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Su
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Su Kavramı *

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Yazar su konusunda bilgileri kendisine göre yorumlamaktadır.
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Canlı vücudunda olan su, dokuların oluşumu, hücrelerde de maddelerin geçişimi ötesinde yapısında da yüzde elli oranından fazla bulunmaktadır.

Yaşam için gerekli olan bu suyun, başka hücre ve vücudumuzda korunması, devamlı değiştiği düşünülürse, yeterli ve dengeli olarak alınmalı, birlikte de elektrolitler, benzeri gereksinimlerin de alınması önemlidir.

Kısaca su yaşam demektir, bu boyut algılanmalıdır.

Homo sapiens, sapiens bir insan olarak, yaşaması için su mutlak gereklidir. Yaşa göre ihtiyaç azalmakta ise de yüzde elli üzeri dokularda olması önemlidir.

Sıvı, hücre içi, dokular arası, bazı boşluklarda, göz küresi gibi yapılarda, damarlarda dolaşım ve tüm hücreler arası iletişim açısından önemi belirgindir.

Vücudumuzdaki suyun belirli bir elektrolit kapsamı olmakta, bu açıdan belirli dengenin sağlanması açısından önemlidir.

Özet

Su Kavramı

Amaç: Yaşam için gerekli olan su, vücudumuzun da temel yapılarındandır. Sosyal açıdan da önemli bir katkı sağlar, su ve suyun içinde hazırlanan çay, önemli sosyal ikramlardandır. Bu makalede su konusu irdelenmekte, takip eden makalelerde de diğer bakış açılarından su konusu irdelenecektir.

Dayanaklar/Kaynaklar: İnternet ve Wikipedia temel bilgi kaynağı olmaktadır.

Giriş: Su molekül açısından basit gibi görünse de oksijen ve hidrojen bağlanması farklı yerlerde olması hem eksi hem artı çekim sağlamakta, ancak bağ oluşturmadığı için, molekülleri çekip veya itmektedir. Su molekülü içindeki maddelere bir enerji, bir dinamizm sağlamaktadır.

Genel Yaklaşım; Maddenin 3 hali, a) katı, buz, kar, b) sıvı hali su, c) gaz hali, buhar olarak normal ısılarda gözlenmektedir. Bu doğanın etkileşimi ve yaşamda da bitki ve hayvanların yaşaması için ortam sağlamaktadır. Bu 3 halin kendine göre farklı özellikleri vardır, insanlar açısından da sosyal önemli katkı sağlarlar.

Başlıca boyutlar: Her bireyin su kavramı farklıdır, yumuşak kaynak suyun tercih edilerek içilmesi, tadı açısından hayranlık duyulması da gözlenmektedir.
Yaklaşım: Su içilme ötesinde kullanma olarak önemlidir. Temizlik insan açısından, ayrıca endüstride de kullanılan su, sonucunda çevre kirliliğinin oluşması önemli bir atık su problemi yaratmaktadır.
Sonuç: İnsanların yaşaması açısından önemli olan su, atık sular ile de oluşan kirlilik nedeni ile de belirli bir çevre sorunu yaratmaktadır. Su kısıtlılığı da suyun yaşamsal önemini arttırmaktadır.
Yorum: Su, varlık için önemli iken, giderek kısıtlı olması yanında kirliliği de tehdit eder boyutta olmuştur.
Anahtar Kelimeler: Su özelliği, Su molekülü ve etkileşimi

Outline
The Concept of Water
AIM: The obligatory essential for living; water is the most common material at our body. Water is also contribute to our social life, as tea is the common desired one, for relationship. In this Article water as a concept is taken in consideration, later Articles are also evaluated form other aspects of water.
Grounding Aspects: From internet and Wikipedia as an information taken source.
Introduction: As a molecule of water, it seems simple, thus, the hydrogen and oxygen bonds at counter place, makes positive and negative magnetism, consequently, not making bond, but making a dynamism so, activity is obvious.
General Considerations: There are three states of a factual, as a) solid, ice, snow, b) liquid, water, c) gas, steam, can be seen at natural conditions. The specifications at these temperatures are unique and specific.
Proceeding: In addition of drinking, using of water is important, thus in industry usage, the discharged one be a reasoning of environmental pollution. Making a great importance.
Conclusion: Water is essential for life, as also cleaning and for industrial usage. So, scarcity of the water be especially important for care and serve water. Water pollution is also increasingly important for vitality.
Key Words: The properties of water, the effects of water molecule

Giriş

Su yaşam açısından önemli olduğuna göre, her bireye için, her topluma göre, her kültürün bakış açısından bunun yansıması olmalıdır.

Kişisel olarak, İlkokul son sınıfta peritonit olmuş ve ameliyat ile karnımdan 1,5 Litre pus boşaltılmış, ancak bana 1,200mL toplam damardan sıvı verilmiştir. O dönemlerde sıvı fazla verilmediği, sıvı kısıtlaması temel alındığı dikkate alınmalıdır. Sonuçta su diye sayıklama ötesinde, tüm gözümün önünde bardaktan su içme, tabaktan suyu yudumlama, gözlerimin önüne gelmiştir. Halen de su, kaynak sularına hayranlığım olmaktadır, bir seferde bir litreye yakın su içmemin gerekçesi, hayranlığımdandır.

