 January 2021	EU rules on importing and exporting plastic waste	Poland
	Single-use plastics (SUP)	2 July 2019, Commission adopted the Implementing Decision 2021/1752 by 1 October 2021	EU rules on SUPs to fight against marine litter and plastic pollution	Bulgaria
<p>मोहित- " क्या तुम दोनों को पता है कि United Nations Environment Assembly (UNEA) ने 2016 - 2017 में यह प्रस्ताव दिया था कि माइक्रोप्लास्टिक्स के कारण होने वाला प्रदूषण अब सभी देशों को चिंता का विषय लगने लगा है। यह कारण भी है कि UN SDGs (United Nations Sustainable development goals) ने इस बात पर बल दिया है कि सभी देश, scientific व local community मिलकर इस समस्या से जूँझ सकते हैं।"</p>				

शोभित – "ADIDAS brand ने Parley Ocean Plastic के साथ मिलकर समुद्री plastic waste ka पुनर्चक्रण कर अपनी एक नई water- रेसिस्टेंट outdoor clothing range की collection लॉन्च की है।"

मोहित व मनीषा (एक साथ) – "वाह!!!!"

अब आप थोड़ा रिसर्च करें

1. पता लगाएं कि हमारे देश में क्या नए कदम उठाए जा रहे हैं?
2. SDG क्या हैं और इनको हमारे देश में कैसे अपनाया गया है?
3. क्या ADIDAS-Parley जैसा कोई कदम किसी और ब्रांड ने भी उठाया है?

(a)Case study on e-waste

(Following case study has been adopted from the booklet “ माध्यमिक विज्ञान में सतत विकास लक्ष्यों को एकीकृत करने के लिए केस स्टडीज़” published by the SCERT, Delhi)

Before going through this case study the learners can conduct a survey in their neighborhood and find out:

How many laptops/mobiles/digital devices does a family have and how many are actually required?

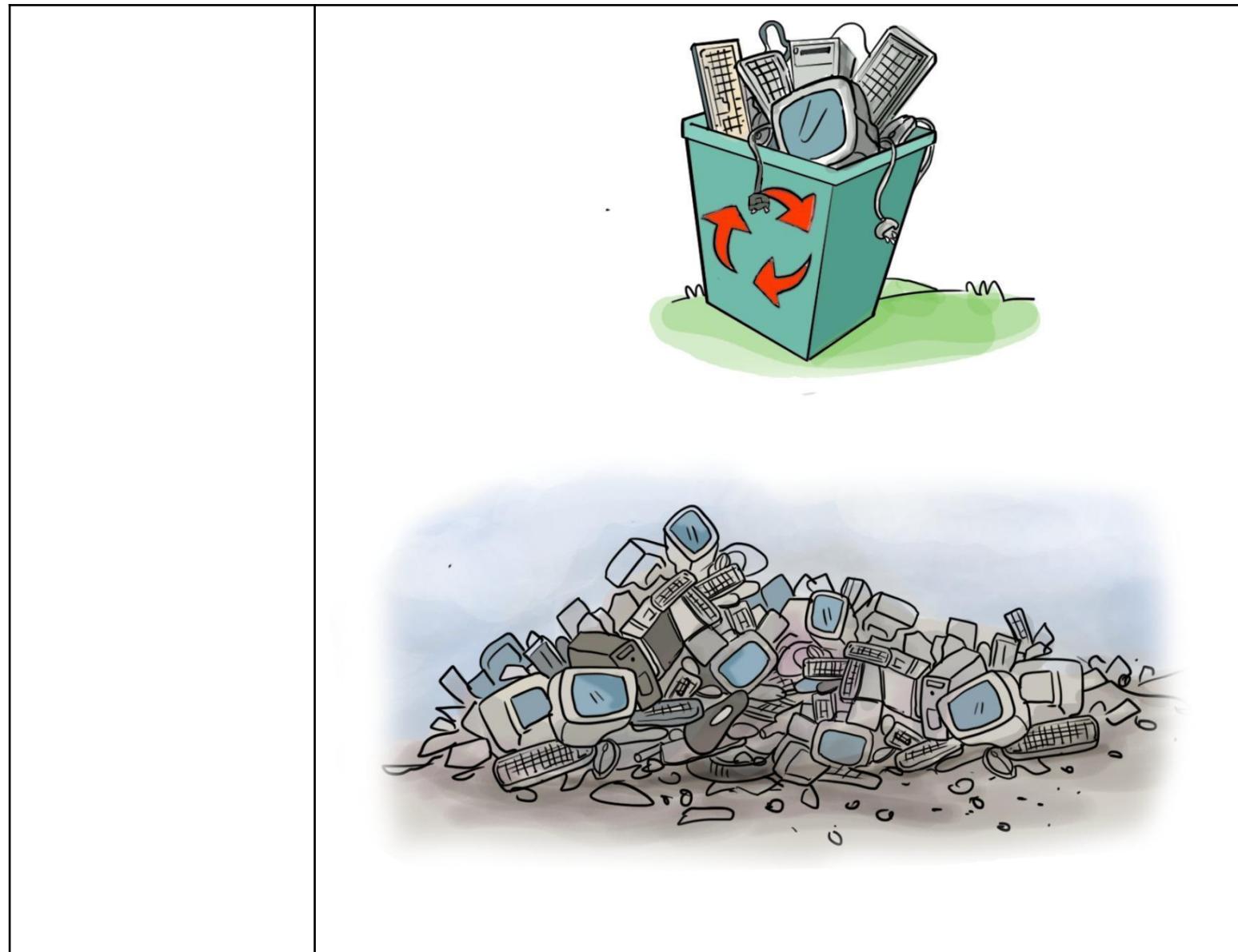
What do they do with the e-waste?

