

Name: _____ Period: _____ Date: _____

Ms. Randall Marine Science

Chemical Oceanography

Directions: This unit will focus on the chemistry of seawater. Using scientific research techniques, you will be responsible to become an expert on a given topic. You will create a poster as well as an oral presentation on your assigned topic with your partner in order to share your knowledge with the rest of the class. The information presented will be used to complete a graphic organizer that will act as your notes. All work will be completed during class time, however, additional time outside of class will be necessary for you to print pictures to add to your poster to exemplify your topic. Be sure to include all of the information requested as well as anything else that you learn. You must include your references/sources on your poster!

Topic 1: pH

1. Describe the pH scale.
2. Explain how a substance becomes more acidic or basic.
3. Draw and explain the role of the carbonate buffering cycle in maintaining a constant pH in seawater.
4. Draw and describe the carbon cycle as it relates to ocean pH.
5. Explain how changes in pH affect various organisms and their ability to survive
6. Describe adaptations marine organisms have to manage changes in pH.
7. Define ocean acidification, its causes and what scientists are doing to stop it.

Topic 2: Salinity

1. Identify the salinity of the major ocean basins.
2. Discuss the relationship between latitude and salinity.
3. Describe the relationship between salinity and water density. Define the term "Halocline."
4. Identify sources of salt that contribute to the salinity of seawater.
5. Explain how resources, like salt, or fresh water, can be extracted from seawater.
6. What is osmoregulation? How does it allow organisms to adapt to changes in salinity?
7. Describe how salinity affects the heat capacity of water as well as its colligative properties (freezing point depression/boiling point elevation).

Topic 3: Temperature

1. Define temperature. What is the heat capacity of water and why is it so unique and important to our oceans?
2. Describe the relationship between temperature and water density. Define the term "Thermocline."
3. How does the arrangement of water molecules change as water moves from a solid to a liquid to a gas when it gets heated?
4. Using data and information on global climate change, how do meteorologists create a forecast for the rate of temperature change in the oceans on a global scale?
5. How does the concentration of carbon dioxide in the atmosphere influence ocean temperature?
6. How is global warming affecting our ocean temperatures? How are marine organisms being affected?
7. How is water temperature related to the health of organisms such as coral? What is coral bleaching?

Topic 4: Dissolved gases

1. Identify abundant gases in the ocean and their source and uses.
2. Explain how the process of photosynthesis affects the concentrations of dissolved gasses in the ocean.
3. Explain the carbon cycle as it appears in the oceans.
4. Analyze available data to describe the impact of carbon dioxide emissions on seawater.
5. Describe the relationship between depth and dissolved oxygen and carbon dioxide concentrations.
6. Describe and diagram anatomy found in fish for obtaining dissolved oxygen from water.
7. Describe the relationship between cellular respiration and photosynthesis in terms of gas exchange.

Topic 5: Nitrates, phosphates and other dissolved chemicals

1. Identify and describe chemical resources that can be gleaned from the oceans.
2. What molecules in living things are made of nitrogen and phosphorus?
3. What are common sources of nitrates and phosphates in water?
4. How do nitrate and phosphate levels vary across different oceans?
5. How do dissolved nitrates and phosphates affect water quality?
6. What is Eutrophication?
7. What are scientists doing to limit eutrophication?

Topic 6: Waste and Pollution

1. Describe the types of waste found in the oceans and explain how they affect water quality. Describe the sources of ocean pollution
2. What is marine debris?
3. Define the terms biodegradable and photodegradable
4. What is the Great Pacific Garbage Patch?
5. How does pollution affect the seafood we eat?
6. Research and describe what we are doing now to mitigate the damage done to the past with regards to ocean pollution.
7. What laws/regulations exist to prevent industry and countries from polluting the ocean?

Topic 7: Properties of water

1. Describe and draw the atomic and molecular structure of water.
2. List and describe the properties of water
3. Draw a model of a hydrogen bond in water
4. Define and give an example of adhesion and cohesion.
5. What is the specific heat capacity of water?
6. What happens to the boiling and melting point of water when salt is added to it?
7. Explain the dependence of living systems on the properties of water

CATEGORY	4	3	2	1
Required Elements	The poster includes all required elements as well as additional information.	All required elements are included on the poster.	All but 1 of the required elements are included on the poster.	Several required elements were missing.
Labels	All items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Almost all items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Many items of importance on the poster are clearly labeled with labels that can be read from at least 3 feet away.	Labels are too small to view OR no important items were labeled.
Graphics - Relevance	All graphics are related to the topic and make it easier to understand. All borrowed graphics have a source citation.	All graphics are related to the topic and most make it easier to understand. Some borrowed graphics have a source citation.	All graphics relate to the topic. One or two borrowed graphics have a source citation.	Graphics do not relate to the topic OR several borrowed graphics do not have a source citation.
Attractiveness	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout, and neatness.	The poster is acceptably attractive though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.
Grammar	There are no grammatical/mechanical mistakes on the poster.	There are 1-2 grammatical/mechanical mistakes on the poster.	There are 3-4 grammatical/mechanical mistakes on the poster.	There are more than 4 grammatical/mechanical mistakes on the poster

Topic 1: pH

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Additional facts/diagrams:

Topic 2: Salinity

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Additional facts/diagrams:

Topic 3: Temperature

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Additional facts/diagrams:

Topic 4: Dissolved gases

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Additional facts/diagrams:

Topic 5: Nitrates, phosphates and other dissolved chemicals

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Additional facts/diagrams:

Topic 6: Waste and Pollution

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Additional facts/diagrams:

Topic 7: Properties of water

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Additional facts/diagrams: