Conductivity solutions essay

Conductivity Solutions Abstract: We produced conductivity tests in water and other various solutions with a computer faced Conductivity Probe using the unit of microsiemens per centimeter (uS/cm) to find out which solutions had a high conductivity and which solutions had a low conductivity. Many different solutions vary in conductivity due to the ratio of ions. Different levels of ions have an impact on conductivity because of the different charges and different types of bonds. Conductivity is related to concentrations of ions and the speed with which ions diffuse through a solution.

Faster-moving ions create higher conductivities and vise versa. If a solution is diluted the concentration of ions goes down, and the ability to pass a current is diminished. Therefore, the more ions or salt dissolved in solution, the higher the conductivity. Introduction: Molecules and Ions are essential for life because they are found in all organisms. Molecules are the smallest particle of a substance that retains the chemical and physical properties of the substance and is composed of two or more atoms; a group of like or different atoms held together by chemical forces. Ions are charged molecules or an atom or a group of atoms that has acquired a net electric charge by gaining or losing one or more electrons.

Conductivity is the measurement of the ability of an aqueous solution to carry an electric current. In this lab we produced conductivity tests to discover the differences between molecules and ions of various solutions such as Glucose, Sucrose, Ethanol, Sodium Chloride, Calcium Chloride, distilled, tap, pond and ocean water. The main point of the experiment was to test the hypothesis which is that distilled water has a decreased

conductivity than other solutions. We wanted to find out specific data on these solutions in order to compare and contrast the differences and why the solutions resulted that way. It is predicted that solutions with more of a pure form such as distilled water will have a lower conductivity than the more dense solutions of mixed composition and elements which will create more of an electric charge. Results: Testing all of the solutions with the conductivity probe we were able to discover that there was a wide range of data depicting solutions with extremely high conductivity to solutions with very low conductivity.

The bar graph in Figure 1 describes the data collected by the conductivity probe throughout the experiment on the levels of conductivity in all the solutions tested by using the unit of microsiemens per centimeter (uS/cm). Results for the experiment include tends of very low conductivity in the sugars and some waters, such as Glucose 41 uS/cm, Sucrose 35 uS/cm, distilled water 60 uS/cm, tap water 365 uS/cm, and pond water 406 uS/cm. Ethanol was also low at 41 uS/cm compared to the other solutions Sodium Chloride 4, 700 uS/cm, Calcium Chloride 8, 400 uS/cm, Iron Chloride 1160 uS/cm and ocean water at 60, 000 uS/cm. The solutions containing Chlorine were significantly higher in conductivity than other solutions due to the reason that Chlorine can create ionic bonds and polar covalent bonds. However, there was no significant difference between the tap and pond water, yet a large difference in the distilled water without the trace minerals and carbon dioxide that dissolves when water touches air.

?? Discussion: The observed data resulted in a conformation of the hypothesis stated that distilled water had a lower conductivity than the other

tested solutions. Any ionic substance that dissolves reasonably well in water will make a solution able to conduct electricity. An significant increase in the conductivity of ocean water has been documented and has been attributed to the density of the ocean water including ionic compounds. The ocean water is extremely high with a mixture of salts that do not dissolve completely along with trace minerals and metals versus the lighter density in the pure substance of distilled water without salt. The pond water contains no salt but metallic ions which derive from the runoff into the water and straight up from the earth. The tap water has a larger conductivity then the distilled water because the tap water contains dissolved ions and trace minerals from the metal pipes.

There were multiple possible errors we discovered during this lab. The results could have differed greatly due to these errors. Possible errors include defects of the computer and improper completion of procedures. The computer might have a wide range of measurements positive or negative around 20 units or the probe could malfunction and read the wrong conductivity level.

Improper procedures could include mixing solutions up by accident, contamination or not properly rinsing off the probe after every test. Many different minerals are vital for living organisms to eat and live, but we find these similar nutrients and minerals in water. Our food contains a lot of these components which are mainly composed of water for survival. So the question arises of how does the water quality affect an organism? Do organisms with a lower water quality have a lower lifespan than organisms that have access to more pure water? What would the affect be on a human

if they consumed tap water that had the same level of conductivity as ocean water? How do the concentrations of ions in solutions differ after dilution? Does the relationship of conductivity and concentration of ions change depending on the temperature of solutions? It is a fact that all organisms need water in order to survive. In this lab we were able to discover the amount of conductivity in various solutions greatly differed due to the way each solution was composed.

In other words we discovered that ocean water had such a high conductivity due to the numerous elements with extremely active functional groups. The elements that are paired together from opposite sides of the periodic table are charged opposites, which means they have a higher conductivity therefore form strong functional groups. The solutions with stronger or more negative function groups will have a higher conductivity. These functional groups account for conductivity because of the highly energetic ionic compounds. The element such as NaCl or salt has ionic compounds that solute in water, separate and dissolve completely.

When salt is dissolved in water, the positive and negative ions allow electrons to flow easier, therefore ionic bonds break easier and have more energy when they break apart.