Unit 7 - Water Quality

Monday - November 26th

Water Pollution Brainstorm



|  |  |
| --- | --- |
| **Type of Pollutant** | Examples of Pollutant |
| **Sediments** |  |
| **Oxygen Demanding Agents** |  |
| **Toxic Metals** |  |
| **Inorganic Plant Nutrients** |  |
| **Organic Chemicals** |  |



|  |  |
| --- | --- |
| **Vocabulary Term** | **Definition** |
| **Water Pollution** |  |
| **Pollutant** |  |
| **Sediments** |  |

Activity #1 - Newslea - Pollutants - Microplastics

As you read the article, fill in the table below. Explain how each pollutant is a nuisance for water quality.

|  |  |
| --- | --- |
| Type of Pollutant | Description of impact on the environment and organisms |
| Tires |  |
| Synthetic Clothing |  |
| Tennis Balls |  |
| Laundry And Dishwasher Pods/Tablets |  |
| Cigarette Butts |  |
| Glitter |  |
| Wet Wipes |  |
| Tea Bags |  |
| Paint |  |
| Takeaway Cups |  |

November 27th - Bioaccumulation and BOD

BOD: Oxygen is removed from water by bacteria

Result - Less available oxygen for organisms other than bacteria

Where to find BOD at its highest? WHY?

All streams have some ability to breakdown organic waste. Problems occur when a stream is overloaded with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Low Pollution:

Low BOD

High Dissolved Oxygen


High Pollution:

High BOD
Low Dissolved Oxygen

Biological Oxygen Demand Graphing Activity

**Part A: Data Table:** Use the information in the data table to create a BOD vs. DO graph below

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Biological Oxygen Demand | 15 ppm | 30 ppm | 60 ppm | 72 ppm | 98 ppm | 115 ppm | 125 ppm |
| Dissolved Oxygen | 100 ppm | 80 ppm | 60 ppm | 40 ppm | 12 ppm | 5 ppm | 0 ppm |

Graph Title \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Part B: Drawing Conclusions from the Graph**:

Using the graph you created, make three specific statements about Biological Oxygen Demand (BOD) and Dissolved Oxygen (DO). A possible sentence frame - The graph above shows \_\_\_\_\_\_\_\_\_\_\_\_\_\_ about BOD and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ about DO.

**Part C: Conclusion Questions**

1. What does the word *biological* mean?
2. What does the word *demand* mean?
3. Compare and contrast oxygen demand vs. dissolved oxygen content.
4. Explain how oxygen demand and dissolved oxygen content can be used to determine the health of the water source. (Does high or low oxygen demand mean healthy water, explain!)
5. In 3-5 sentences, explain the importance of the health of a water source to not only organisms who live there, but the human who use that water for their daily uses.

Bioaccumulation:

Toxic metals that can be absorbed by plants or animal tissues

Bioaccumulation: toxins increase in amounts as you move up the trophic levels.



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| **Vocabulary Term** | **Definition** |
| **Biological oxygen demand (BOD)** |  |
| **Photosynthesis** |  |
| **Bioaccumulation** |  |
| **Eutrophication** |  |



November 28th - Macroinvertebrates

Video Conclusions:



**Stream Macroinvertebrate Sampling Simulation**

Procedure:

1. Remove your organisms from the baggie and place them face up on the table.
2. Use the stream Sampling Classification Sheet to record the types of organisms that are present.
3. Write the organisms under their appropriate group number on the sampling worksheet (on the back).
4. Count the number of organisms in each group and place BEFORE the multiplication sign in Column C
5. Do the math in Column C for each group and place the answer in Column D
6. Add up all the sums in Column D to obtain your biotic index number.

**Post-Lab** Questions: Should be done **using complete sentences**.

1. Which group number had the most organisms present (use Column B)?
2. The following chart should be used to determine the Biotic Index of your water quality.

|  |  |
| --- | --- |
| Greater than 22 | Excellent |
| 22-17 | Good |
| 16-11 | Fair |
| Less than 11 | Poor |

Use the chart to determine the quality of your water and discuss why your water quality was that way.

1. What are **three** factors that affect water quality (use Background information to help)?
2. What steps could be taken to **improve** water quality of a body of water?

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| **Vocabulary Term** | **Definition** |
| **Bioindicators** |  |
| **Biotic Index**  |  |
| **Macroinvertebrate** |  |

November 29th - Laws and Treatment

Drinking water (Potable Water) is purified by

Water Treatment Stages:

1. Screening
2. Aeration
3. pH correction
4. Flocculation

5. Sedimentation
6. Pre-chlorination
7. Filtration
8. Disinfection
9. pH adjustment

**Municipal water Purification Plant**

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**Home Septic System**

* No Chlorine used
* Uses a settling tank to settle the solids
* Lets waste water percolate into the soil to decompose

Glencoe - Virtual Labs

Using this site: <http://www.glencoe.com/sites/common_assets/science/virtual_labs/CT04/CT04.html>

Directions:

1. Test all the water samples by scrolling through the different water types and hit “Test”
2. As you test the samples, fill in the table below, to complete the Type of Contamination and Treatment, use the tabs at the bottom of your screen
3. Use the information you collected to answer the discussion questions at the end.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sample Name | City | Mountain | Lake | Well  | Rural |
| Acidity pH |  |  |  |  |  |
| Metals (mg/L) |  |  |  |  |  |
| Coliform Bacteria (ml) |  |  |  |  |  |
| Pesticides (mg/L) |  |  |  |  |  |
| Nitrates |  |  |  |  |  |
| Type of Contamination |  |  |  |  |  |
| Treatment |  |  |  |  |  |

Discussion Questions:

1. What contaminants were found in surface water samples? What contaminants were found in groundwater samples?
2. Why might groundwater and surface water have different contaminants? Explain beyond their different locations.
3. Generally farmers do not farm and industries do not build factories on the side of mountains, making the mountain sparse of human population. Develop a hypothesis to why there might be high levels of nitrate in the water?
4. Explain the concept of pH and what chemicals are used to treat low pH levels?
5. Water in an old building was tested recently for metal contaminants and it showed high copper and iron contents with low pH levels. Twenty years ago, a water reading from this same exact building had low pH levels, but no metal contaminants. How and why did this occur?

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| **Vocabulary Term** | **Definition** |
| **Clean Water Act** |  |
| **Home Septic Systems** |  |
| **Water Treatment System** |  |

November 30th - Deprivation and Conservation

Observation Lab:

Directions:

1. Using the microscope, look at the pond water displayed by the lens
2. Using the microscope, look at the tap water displayed by the lens
3. Using the microscope, look at the purified water displayed by the lens
4. For each water type, fill in the table below and answer the questions afterwards

Data Table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Water Type | Description of Color | Organisms Present? | pH level | Possible Treatment Needed |
| Pond Water |  |  |  |  |
| Tap water |  |  |  |  |
| Purified Water |  |  |  |  |

1. Based on just your observations, which water do you think is the cleanest and why?
2. Based on your data, which water is the cleanest and why?
3. Explain why you picked the treatment plans you did.
4. Why is it important to reduce how many chemicals are in our treatment processes? (Think about point and non-point sources)



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| **Vocabulary Term** | **Definition** |
| **Water Conservation** |  |
| **Water Deprivation**  |  |
| **Compost** |  |