Are they aware of the processing of the e-waste and its impact on the environment?
Study the case given below and find out answers to the associated questions:

ई - वेस्ट: आधुनिकता बनी अभिशाप!!!!!

13 वर्षीय जसकरण और उसका परिवार दिल्ली में रहते हैं। कुछ दिन पूर्व जब जसकरण के पापा का मोबाइल फोन खराब हो गया और वह उसको लेकर कहीं जाने लगे तो जसकरण ने उत्सुकता पूर्वक पापा से पूछा, ”पापा, इस पुराने मोबाइल फोन को लेकर आप कहां जा रहे हो ?” पापा ने नम्रता पूर्वक उत्तर दिया, ”बेटा, मैं इस फोन को रीसायकल सेंटर पर जमा करने जा रहा हूँ। जसकरण की उत्सुकता और अधिक बढ़ गई और उसने पापा से पूछा, ”इस बेकार फोन का

कोई क्या करेगा? रीसायकल सेंटर वालों के यह किस काम का? इस बेकार फोन को तो कूड़ेदान में फेंक देना चाहिए।”
यह सुनकर पापा ने उत्तर दिया, ”नहीं जसकरण, ऐसी गलती कभी नहीं करना। यह ई-वेस्ट है। जसकरण ने पूछा, ”ई-वेस्ट किसे कहते हैं पापा और इसे कूड़ेदान में क्यों नहीं फेंकना चाहिए?”
जसकरण के इस सवाल पर उसके पापा ने उसे ई-वेस्ट के बारे में जो जानकारी दी वह नीचे दी जा रही है।



जिन इलेक्ट्रिकल और इलेक्ट्रॉनिक सामानों को इस्तेमाल के बाद हम फेंक देते हैं वही ई-वेस्ट कहलाते हैं। ओ सी ई डी (OCED, ऑर्गेनाइजेशन फॉर इकोनामिक कोऑपरेशन एंड डेवलपमेंट) के अनुसार कोई भी वह उपकरण जो बिजली के उपयोग से चलता है, जब अपने जीवन के अंत तक पहुंच जाता है तो वह ई-वेस्ट कहलाता है। कंप्यूटर मॉनिटर, पीसीबी, सीडी, मदरबोर्ड, टोनर कार्टर्ज, केबल, बल्ब, ट्यूबलाइट आदि ई-वेस्ट के अंतर्गत आते हैं।

सोचो और बताओ

- 1) आपके घर में उत्पन्न ई-वेस्ट का आप क्या करते हैं ?
- 2) ई-वेस्ट को लापरवाही से फेंकने के क्या नुकसान हो सकते हैं?

