The water molecule worksheet answers

Do you love this? Not loving this? Please consider a moment to share your feedback with us. Thank you! The water molecule, in total, has 10 protons and 10 electrons, so it is neutral. In water molecules, oxygen atoms and hydrogen atoms share electrons in covalent bonds, but the exchange is not the same. In the covalent link between oxygen and hydrogen, the oxygen atom binds electrons slightly more powerfully than hydrogen atoms. Unequal sharing of electrons gives the water molecule a little negative charge at the oxygen atoms and a slightly positive charge at hydrogen atoms. When a neutral molecule has a positive zone at one end and a negative area on the other, it is a polar molecule. Water molecules bind to each other based on the attraction between the positive end of one water molecule and the negative end of another. Students will be introduced to the idea that water is somewhat positive to charge one end of the molecule and a slightly negative charge on the other (polar molecule). Students look at animations, make illustrations, and use their own water molecule patterns to develop an understanding of how the polar nature of water molecules can help explain some of the important properties of water. Purpose Students will be able to explain at the molecular level that makes water a polar molecule. Students will also be able to show in the drawing that the polar nature of the water can explain some of the water's interesting properties and help explain its evaporation rate compared to less polar fluid. Assessment The Activity page will serve as a class 5-E class plan component. Activity pages are formative assessments of student progress and understanding. Safety Make sure you and the students wear properly sleep goggles. Isopropyl alcohol is flammable. Protect it from flames or spark ignition sources. Read and follow all the warnings on the label. Use in a well-ventilated room. Discard a small amount of drainage or according to local regulations. Materials for each group of foam water molecule models from chapter 2, Lesson 2 (two per student) Permanent markers (blue and red) Isopropyl alcohol (70% or higher) Water Brown paper towel Droppers Note about materials Students made molecular models of water molecules using Styrofoam balls and toothpicts in chapter 2, Lesson 2. Give each student two of these water molecule models for this activity. Remind students that in chapters 1 and 2, they studied water behavior at different temperatures and studied changes in water status. Many explanations were based on the idea that water molecules are tied to each other. Remind students that in chapter 4 they looked at the covalent bond between oxygen and hydrogen that produce a water molecule. Students will now look more closely at the covalent links in the water to understand why water molecules are tied to each other. Project video Water Balloon. This video was shown in Lesson 1 of Chapter 1 to show that water molecules are attached to one another. Project video Water Fountain. Point out that water is able to stay together in these circles, because water molecules are very attracted to each other. Project the animation of the Polar Water molecule. The first animated electron frame is divided between atoms in a covalent link. Remind students how common electrons in a water molecule attract both oxygen and hydrogen atom protons. These attractions hold atoms together. Water molecules are neutral. Make sure students understand that no protons or electrons are being gained or lost. The water molecule has a total of 10 protons and 10 electrons (8 of oxygen atoms and 1 of each of the two hydrogen atoms). Since it has the same number of protons and electrons, the water molecule is neutral. Click Play Electron Cloud Pattern shows where electrons are in the molecule. Tell students that another way to see the difference is where electrons are using an electron cloud model. Remind students that it is impossible to know exactly the location of the electron, so sometimes the busy regions of electrons are displayed as clouds around an atom or molecule. Unequal electron sharing makes water a polar molecule. Tell students that the oxygen atom attracts electrons a little more powerfully than hydrogen does. So, even though the electrons from each atom attract both oxygen and hydrogen, the electrons are a little more attracted to oxygen. This means that electrons spend a little more time at the oxygen end of the molecule. This makes the oxygen end of the molecule slightly negative. Since the electrons are not at the hydrogen end, how much that target is somewhat positive. When a covalently linked molecule has more electrons in one area than another, it is called a polar molecule. The electron cloud model can show unequal electron sharing. Point out that the electron cloud around oxygen is darker than the electron cloud around the hydrogen. This suggests that electrons are more attracted to oxygen at the end of molecules than hydrogen ends, making water molecules polar. Click next color you can add an electron to the cloud model to show where the electrons are more or less likely to be. Tell students that this is another sample of the water molecule. In this model, color is used to display the polar areas of water molecules. The negative area at the oxygen atom is red, and the positive area at the hydrogen atoms is blue. Project the animation of polar water together. Ask students: What do you notice about how water molecules are orientated? The red (oxygen) area of one water molecule is located at the blue (hydrogen) end of the water molecule Molecules. Why do water molecules attract each other like this? Since the oxygen tip of the water molecule is slightly negative and the hydrogen tip is slightly positive, it makes sense that water molecules bind to each other. Give each student an activity page. Students will record their observations and answer questions about activity on the activities page. Explain it with Atoms & Molecules and Take it below sections of the action sheet will either be completed as a