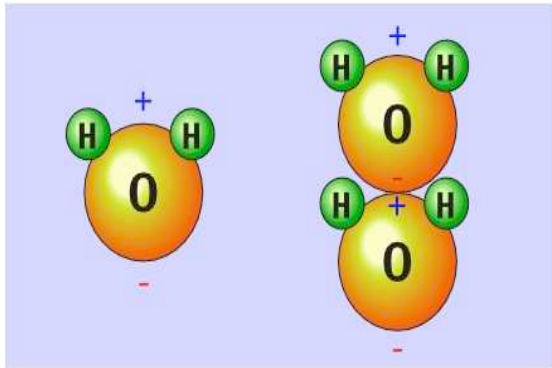


Properties of Water Unit Review



Eighth Grade 2008-2009

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Key Points:

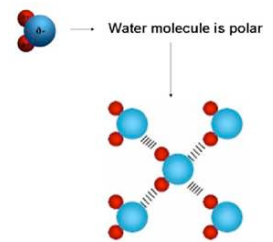
- Water is a polar molecule. That means that water has an uneven distribution of charges.
- Because water is a polar molecule, it has other properties, like adhesion, cohesion, and surface tension.
- Water dissolves more substances than any other substance in the world.
- Water's high specific heat helps keep humans alive.

Water: The Polar Molecule

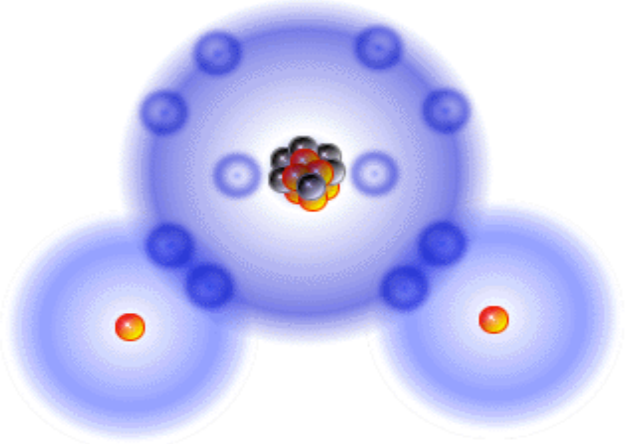
Water molecules are each made up of two hydrogen (H) atoms attached to one oxygen atom (O). Each hydrogen atom **shares** one electron with the oxygen atom. That means that water has **covalent bonds** between the hydrogen atoms and the oxygen atom.

The oxygen atom attracts the electrons more than the hydrogen atoms do, so oxygen has a tendency to pull the electrons closer to its nucleus. Because electrons have a negative charge, this arrangement causes the oxygen end of the water molecule to have a slightly negative charge while the hydrogen ends of the molecule

have a slightly positive charge. This uneven distribution of charges around the water molecule is called **polarity**. Polarity gives water many of its special properties that are discussed in this newsletter.



Water Molecule



Inside this issue:

Water: The Polar Molecule 1

Adhesion, Cohesion, and Surface Tension 1

Specific Heat 2

Density and Buoyancy 2

Water: The Universal Solvent 2

Adhesion, Cohesion, and Surface Tension

Because water is polar, water molecules are attracted to each other. The positive hydrogen of one water molecule is attracted to the negative oxygen on a water molecule next to it. When water sticks together like this, we call it **cohesion**. There's a special type of cohesion

called **surface tension**. Surface tension is a force that acts on the particles at the surface of a liquid—because the particles are attracted to each other, they pull down and to the sides. This causes the molecules at the surface to be held tightly together.

Water also displays the prop-

erty of **adhesion**, which occurs when water molecules stick to other substances.

Both adhesion and cohesion allow water to demonstrate **capillary action**, when it moves up a column (like a plant stem). This is vital for plants to stay alive.

Properties of

Density and Buoyancy

Density is the measure of the mass of a substance per unit volume (formula: mass/volume). In other words, density is just a measure of how tightly packed together molecules are.

The density of water changes with temperature. Cold water is actually denser than warm water.

The density of water also changes as water changes state. Although most substances become denser when they freeze (because their particles are packed closer together),

water actually becomes less dense as it freezes (because it expands). Because it has a lower density, ice floats in liquid water (as you've see in glasses of water, like the one to the right).

Buoyancy is the ability of water to push up on any object that is immersed in it. Because water molecules like to stick together, water pushes up on anything that is put in it. If the object is less dense than water, the **buoyant force** (force that pushes up) is enough to keep the object floating. When the



object is denser than water, the object will sink in spite of the buoyant force pushing up. Wood, oil, and wax are examples of objects that float, while most metals will sink. Some metal objects (like boats) will float because their shapes hold air, which is actually less dense than water.

Water's special
properties occur
because water is a
polar molecule.

Specific Heat

Specific heat is the amount of energy needed to raise the temperature of one kilogram of a substance by one degree Celsius. **Water has a really high specific heat**, so it takes a long time for water to heat up or cool down. This property of water saves our lives on a daily basis.