आज की इस प्रगतिशील दुनिया में ई-वेस्ट चिंता का एक बड़ा विषय है। संयुक्त राष्ट्र ने ई-वेस्ट से उत्पन्न खतरे को देखते हुए हाल ही में एक रिपोर्ट जारी की जिसके अनुसार 2019 में करीब 5.36 करोड़ MT ई-वेस्ट उत्पन्न हुआ था तथा 2030 तक यह बढ़कर 7.4 करोड़ MT तक पहुंच जाएगा। 2019 में अकेले एशिया में ही 2.49 करोड़ टन ई-वेस्ट उत्पन्न हुआ था। ऐसा अनुमान लगाया जा रहा है कि 16 वर्षों में ई-वेस्ट का उत्पादन लगभग 2 गनों हो जाएगा। भारत एक विकास शील देश है और तकनीकी दिशा में भी देश निरंतर प्रगति के पथ पर है। यदि सिर्फ मोबाइल फोन की ही बात करें तो 2007 की तुलना में मोबाइल फोन की संख्या 18 गुना अधिक हो गई है। देश के आईटी हब कहे जाने वाला बैंगलुरु में 1991 में लगभग 13 आईटी कंपनी थी जिनकी संख्या लगभग बढ़कर 3000 हो गई है। देश में आई टी कि इस प्रगति से निश्चित रूप से हमारे जीवन को तकनीकी रूप से और अधिक समृद्ध बना दिया है परंतु ई-वेस्ट का उत्पादन इसके साथ जुड़ी एक बहुत बड़ी समस्या है। बैंगलुरु की भाँति ही देश के अन्य शहर जैसे कि चेन्नई, मुंबई, हैदराबाद, पुणे और गुरु ग्राम आदि में भी आईटी क्षेत्र कुकुरमुता की तरह फैल रहा है। इस डिजिटल क्रांति की शुरुआत 1980 में हुई और अब वह थमने का नाम नहीं ले रही है। इस डिजिटल क्रांति ने लोगों को सुख सुविधा के अनेक साधन उपलब्ध करवाए जो ना सिर्फ किफायती है बल्कि उन्होंने हमारे जीवन को भी बड़ा आसान बना दिया है। नीचे दिए गए ग्राफ से आप इस बढ़ोतरी का अंदाजा लगा सकते हैं।

निम्न प्रश्नों के विषय में अपने मित्र के साथ चर्चा करो।

- 1) डिजिटल क्रांति और ई -वेस्ट का उत्पादन आपस में किस प्रकार जुड़े हैं?
- 2) भारत में ई-वेस्ट का उत्पादन क्यों बढ़ता जा रहा है?
- 3) ई-वेस्ट किस प्रकार पर्यावरण तथा मनुष्य के लिए हानिकारक है?
- 4)

ऊपर दिए गए आंकड़े निश्चित ही चौंकाने वाले हैं। एक और चौंकाने वाला तथ्य यह भी है कि भारत में ई वेस्ट का उत्पादन से ज्यादा आयात होता है। केवल संयुक्त राज्य अमेरिका(USA) ही अपने ई-वेस्ट का 80% भारत को भेजता है। हमारा देश भारत सदैव ही बेरोजगारी की समस्या से जूझता रहा है और इसी कारण अन्य देशों की 5 तलना में यहां ई-वेस्ट का प्रबंधन करना सस्ता है, यही वजह है कि भारत में पिछले कुछ वर्षों में ई-वेस्ट का उत्पादन तथा आयात काफी बढ़ गया है। देश की घनी आबादी वाले क्षेत्र जैसे दिल्ली, मेरठ, फिरोजाबाद, चैन्नई, बैंगलुरु और मुंबई पिछले कुछ समय में बड़े ई-वेस्ट केंद्र के रूप में उभर कर आए हैं। देश की राजधानी दिल्ली में ही करीब 25000 लोग रीसाइकिल का काम कर रहे हैं। भारत में उत्पादित तथा आयातित ई-वेस्ट समाज और पर्यावरण दोनों पर ही दुष्प्रभाव डाल रहा है। कचरे को खुले स्थान पर जलाया जाता है जिससे सीसा (Lead) और पारा (Hg) जैसे जहरीले रसायन हवा में निकलते हैं। यह खतरनाक रसायन सांस की बीमारी उत्पन्न करते हैं। इन रसायनों द्वारा प्रजनन दोष, विकासात्मक दोष तथा तंत्रिका तंत्र से जुड़े दोष भी उत्पन्न हो सकते हैं। बहुत से परिवार अपना पेट पालने के लिए स्वयं को तथा अपने परिवार को जोखिम में डाल रहे हैं। इन लोगों में जागरूकता की कमी इसका एक बहुत बड़ा कारण है। यह लोग ई-कचरे से सोने जैसी कीमती धातु को प्राप्त करने के लिए प्रबल अम्लों का उपयोग करते हैं वह भी बिना मास्क और बिना किसी तकनीकी विशेषज्ञता के। ई-वेस्ट से होने वाली बीमारियों के बारे में विस्तार पूर्वक जानने के लिए नीचे दी गई सारणी को ध्यानपूर्वक पढ़ें।