Su Kavramı

Wikipedia kapsamında, geniş veri için İngilizce alınmış olup, su boyutu inceleyelim, Su ve suyun özellikleri konusu:

Water. Wikipedia[1]

Water is an inorganic, transparent, tasteless, odorless, and nearly colorless chemical substance, which is the main constituent of Earth's hydrosphere and the fluids of all known living organisms (in which it acts as a solvent[1]). It is vital for all known forms of life, even though it provides no calories or organic nutrients. Its chemical formula is H_2O, meaning that each of its molecules contains one oxygen and two hydrogen atoms, connected by covalent bonds. Two hydrogen atoms are attached to one oxygen atom at an angle of 104.45°.[2]
"Water" is the name of the liquid state of H_2O at standard conditions for temperature and pressure. It forms precipitation in the form of rain and aerosols in the form of fog. Clouds consist of suspended droplets of water and ice, its solid state. When finely divided, crystalline ice may precipitate in the form of snow. The gaseous state of water is steam or water vapor.
Water covers 71% of the Earth's surface, mostly in seas and oceans.[3] Small portions of water occur as groundwater (1.7%), in the glaciers and the ice caps of Antarctica and Greenland (1.7%), and in the air as vapor, clouds (consisting of ice and liquid water suspended in air), and precipitation (0.001%).[4][5] Water moves continually through the water cycle of evaporation, transpiration (evapotranspiration), condensation, precipitation, and runoff, usually reaching the sea.
Water plays an important role in the world economy. Approximately 70% of the freshwater used by humans goes to agriculture.[6] Fishing in salt and fresh water bodies is a major source of food for many parts of the world. Much of the long-distance trade of commodities (such as oil, natural gas, and manufactured products) is transported by boats through seas, rivers, lakes, and canals. Large quantities of water, ice, and steam are used for cooling and heating, in industry and homes. Water is an excellent solvent for a wide variety of substances both mineral and organic; as such it is widely used in industrial processes, and in cooking and washing. Water, ice and snow are also central to many sports and other forms of entertainment, such as swimming, pleasure boating, boat racing, surfing, sport fishing, diving, ice skating and skiing.

Yorum

Su bilinen bir madde olması ötesinde, onun çok yönlü olmasını sağlayan, iki hidrojen atomunun 104,45 derece açı ile oluşmasıdır. Bu yapı, molekülü hidrojen tarafını pozitif, oksijen tarafını da negatif yönde yapmaktadır. Bu bağ olarak değil, çekicilik şeklinde olması da bir anlamlıdır. Çekici olması ile bağlanıp, kimyasal bir yapı yaparken, sadece çekici olması olarak, ortamda bir hareketlilik, çekme, itme boyutu ile bir etkileşim olmaktadır. Bunun saniyede milyonlarca olması, aynı zamanda ortamın ısısı ile de artmakta ve azalmaktadır. Çekim alanı olarak su molekülü, kalp yapısında olup, kulakçıklar artı, eksiyi çekiyor, karıncık ise eksi, artıyı çekmektedir.

Dünyanın %71 oranında su ile kaplı olması, temelde suyun yaşamda ortam olarak önemlidir. Buna karşın su kısıntılarının olması da bir paradoks gibi görülebilir.

Etymology
The word *water* comes from Old English *wæter*, from Proto-Germanic **watar* (source also of Old Saxon *watar*, Old Frisian *wetir*, Dutch *water*, Old High German *wazzar*, German *Wasser*, *vatn*, Gothic 𐍅𐌰𐍄𐍉 (*wato*), from Proto-Indo-European **wod-or*, suffixed form of root **wed-* ("water"; "wet").[7] Also cognate, through the Indo-European root, with Greek ύδωρ (*ýdor*), Russian вода́ (*vodá*), Irish *uisce*, and Albanian *ujë*.

Yorum[2]

Türkçe 735 yılında Orhun Kitapevinde "suv-*yer, su sahipsiz kalmasın*", 1073 Kaşgarlı Mahmut "su vermeyene süt ver" ifadesi ile yer almaktadır[2].
Kazak; sw, Kırgız; suu, Özbek; suv, Türkmen; suw, Uygur; su demektedir.
Çince ise shui olarak geçer.

Hattuşaş Medeniyetinde suyun adı wasser olup, Germen dilinin kaynağı olmaktadır. Bu açıdan Anadolu Germen yapısı olarak temel kaynaktır.

History
Chemical and physical properties
Water (H_2O) is a polar inorganic compound that is at room temperature a tasteless and odorless liquid, nearly colorless with a hint of blue. This simplest hydrogen chalcogenide is by far the most studied chemical compound and is described as the "universal solvent" for its ability to dissolve many substances.[8][9] This allows it to be the "solvent of life":[10] indeed, water as found in nature almost always includes various dissolved substances, and special steps are required to obtain chemically pure water. Water is the only common substance to exist as a solid, liquid, and gas in normal terrestrial conditions.[11]

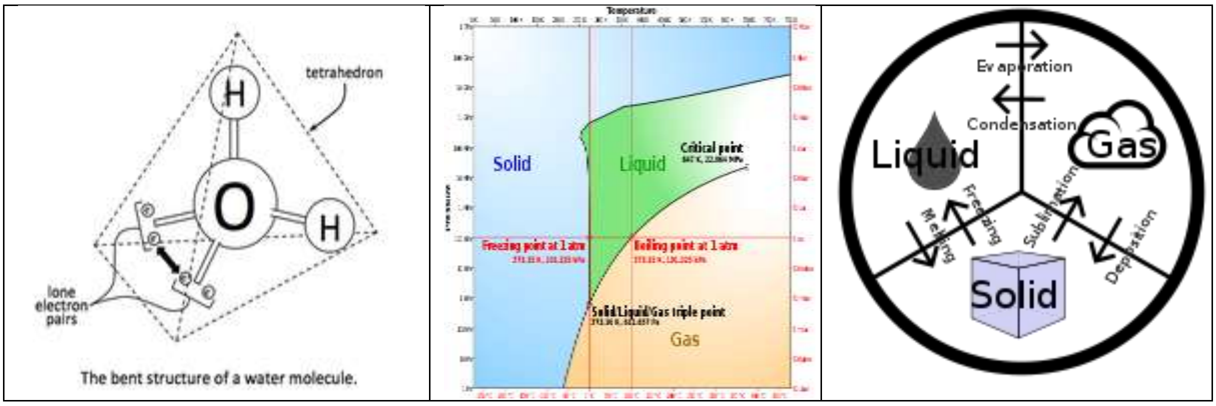
Yorum

Su, yaşamsal ortamda 3 boyutu olan; buz/katı, buhar/gaz ve sıvı/su olarak olan bir maddedir. Bu açıdan bu üç önemli bir yapısı, yaşam ortamımızda gözlenmektedir.
Birçok madde suyun içine eriyebilmektedir.