class, in groups, or individually, depending on your instructions. To find out questions and answers, see the teacher version of the activities page. Project the image attractions at different levels. Students can be confused about bonds within water molecules and the attractions between water molecules. Bonds of molecules and polar attractions between molecules. Explain to students that the interaction between oxygen of one water molecule and the water line of another differs from the division of electrons between oxygen and hydrogen's own water molecule. It's all about objects between positive and negative. Point to students that attractions between positive and negative works on three different levels. One atom stays together because of the attraction between positively charged protons and negatively charged electrons. In a molecule, two or more atoms remain together because of the interconnected interconnection between positively charged protons from one atom and negatively charged electrons from the other atom. This causes covalent or ion bonding, which contains atoms or ions together. Two or more water molecules stay together because of the positive and negative parts of molecules attracting each other. Foam water molecule models from chapter 2, Lesson 2 (two per student) Permanent markers (blue and red) Draw blue + for each of the hydrogen atoms. Draw two reds at the bottom of the oxygen atom. Repeat this for your other water molecule. Place the water molecules so that the opposite charges are close to each other. How does your Styrofoam ball models water molecules relate to the color-coded charging density pattern shown in animation? Different colors indicate that water is a polar molecule. What do red signs mean on the oxygen atom? Red − signs denote a place where there are more electrons. What do blue + signs mean for hydrogen atoms? Blue signs + denote a place where there are fewer electrons. Because water molecules are polar, how do they organize themselves in liquid water? One positive zone of the water molecule is bound to the negative zone of another water molecule. Remind students that water molecules are very polar. Strong attractions between water molecules affect the tension of the water surface, point and evaporative rate. Tell students that they will conduct an experiment to compare evaporative rates of water and other liquids that are not as polar. Ask students: Do you think a substance like water with polar molecules could evaporate faster or slower than a substance like alcohol with molecules that are not as polar? More polar molecules will stick together more and possibly evaporate more slowly than fewer polar molecules. Fewer polar molecules should evaporate faster because they are not as attracted to each other. How could you develop a quick and easy evaporation test to compare the rate of evaporation between water and alcohol? What materials will you need? If you use the same amount of water and alcohol? How do you know if one evaporates faster than the other? Is there a way to do this so it doesn't take much time? Students should say that they will need the same small amount of water and alcohol. These liquids should be placed at the same time on the surface, such as a brown paper towel, so students can tell when each liquid evaporates. Does water evaporate faster or slower than less polar alcohol? Materials for each group of Isopropyl alcohol (70% or higher) Water Brown paper towel Droppers procedure At the same time, place 1 drop of water and 1 drop of alcohol on a brown paper towel. Observe. The expected results of the dark spot on the paper towel made by alcohol will become lighter faster than the dark places brought by the water. This indicates that alcohol evaporates faster than water. Learn more about counting molecules in the teacher's background. Note: This test is good for high school students, but there is something about the test that doesn't make it completely fair. There are many more water molecules to drop water than alcohol molecules drop alcohol. The test would be fairer if the same number of water and alcohol molecules were placed on a paper towel. This requires a way to count molecules. The determination of the number of particles in the sample is the basic concept of chemistry, but it is outside the scope of the secondary chemistry unit. Even though the same number of water and alcohol molecules were used in this activity, alcohol would evaporate faster. Ask students: Who evaporated faster, water or alcohol? Alcohol evaporated faster. Project the image of water and alcohol molecules. Tell students that understanding polarity can help explain why water evaporates more slowly than alcohol. Remind students that oxygen-hydrogen (O-H) bonds in water make it a polar molecule. This polarity makes water molecules attract each other. Explain that the oxygen-hydrogen (O-H) bond in the alcohol molecule is also polar. But, carbon-hydrogen (C-H) bonds the rest of the alcohol molecule is nonpolar. In these bonds, electrons are shared more or less Because there are both polar and nonpolar areas on alcohol molecules, they are slightly less attracted to each other than water molecules are to each other. This makes it easier to extract alcohol molecules and move in the air like gas. This is why alcohol evaporates faster than water. You know that water and alcohol have different properties because the molecules they are made of and how these molecules interact with each other. Project picture Water and Alcohol Boiling. This picture shows that alcohol boils at a lower temperature than water. Boiling at 100°C alcohol boils at 82.5 °C Ask students: Knowing what you are doing about the polarity of water and alcohol, explain why alcohol boils at lower temperatures than water. The polar characteristic of water molecules causes them to attract each other well. Less polar alcohol molecules don't attract each other as powerfully as water molecules do. It takes more energy to make the water boil than it is to make the alcohol boil. In other words, alcohol boils at lower temperatures than water. Water.