ई वेस्ट	प्रक्रिया	व्यावसायिक खतरा	पर्यावरणीय खतरा
कैथोड रे ट्यूब	कॉपर को	सिलिकोसिस तथा	भारी धातुओं का

	निकालकर तोड़ना तथा फेंकना	जहरीली गैसों का सांस के साथ अंदर जाना	भूजल में मिलना
सर्किट बोर्ड	कंप्यूटर चिप को निकालकर तोड़ना, अंदर से निकली धातु को खुले में जलाना	सीसा तथा पारे का सांस के साथ अंदर जाना	वायु प्रदूषण
कंप्यूटर द्वारा उत्पन्न प्लास्टिक	खुले में फेंक देना	जैव अनिम्नीकरणीय	वायु तथा मृदा प्रदूषण
चिप तथा सोने की परत चढ़े उपकरण	प्रबल अम्लों का प्रयोग कर सोने को निकालना	अमल द्वारा आंखों तथा त्वचा को नुकसान	अम्लों द्वारा पानी में रहने वाले जीव जंतुओं को नुकसान

अब सोचो और बताओ

- 1) इंस्टेट का प्रबंधन क्यों आवश्यक है?
- 2) इंस्टेट का उत्पादन किस प्रकार कम किया जा सकता है?
- 3) इंस्टेट के प्रबंधन के लिए क्या कदम उठाए जाने चाहिए?

देश में इंस्टेट को कम करने के लिए तथा इसके निपटारे के लिए इंस्टेट प्रबंधन और हैंडलिंग नियमों का बनाया जाना अत्यंत आवश्यक है। ऐसी कुछ कंपनियां भी हैं जो ग्राहकों द्वारा लौटाए गए उपकरणों को प्राप्त कर उन्हें रीसायकल करने की सुविधा प्रदान कर रही है। कुछ कंपनियां ने काफी सारे ड्रॉप ऑफ सेंटर भी बनाए हैं तथा वह फ्री पिकअप सेवा भी प्रदान कर रही हैं। देश में ही इंस्टेट का आयात कम करने के लिए कड़े कदम उठाए जाने की आवश्यकता है। यदि सरकार और जनता दोनों जागरूक हो जाएं तो निश्चित ही भविष्य में इंस्टेट की समस्या से छुटकारा पाया जा सकेगा।

(d) Mining activities
Team ,pair ,solo

The learners can be asked to discuss the impact of sand mining on the environment in a team, then in pairs and then consolidate their learning solely. This will help in developing collective knowledge about sand mining and how to prevent environment from its harmful impact.

(e) CFCs and ozone

Project report

Work in groups .The learners would be asked to visit the library or search the internet to prepare a project report on ozone and CFC. The project report should answer the following:

- (a) What is the significance of ozone for the planet Earth?
- (b) which chemicals are responsible for the depletion of ozone.
- (c) what action has been taken so far to restrict the depletion of the ozone layer and to what extent have we been successful?
- (d) Whether the hole in the ozone layer is of the same size everywhere?
- (e) What changes have taken place in the size of the hole in the ozone layer in the past few years?
- (f) What has been the impact of covid imposed lockdowns on the ozone layer?

Suggested Task 18.5

Campaign for a cause

Learners can be asked to recall the changes in the structure and form of the materials dug in Pit A and Pit B in preparatory activities 1 and 2 (that was done during unit 5). The idea of managing biodegradable and non-biodegradable waste can hence be reinforced.