Bu statik bir erime ötesindedir, Suyun yapısı olarak artı ve eksi elektrostatik bir yapısı nedeniyle bu diğer molekülleri de itmekte ve çekmekte, bir hareket sağlayarak, tüm ortama maddelerin, elektrolitlerin temasına olanak sağlamaktadır.

Her atomun etrafında kademeli olsa bile bir çekim alanı vardır. Hidrojenin alanı bir boru şeklinde silindirik iken, oksijen ise yuvarlık şeklindedir. Farklı iki maddenin birbiri içine girmesine karşın, etrafında bir boyut oluşturabilmektedir. İki yuvarlak ile iki silindir farklı iken, ikisinin bütünleşmesi ile etrafındaki yapı özel ve özgündür.

Suyun 3 Genel Yapısal Durumu



Grafik/Şekil 1: Su, üçlü bir yapı olarak, sıvı, gaz ve katı/buz hali dikkate alınmalıdır

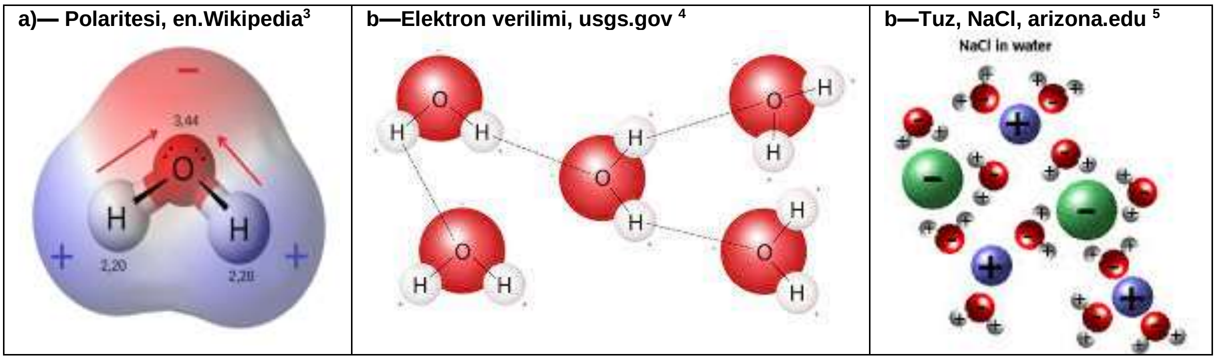
States

Along with *oxidane*, *water* is one of the two official names for the chemical compound H_2O;[12] it is also the liquid phase of H_2O.[13] The other two common states of matter of water are the solid phase, ice, and the gaseous phase, water vapor or steam. The addition or removal of heat can cause phase transitions: freezing (water to ice), melting (ice to water), vaporization (water to vapor), condensation (vapor to water), sublimation (ice to vapor) and deposition (vapor to ice).[14]

Yorum

Su, molekül arasında boşlukların olması ve eritici yapısı ile, devamlı artı ve eksi çekimler ile değişime, hareketliliğe olanak sağlaması ile önemli bir boyuttadır.
Canlılarda, insanların temel yapısının su içinde olduğu, yapısı itibariyle farklı kapsamda olsa bile, işleve su ortamında gerçekleşmektedir.

Suyun Polaritesi



Grafik/Şekil 2: Su, polaritesi yapısal modeli ve NaCl, suyun içinde dağılımı.

Density

Water differs from most liquids in that it becomes less dense as it freezes.[16] In 1 atm pressure, it reaches its maximum density of 1,000 kg/m^3 (62.43 lb/cu ft) at 3.98 °C (39.16 °F).[17] The density of ice is 917 kg/m^3 (57.25 lb/cu ft), an expansion of 9%.[18][19] This expansion can exert enormous pressure, bursting pipes and cracking rocks (see Frost weathering).[20]
In a lake or ocean, water at 4 °C (39.2 °F) sinks to the bottom, and ice forms on the surface, floating on the liquid water. This ice insulates the water below, preventing it from freezing solid. Without this protection, most aquatic organisms would perish during the winter.[21]

Yorum

Buzun sudan daha dansitesi az olması, onun yüzeyde olarak, buz olarak örtü şeklinde olması önemli bir boyuttur. Bu bir izolasyon yapması yanında, erimesi ile su düzeyi yükselmektedir. 25,000 yıl önce, buzların erimesi ile su yükselmiş ve Akdeniz, kapalı iken, Cebelitarık açılmış, 260metre su düzeyi yükselerek, Karadeniz açılmış, boğazlar oluşmuştur.
Su düzeyinin artı4 derecede olması önemli bir kavram olduğu anlaşılmaktadır. Bir durgun suda, aynı derecede değil, katmanlar şeklinde olduğu gözlenir.

Phase transitions

At a pressure of one atmosphere (atm), ice melts or water freezes at 0 °C (32 °F) and water boils or vapor condenses at 100 °C (212 °F). However, even below the boiling point, water can change to vapor at its surface by evaporation (vaporization throughout the liquid is known as boiling). Sublimation and deposition also occur on surfaces.[14] For example, frost is deposited on cold surfaces while snowflakes form by deposition on an aerosol particle or ice nucleus.[22] In the process of freeze-drying, a food is frozen and then stored at low pressure so the ice on its surface sublimates.[23]
The melting and boiling points depend on pressure. A good approximation for the rate of change of the melting temperature with pressure is given by the Clausius–Clapeyron relation:
The Clausius-Clapeyron relation also applies to the boiling point, but with the liquid/gas transition the vapor phase has a much lower density than the liquid phase, so the boiling point increases with pressure.[26] Water can remain in a liquid state at high temperatures in the deep ocean or underground. For example, temperatures exceed 205 °C (401 °F) in Old Faithful, a geyser in Yellowstone National Park.[27] In hydrothermal vents, the temperature can exceed 400 °C (752 °F).[28]
At sea level, the boiling point of water is 100 °C (212 °F). As atmospheric pressure decreases with altitude, the boiling point decreases by 1 °C every 274 meters. High-altitude cooking takes longer than sea-level cooking. For example, at 1,524 metres (5,000 ft), cooking time must be increased by a fourth to achieve the desired result.[29] (Conversely, a pressure cooker can be used to decrease cooking times by raising the boiling temperature.[30]) In a vacuum, water will boil at room temperature.[31]