Because water maintains a fairly constant temperature,

lakes, streams, and oceans are able to stay about the same temperature even as the air temperature changes around them. It takes a long time for them to heat up or cool down. This helps keep aquatic organisms alive.

Even more importantly, however, water's high specific heat ensures that our bodies are able to maintain **homeostasis**,

or keep constant internal environments. Without the high specific heat of water, our bodies internal temperature, which is normally about 98.6 degrees Fahrenheit, would change as the temperature around us changed. Because our bodies are made mostly of water, we are able to keep the same internal temperature.

Water: The Universal Solvent

Water is called the **universal solvent** because it can dissolve more substances than any other known substance. The main property of water that makes it so good at dissolving other substances is polarity.

Remember, a **solvent** is a substance in which another substance dissolves. The **solute** is the substance that is getting dissolved. A solute plus a solvent equals a **solution**.

The fact that water is the universal solvent ultimately allows water to do many important things. Water can deliver really important nutrients to cells in plants, animals, and other organisms because it dissolves so many substances.

The fact that water dissolves so many substances also allows us to make Kool-Aid. Water dissolves both the Kool-Aid powder and the sugar!



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of Water Without Losing Any of
Its Astonishing Cleaning Power!*

Density and Buoyancy

This story can fit 150-200 words.

One benefit of using your newsletter as a promotional tool is that you can reuse content from other marketing materials, such as press releases, market studies, and reports.

While your main goal of distributing a newsletter might be to sell your product or service, the key to a successful newsletter is making it useful to your readers.

A great way to add useful con-

tent to your newsletter is to develop and write your own articles, or include a calendar of upcoming events or a special offer that promotes a new product.

You can also research articles or find "filler" articles by accessing the World Wide Web. You can write about a variety of topics but try to keep your articles short.

Much of the content you put in your newsletter can also be used for your Web site. Microsoft Publisher offers a simple way to convert your newslet-

ter to a Web publication. So, when you're finished writing your newsletter, convert it to a Web site and post it.



Caption describing picture or graphic.

Specific Heat

This story can fit 100-150 words.

The subject matter that appears in newsletters is virtually endless. You can include stories that focus on current technologies or innovations in your field.

You may also want to note business or economic trends, or make predictions for your

customers or clients.

If the newsletter is distributed internally, you might comment upon new procedures or improvements to the business. Sales figures or earnings will show how your business is growing.

Some newsletters include a column that is updated every issue, for instance, an advice

column, a book review, a letter from the president, or an editorial. You can also profile new employees or top customers or vendors.

"To catch the reader's attention, place an interesting sentence or quote from the story here."

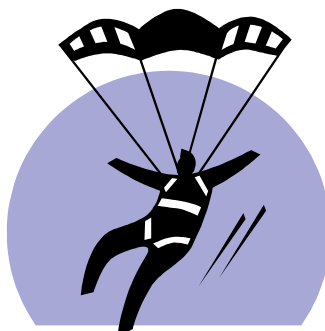
Water: The Universal Solvent

This story can fit 75-125 words.

Selecting pictures or graphics is an important part of adding content to your newsletter.

Think about your article and ask yourself if the picture supports or enhances the message you're trying to convey. Avoid selecting images that appear to be out of context.

Microsoft Publisher includes thousands of clip art images



Caption describing picture or graphic.

from which you can choose and import into your newslet-

ter. There are also several tools you can use to draw shapes and symbols.

Once you have chosen an image, place it close to the article. Be sure to place the caption of the image near the image.



Primary Business Address
Your Address Line 2
Your Address Line 3
Your Address Line 4
Phone: 555-555-5555
Fax: 555-555-5555
E-mail:
someone@example.com

Your business tag line
here.

WE'RE ON THE WEB!

EXAMPLE.MICROSOFT.CO

M

This would be a good place to insert a short paragraph about your organization. It might include the purpose of the organization, its mission, founding date, and a brief history. You could also include a brief list of the types of products, services, or programs your organization offers, the geographic area covered (for example, western U.S. or European markets), and a profile of the types of customers or members served.

It would also be useful to include a contact name for readers who want more information about the organization.

Back Page Story Headline

This story can fit 175-225 words.

If your newsletter is folded and mailed, this story will appear on the back. So, it's a good idea to make it easy to read at a glance.

A question and answer session is a good way to quickly capture the attention of readers. You can either compile questions that you've received since the last edition or you can summarize some generic questions that are frequently asked about your organization.

A listing of names and titles of managers in your organization is a good way to give your newsletter a personal touch. If

your organization is small, you may want to list the names of all employees.

If you have any prices of standard products or services, you can include a listing of those here. You may want to refer your readers to any other forms of communication that you've created for your organization.

You can also use this space to remind readers to mark their calendars for a regular event, such as a breakfast meeting for vendors every third Tuesday of the month, or a biannual charity auction.

If space is available, this is a good place to insert a clip art



Caption describing picture or graphic.

image or some other graphic.