The learners would be asked to start the waste segregation campaigns in their homes, school and neighborhood in their own unique way.

Suggested Task 18.6

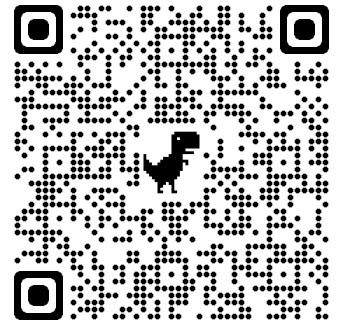
Putting my foot into the shoes of.....

	<p>The learners can be made to put themselves in the following situations and would be asked to apply the 5R formula in those given situations:</p> <ul style="list-style-type: none"> i) You are a homemaker and your family loves to eat south indian food . ii) You are a factory owner and you are into plastic goods manufacturing. iii) You are a shopkeeper and you sell stationery items. iv) You are an aspiring candidate for the general elections and soon you have to start with the campaigning. (v) How do I apply the '5R'formula in my life as me?

Bibliography:

S. No.	ICT tool	Link and scan code
1	https://www.thehindu.com/news/national/other-states/suspected-hooch-kills-10-in-dry-bihar-during-holi/article65243046.ece	Alcoholism
2	https://www.youtube.com/watch?v=Nce1xOJvRQc	<u>Physical properties of acetic acid</u>

		
3	https://www.hindustantimes.com/india-news/massive-inferno-at-bhalswa-landfill-in-north-delhi-4th-landfill-fire-in-a-month-101650992868377.html	<u>Landfill fires</u>
4	https://www.cseindia.org/traditional-water-harvesting-systems-683	<u>Traditional water harvesting</u>

5		<u>GIF Case study on micro beads</u>
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Action: Teaching and learning through inquiry

TASKS	FORMATIVE ASSESSMENT
01	Name the reactions/complete the reaction/name the product The learners can be provided with raw materials/incomplete equation/final products and can be asked to find the missing elements/name the reaction/name the products etc.
02	One minute essay Write one minute essays on the following topics: Impact of landfill fires Depletion of ozone Advantages of water harvesting

03	Form a criteria regarding efficiency of different types of fuels (like biodiesel, dung cakes, wood, bio-gas, coal, petrol, diesel, kerosene oil, LPG, etc.).
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Diversification	<p>V(Visual)- Word Wall, Charts, Paintings, Flash Cards, Videos</p> <p>A(Audio)- Podcasts, IVRs, Discussions, Debates, Think-Pair-Share, Poem Recitation</p> <p>R(Reading/Writing)- Books, Projects, Assignments</p> <p>K(Kinesthetics)- Role-Play, Drama, Collection of Data (Survey), Demonstrations, Model Making, Hands-on activities</p> <p>CWSN – A-V aids, flash cards, texture scrap books, observation through touching of objects for visually impaired.</p> <ul style="list-style-type: none"> ● The language and terminology used in classrooms will be from the commonly spoken dialect. ● Reports can be prepared in audio, video or textual forms. ● Group tasks to be performed collaboratively and instructions by teachers to be given to students regarding division of responsibilities as per interests and abilities of learners. ● Videos having Hindi/English subtitles/captions to be shown in the classrooms. ● Accessibility (ramps etc) to be ensured at the site. ● Inclusive lab tools to be used. ● Equal representation of students with different abilities will be ensured during social events. ● The data to be presented in audio, visual and textual forms.
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Resources	<ul style="list-style-type: none"> ● Textbooks /Reference books/ library books ● Lab Equipment ● A piece of cotton cloth ● Some almonds/papad/roti ● Some human hair ● A piece of paper ● Copper oxide ● Clay of Different colours ● Ball and stick modelling kit ● Matchstick and clay ball ● Camphor ● Naphthalene ● Alcohol ● Smart phones ● Newspapers / science Magazine ● Internet ● Chart papers ● Art & craft Material ● Graph papers ● Collaborative learning ● YouTube Videos related to the concept
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|--|--|
| | <ul style="list-style-type: none">● e-learning portals (DIKSHA -LEAD)● Tactile books for CWSN |
|--|--|