Yorum

Karlı ortamda, güneş vurduğunda tüm kar erimeden, sadece üst kısmı, 80kalori alması ile, buz, 600kalori ile de buharlaşır. Bu açıdan hava ısınmadan, sıfır altında olduğunda, toprak nemlenmez ama buzlar ve kar buharlaşıp kaybolabilir. Bu açıdan, toprağın ıslatılması unutulmamalıdır, aynı çöl gibi bir boyutun olacağı da dikkate alınmalıdır. Üstteki buz alttaki donmuş yapıyı korusa da ıslatarak su gereksinimini karşılamaktadır.
Kaynama noktası deniz seviyesindekidir, halbuki yukarıda daha düşük derecede kaynar, buna karşın yüksek basınçta farklı olacağı için düdüklü tencere ile sterilizasyon yapan otoklavların çalışma mekanizması farklı olmaktadır.

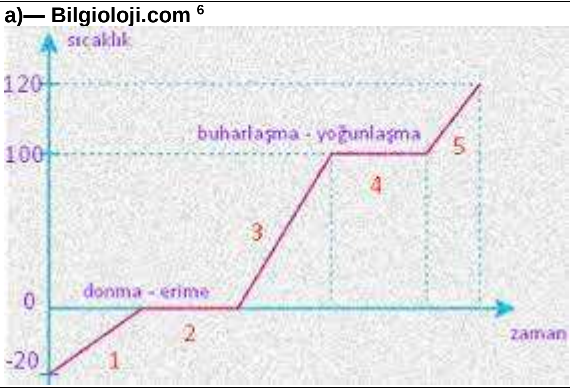
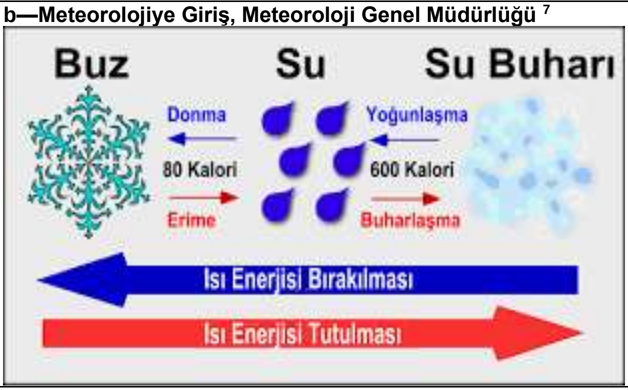
Triple and critical points

On a pressure/temperature phase diagram (see figure), there are curves separating solid from vapor, vapor from liquid, and liquid from solid. These meet at a single point called the triple point, where all three phases can coexist. The triple point is at a temperature of 273.16 K (0.01 °C) and a pressure of 611.657 pascals (0.00604 atm);[32] it is the lowest pressure at which liquid water can exist. Until 2019, the triple point was used to define the Kelvin temperature scale.[33][34]
The water/vapor phase curve terminates at 647.096 K (373.946 °C; 705.103 °F) and 22.064 megapascals (3,200.1 psi; 217.75 atm).[35] This is known as the critical point. At higher temperatures and pressures the liquid and vapor phases form a continuous phase called a supercritical fluid. It can be gradually compressed or expanded between gas-like and liquid-like densities, its properties (which are quite different from those of ambient water) are sensitive to density. For example, for suitable pressures and temperatures it can mix freely with nonpolar compounds, including most organic compounds. This makes it useful in a variety of applications including high-temperature electrochemistry and as an ecologically benign solvent or catalyst in chemical reactions involving organic compounds. In Earth's mantle, it acts as a solvent during mineral formation, dissolution and deposition.[36][37]

Yorum

İklim açısından su, buhar ve buzun önemi önemlidir. Kar yağarken, sudan kalori alır, hava farklı olur, bir bakıma ısınma algısı olabilir. Terli vücuttan da nemin buharlaşması, ateşi düşürücü etkisi olarak gözlenir.
Antipiretik ’ler, IL-2 ve diğer mekanizmalara etki ile, 65mg/kg verilmesi ve tek dozda 20mg/kg ulaşılması ile etkin olmaktadırlar. Kardiyolojik açıdan tek doz 82-100mg verilmesi yeterli olmakta, ancak tedavi dozu 100mg/kg gibi yüksektir. Söz edilmesinin nedeni, ilaç etki etmeden, derhal vücudun ıslatılması, buharlaşma ile vücuttan çekilen enerji ile çocuk soğuyacaktır. Özellikle 41 derece üstünde olan durumlarda, Heat stroke’dan koruma açısından, en önemli yaklaşım olmaktadır. Isı düşmesi 1 kalori düşürürken, buharlaşma çok yüksek kalori çekmektedir.

Suyun Enerji tutulması ile Enerji Bırakılması

a)— Bilgioloji.com [6]	b—Meteorolojiye Giriş, Meteoroloji Genel Müdürlüğü [7]
	

Grafik/Şekil 3: Su aynı derecede iken 600kalori enerji alma ile buhar, 80kalori bırakma ile buz oluşur.

Phases of ice and water
The normal form of ice on the surface of Earth is Ice Ih, a phase that forms crystals with hexagonal symmetry. Another with cubic crystalline symmetry, Ice Ic, can occur in the upper atmosphere.[38] As the pressure increases, ice forms other crystal structures. As of 2019, 17 have been experimentally confirmed and several more are predicted theoretically.[39] When sandwiched between layers of graphene, ice forms a square lattice.[40]
The details of the chemical nature of liquid water are not well understood; some theories suggest that its unusual behaviour is due to the existence of 2 liquid states.[17][41][42][43]

Yorum

Su buharı donması ile kar olurken, suyun donması ile buz oluşur.

- Birden çok hızlı ve yüksek donma derecesi ile moleküller tek dize şeklinde olup, kitlesel oluşmaktadır. Karbon boyutunda da benzer dizilim ile grafit olurken, diğerinde kömür şekline gelir. Ayni yapı içinde, buz oluşmaz.
- Buhar donarken kristalleşir ve her kristal birbirinden farklı yapıdadır. Kristalleşirken, oluşan yapı, sekizgen şeklinde yapılanabilmektedir.
- Buz kitlesi ile oluşan yapıda içinde ısı daha düşük değildir. Bir kitlesel boyut şeklindedir.
- Birikerek oluşan katmanlar ile donma ile, tabakanın bütünleşmesi, zaman içinde erime ile ancak olabilir. Sıklıkla katmanlar gözlenebilir.
- Buz dağlarında oluşan boşluklarda suların olduğu ve bir yarıklar şeklinde oluşması ile, burada ısınma ile kırılmalar ve buz kitleleri oluşmaktadır. Buz, sudan daha hafif olduğu için, yüzmektedir. Ancak çok hafif olmaması nedeniyle %90 suya gömülü pozisyondadır.

Su moleküllerinin dizimi ile, farklı yapının oluşması bir gözlemsel boyut olmaktadır.
Birçok yapıda da suyun farklı oluşumlar altında gözlenmesi kanımca olasıdır.

Taste and odor
Pure water is usually described as tasteless and odorless, although humans have specific sensors that can feel the presence of water in their mouths,[44] and frogs are known to be able to smell it.[45] However, water from ordinary sources (including bottled mineral water) usually has many dissolved substances, that may give it varying tastes and odors. Humans and other animals have developed senses that enable them to evaluate the potability of water by avoiding water that is too salty or putrid.[46]

Yorum

Su tatsız olması ona bir özellik vermektedir. Çay bir örneğidir. Bitkiler içindeki maddeleri bu şekilde dışarı verebilmektedirler.
Geleneklere göre çay yapımı özellik arz etmektedir. Bir örnek verilirse:

- Çayın sıcak su ile yıkanması ile, içindeki kafein, tein gibi maddeler suya geçer. Bu durumda gerekirse yıkama suyu atılabilir, kafeinsiz çay yapılmış olacaktır.
- İlk bir dakika içinde suya geçen boyut ilk koku şeklindedir, ikinci dakika ile bu daha netleşir.
- Beşinci dakikada tam renk ve aroma suya geçer.

- On dakikadan sonra ise sert tadı yapan tein geçmektedir. 15 dakika sonra ise sert çay olmaktadır. Daha fazla sürede kaynar suda olan çayın içilmesi zordur.
- Çay kaynamış su içine konularak suya geçmesi beklenir, ayrıca kaynatılmaz. Ancak İngiliz usulünde çay su içine konur ve kaynatılır, düdük mekanizması olunca çay alınıp bardaklara konur. Bardağın içine bir miktar su ve süt konması, ilk planda fincanın çatlamaması için olsa da bir İngiliz usulü olmuştur.
- Japon ve Çin yaklaşımında ufak kap içinde, her demleme süresindeki boyut; yıkama, 1-2 dakika ve 5 dakika, ile 10 dakikalık çay ayrı olarak sunularak içilir.
- Genellikle her bardak için bir ufak kahve kaşığı çay konurken, Japon yaklaşımında ise, daha fazla, en az iki kat konur.
- Su daha önce çalkalanarak oksijenlenmesi beklenir, kaynaması başlayınca indirilir.
- Çayın, ilk yarım fide beyaz çay demektir.
- Ayrıca 2,5 yaprak, kısaca ilk 3 yaprak farklıdır.
- Kullandığımız çalıdan oluşan çaydır. *Tea*, tea adlı ağaçtan alınan bir başka türün yapraktan oluşturulan çaydır.

Tüm bunlar suyun tatsız olmasından kaynaklanır.

Laboratuvarda distile su ile hazırlanır ve zamana çok uyulur,4-5 dakikayı geçmez, balon jojede hazırlanır.

Color and appearance

Pure water is visibly blue due to absorption of light in the region ca. 600 nm – 800 nm.[47] The color can be easily observed in a glass of tap-water placed against a pure white background, in daylight. The principal absorption bands responsible for the color are overtones of the O–H stretching vibrations. The apparent intensity of the color increases with the depth of the water column, following Beer's law. This also applies, for example, with a swimming pool when the light source is sunlight reflected from the pool's white tiles.

In nature, the color may also be modified from blue to green due to the presence of suspended solids or algae.

In industry, near-infrared spectroscopy is used with aqueous solutions as the greater intensity of the lower overtones of water means that glass cuvettes with short path-length may be employed. To observe the fundamental stretching absorption spectrum of water or of an aqueous solution in the region around 3500 cm^{-1} (2.85 μm)[48] a path length of about 25 μm is needed. Also, the cuvette must be both transparent around 3500 cm^{-1} and insoluble in water; calcium fluoride is one material that is in common use for the cuvette windows with aqueous solutions.

The Raman-active fundamental vibrations may be observed with, for example, a 1 cm sample cell.

Aquatic plants, algae, and other photosynthetic organisms can live in water up to hundreds of meters deep, because sunlight can reach them. Practically no sunlight reaches the parts of the oceans below 1,000 meters (3,300 ft) of depth.

The refractive index of liquid water (1.333 at 20 °C (68 °F)) is much higher than that of air (1.0), similar to those of alkanes and ethanol, but lower than those of glycerol (1.473), benzene (1.501), carbon disulfide (1.627), and common types of glass (1.4 to 1.6). The refraction index of ice (1.31) is lower than that of liquid water.

Yorum

Işık suya girerken bir açı yapar. Bu nedenle güneş dik gelirken denizin altına ulaşırken, yatay gelince, yansıma yapar ve tam mavi renktedir. Güneş batarken de yansıma nedeniyle kırmızı olur. Deniz altındaki bitki ve hayvanlarda buna göre besin ve yuvalarında olurlar.

Yüzeyde olan planktonların üremesi ve renklendirmesi de bir başka boyut katmaktadır. Nitekim deniz yüzeyinde olanların oksijen kaynağının %50'den fazlasını sağlaması bu etkiden olmaktadır.

Yaz dışında ilkbahar ve sonbaharda deniz daha yansıtıcı yapıdadır.

Güneşe göre deniz katman olarak ısısı farklı olmaktadır. Eğer üst yüzeyin çok soğuk veya çok sıcak olması söz konusu olunca, alt kesim kendi aralarında bir halka, dalgalanma olur, denizin altı soğuk kalır. Yazın da üst kesin çok sıcak olacağı için, alt kesimi ısıtacak dalga halkası oluşmaz.

Polar molecule

In a water molecule, the hydrogen atoms form a 104.5° angle with the oxygen atom. The hydrogen atoms are close to two corners of a tetrahedron centered on the oxygen. At the other two corners are *lone pairs* of valence electrons that do not participate in the bonding. In a perfect tetrahedron, the atoms would form a 109.5° angle, but the repulsion between the lone pairs is greater than the repulsion between the hydrogen atoms.[49][50] The O–H bond length is about 0.096 nm.[51]

Other substances have a tetrahedral molecular structure, for example, methane (CH_4) and hydrogen sulfide (H_2S). However, oxygen is more electronegative (holds on to its electrons more tightly) than most other elements, so the oxygen atom retains a negative charge while the hydrogen atoms are positively charged. Along with the bent structure, this gives the molecule an electrical dipole moment and it is classified as a polar molecule.[52]
Water is a good polar solvent, that dissolves many salts and hydrophilic organic molecules such as sugars and simple alcohols such as ethanol. Water also dissolves many gases, such as oxygen and carbon dioxide—the latter giving the fizz of carbonated beverages, sparkling wines and beers. In addition, many substances in living organisms, such as proteins, DNA and polysaccharides, are dissolved in water. The interactions between water and the subunits of these biomacromolecules shape protein folding, DNA base pairing, and other phenomena crucial to life (hydrophobic effect).
Many organic substances (such as fats and oils and alkanes) are hydrophobic, that is, insoluble in water. Many inorganic substances are insoluble too, including most metal oxides, sulfides, and silicates.

Yorum

Su molekülü, birçok maddenin içinde erimesini sağlar. Bu, moleküllerinin iyonize olması ile bu sağlanır. İyonize olmayan maddeler için, ufak boyuta gelmeleri ile moleküller içinde bulunmakta, ince olarak kalmaktadırlar.
Un gibi maddelerin uzun nişasta şeklinde yapıları suda erimez, ısı ile moleküllerin parçalanması ile, suyu tutar boyuta gelirler. Şeker yapısı ile su tutucu, hatta suyu içinde tutacak boyutta olur, bir jel oluşturmaktadır.

Birçok madde suyu içine alır, vücudumuzda olduğu gibi, ettin de yarısının su olduğu algısı ile yapıların içinde kaldığı algılanmalıdır.

Hydrogen bonding
Because of its polarity, a molecule of water in the liquid or solid state can form up to four hydrogen bonds with neighboring molecules. Hydrogen bonds are about ten times as strong as the Van der Waals force that attracts molecules to each other in most liquids. This is the reason why the melting and boiling points of water are much higher than those of other analogous compounds like hydrogen sulfide. They also explain its exceptionally high specific heat capacity (about 4.2 J/g/K), heat of fusion (about 333 J/g), heat of vaporization (2257 J/g), and thermal conductivity (between 0.561 and 0.679 W/m/K). These properties make water more effective at moderating Earth's climate, by storing heat and transporting it between the oceans and the atmosphere. The hydrogen bonds of water are around 23 kJ/mol (compared to a covalent O-H bond at 492 kJ/mol). Of this, it is estimated that 90% is attributable to electrostatics, while the remaining 10% is partially covalent.[53]
These bonds are the cause of water's high surface tension[54] and capillary forces. The capillary action refers to the tendency of water to move up a narrow tube against the force of gravity. This property is relied upon by all vascular plants, such as trees.[55]

Yorum

Su, havadaki oksijeni bile içinde tutabilmekte, bu nedenle balıkların yaşamasına olanak sağlamaktadır. Kaynamış suda oksijen uçmaktadır, bu nedenle kaynamış su akvaryuma çalkalandıktan sonra konulmalıdır.
Su molekülü, yüzeyde bir toplanma ile, bir tabaka oluşturur ve bu yüzey gerilimi oluşturur. Damlanın suya damlaması ile bir çekilme ve patlama şeklinde olması bunun sonucudur. Bu yüzey gerilimden faydalanan su böcekleri suyun üstünde yürümektedirler.

Şampuan su gerilimini ortadan kaldıracağı için, yüzme havuzlarında şampuan konulması bir nevi şike olarak kabul edilmektedir.

Self-ionisation
Water is a weak solution of hydronium hydroxide - there is an equilibrium $2H_2O \Leftrightarrow H_3O + OH$, in combination with solvation of the resulting hydronium ions.
Electrical conductivity and electrolysis
Pure water has a low electrical conductivity, which increases with the dissolution of a small amount of ionic material such as common salt.
Liquid water can be split into the elements hydrogen and oxygen by passing an electric current through it—a process called electrolysis. The decomposition requires more energy input than the heat released by the inverse process (285.8 kJ/mol, or 15.9 MJ/kg).[56]

Yorum

Su elektronların geçirmesi açısından zayıf iken, tuz gibi maddelerin konulması ile yüksek geçirgen olmaktadır.
Elektrik verilmesi ile hidrojen ve oksijen ayrılır, bu elektroliz yöntemi denmektedir. Bunun tersi yapılırsa, su ile çalışan otomobillerde olduğu gibi, atık olan su, su buharı olmaktadır.

Bu fark 285,8kJ/mol bir enerji gereksinimi olmaktadır. Kısaca teknik gelişmesi ile sudan giden taşıtlar gözlenecektir.

Mechanical properties

Liquid water can be assumed to be incompressible for most purposes: its compressibility ranges from 4.4 to 5.1×10^{-10} Pa^{-1} in ordinary conditions.[57] Even in oceans at 4 km depth, where the pressure is 400 atm, water suffers only a 1.8% decrease in volume.[58]

The viscosity of water is about 10^{-3} Pa·s or 0.01 poise at 20 °C (68 °F), and the speed of sound in liquid water ranges between 1,400 and 1,540 meters per second (4,600 and 5,100 ft/s) depending on temperature. Sound travels long distances in water with little attenuation, especially at low frequencies (roughly 0.03 dB/km for 1 kHz), a property that is exploited by cetaceans and humans for communication and environment sensing (sonar).[59]

Yorum

Suyun bir özelliği de sıkışmamasıdır. Bu özellik nedeniyle buhar haline gelen su, basınç oluşturur, ilk buhar kazanları ile tren olarak kullanıldığı gözlenmiştir. Birçok gemi ilk planda buhar gücü ile çalışmıştır.

Bir başka özelliği de derinleştikçe, su bir basınç oluşturmaktadır, 40 metre altında özel aletler olmadan yüzebilmek olanaklı değildir. Öncelikle akciğerler patlamasın diyerek, derin deniz dalıcıları belirli aralıklarla akciğerlerindeki havayı boşaltırlar. Yukarı çıkınca da birden nefes alınca, havadaki %21 olan oksijen, bayılmaya kadar giden etkileşim yapabilir.

Kısaca su ile uğraşanların özelliklerini bilmeleri yaşamsal önemlidir. Ölümcül olmaktadır.

Reactivity

Metallic elements which are more electropositive than hydrogen, particularly the alkali metals and alkaline earth metals such as lithium, sodium, calcium, potassium and cesium displace hydrogen from water, forming hydroxides and releasing hydrogen. At high temperatures, carbon reacts with steam to form carbon monoxide and hydrogen.

Yorum

Oksijensiz ortamda ve yüksek ısıda, kısaca yangınlarda CO şeklinde bir yapı oluşur, bu daha güçlü bir yapıda olduğu söylenebilir. Oksijen bulunca bağlanır, kısaca hemoglobin ile bağlanarak zehirlenme yapar, beyin işlevlerini bozar.

Hidrojen ile oksijenin kimyasal bağı, güçlü değildir, dolayısıyla birçok madde ile birleşerek, çeşitli hidrojen dışarı çıkarak hidroksit formları oluşur. Bu açıdan su katılması ile farklı bir yapı oluşur, bu amaçla inşaatlarda kireç, kireç taşı olması için kullanılır.

On Earth

Hydrology is the study of the movement, distribution, and quality of water throughout the Earth. The study of the distribution of water is hydrography. The study of the distribution and movement of groundwater is hydrogeology, of glaciers is glaciology, of inland waters is limnology and distribution of oceans is oceanography. Ecological processes with hydrology are in the focus of ecohydrology.

The collective mass of water found on, under, and over the surface of a planet is called the hydrosphere. Earth's approximate water volume (the total water supply of the world) is 1.386×10^9 cubic kilometers (3.33×10^8 cubic miles).[4]

Liquid water is found in bodies of water, such as an ocean, sea, lake, river, stream, canal, pond, or puddle. The majority of water on Earth is sea water. Water is also present in the atmosphere in solid, liquid, and vapor states. It also exists as groundwater in aquifers.

Water is important in many geological processes. Groundwater is present in most rocks, and the pressure of this groundwater affects patterns of faulting. Water in the mantle is responsible for the melt that produces volcanoes at subduction zones. On the surface of the Earth, water is important in both chemical and physical weathering processes. Water, and to a lesser but still significant extent, ice, are also responsible for a large amount of sediment transport that occurs on the surface of the earth. Deposition of transported sediment forms many types of sedimentary rocks, which make up the geologic record of Earth history.

Yorum

İklimi ısı derecesi aynı olsa da farklı etkileşim içinde olması, ancak nem, su buharı ve yağmur, su ile oluşmaktadır. Bu nedenle, doğanın bu şeklindeki yapısını oluşturan da su ve suyun yaptığı etkileşimlerdir. Tüm etkilerin su faktörü ile olduğundandır.

Sıcak iklimlerde buharlaşma yüksek olur, soğukta da kar bile az yamaktadır. Çölde bile suyun önemini gece buharın yapraklarda çiğ olarak yoğunlaşması ile böcekler algılamaktadırlar.

Water cycle

The water cycle (known scientifically as the hydrologic cycle) refers to the continuous exchange of water within the hydrosphere, between the atmosphere, soil water, surface water, groundwater, and plants.

Water moves perpetually through each of these regions in the *water cycle* consisting of the following transfer processes:

- evaporation from oceans and other water bodies into the air and transpiration from land plants and animals into the air.
- precipitation, from water vapor condensing from the air and falling to the earth or ocean.

- runoff from the land usually reaching the sea.

Most water vapors found mostly in the ocean returns to it, but winds carry water vapor over land at the same rate as runoff into the sea, about 47 Tt per year whilst evaporation and transpiration happening in land masses also contribute another 72 Tt per year. Precipitation, at a rate of 119 Tt per year over land, has several forms: most commonly rain, snow, and hail, with some contribution from fog and dew.[60] Dew is small drops of water that are condensed when a high density of water vapor meets a cool surface. Dew usually forms in the morning when the temperature is the lowest, just before sunrise and when the temperature of the earth's surface starts to increase.[61] Condensed water in the air may also refract sunlight to produce rainbows.

Water runoff often collects over watersheds flowing into rivers. A mathematical model used to simulate river or stream flow and calculate water quality parameters is a hydrological transport model. Some water is diverted to irrigation for agriculture. Rivers and seas offer opportunities for travel and commerce. Through erosion, runoff shapes the environment creating river valleys and deltas which provide rich soil and level ground for the establishment of population centers. A flood occurs when an area of land, usually low-lying, is covered with water which occurs when a river overflows its banks or a storm surge happens. On the other hand, drought is an extended period of months or years when a region notes a deficiency in its water supply. This occurs when a region receives consistently below average precipitation either due to its topography or due to its location in terms of latitude.

Yorum

En sık ve devamlı değişen su molekülüdür. Buharlaşma ile bulut yolu ile olan gaz yapısı, yağmur ve kar olarak yeryüzüne inmektedir.

Deniz dikkate alındığında da su kaynağı olarak önemli bir değişim yaratmaktadır. Olay sadece yağmur, kar değil, deniz ile de suyun etkinliği gözlenmektedir.

Çöllenme bile su ile ilintilidir, suyun olmaması ile oluşan bir boyuttur.

Fresh water storage

Water occurs as both "stocks" and "flows." Water can be stored as lakes, water vapor, groundwater or "aquifers," and ice and snow. Of the total volume of global freshwater, an estimated 69 percent is stored in glaciers and permanent snow cover; 30 percent is in groundwater; and the remaining 1 percent in lakes, rivers, the atmosphere, and biota.[62] The length of time water remains in storage is highly variable: some aquifers consist of water stored over thousands of years but lake volumes may fluctuate on a seasonal basis, decreasing during dry periods and increasing during wet ones. A substantial fraction of the water supply for some regions consists of water extracted from water stored in stocks, and when withdrawals exceed recharge, stocks decrease. By some estimates, as much as 30 percent of total water used for irrigation comes from unsustainable withdrawals of groundwater, causing groundwater depletion.[63]

Yorum

Yer yüzünde tatlı su, göller ve birikintiler içinde su toplanmakta, burası bir yaşam boyutu oluşturmaktadır. Barajlar da insanların yaptığı bir benzer boyut olmakta, çeşitli amaç olarak da kullanılmaktadır.

Yerin altındaki su, kuyu ve diğer imkanlar ile kullanılmaktadır. Sahra Çölü altındaki su bazı yerlerde vaha olarak çıkmakta, Sudan gibi ülkelerde artezyen suyun kullanılması ile üstteki toprak geniş tarım alanı olarak kullanılabilir ve Dünya gereksinimin 6-7 kat ürün elde edilebilirken, halen sondaj nadirdir ve alanlar tarım için kullanılmamaktadır.

Mekke'deki vaha/pınar olan Zemzem, yüksek buharlaşma ile 1,000 metre üstündeki dağlarda yoğunlaşarak yağmur olarak akar ve üst yüzeyde toprak ve bitki olmadığı için doğrudan katmanlar ile içeri girerek, Mekke'de Zemzem suyunu oluşturmaktadır. Tahminen Mekke'de 100 adet kaynak vardır, Zemzem genişletilmesi için yapılan kazılar ile su karışmış, sertleşmiş ve vazgeçilmiştir. Bunun gibi yağmur, doğrudan yeraltına kaynak olarak oluşmaktadır.

Sea water and tides

Sea water contains about 3.5% sodium chloride on average, plus smaller amounts of other substances. The physical properties of seawater differ from fresh water in some important respects. It freezes at a lower temperature (about −1.9 °C (28.6 °F)) and its density increases with decreasing temperature to the freezing point, instead of reaching maximum density at a temperature above freezing. The salinity of water in major seas varies from about 0.7% in the Baltic Sea to 4.0% in the Red Sea. (The Dead Sea, known for its ultra-high salinity levels of between 30–40%, is really a salt lake.)

Tides are the cyclic rising and falling of local sea levels caused by the tidal forces of the Moon and the Sun acting on the oceans. Tides cause changes in the depth of the marine and estuarine water bodies and produce oscillating currents known as tidal streams. The changing tide produced at a given location is the result of the changing positions of the Moon and Sun relative to the Earth coupled with the effects of Earth rotation and the local bathymetry. The strip of seashore that is submerged at high tide and exposed at low tide, the intertidal zone, is an important ecological product of ocean tides.

Yorum

Dünyadaki suyun temel kaynağı denizler olmaktadır. Buharlaşma ile yağmurun ana orijini olduğu söylenebilir.

Deniz suyunun içindeki tuz oranı ve buna bağlı kaldırma gücü değişmektedir. Bazı iç denizlerin kalması ile tuz gölleri oluştuğu da görülmektedir. Bazı mikroorganizmalar ile soda oluştuğu da gözlenmektedir. Kısaca deniz suyu göllenerek, kurtularak denizden tuz elde edilmektedir. Bazı kaya tuzlarının orijini de deniz tuzlarıdır.

Ayın çekimi ile oluşan met ve cezir, suyun yükselmesi ve çekilmesi, iç denizlerde az olsa da okyanusta fazla olmakta, bu sahillerin düzenlenmesini ve buradaki yaşamın çeşitliliğini de oluşturmaktadır.

The Bay of Fundy at high tide and low tide

Effects on life

From a biological standpoint, water has many distinct properties that are critical for the proliferation of life. It carries out this role by allowing organic compounds to react in ways that ultimately allow replication. All known forms of life depend on water. Water is vital both as a solvent in which many of the body's solutes dissolve and as an essential part of many metabolic processes within the body. Metabolism is the sum total of anabolism and catabolism. In anabolism, water is removed from molecules (through energy requiring enzymatic chemical reactions) in order to grow larger molecules (e.g., starches, triglycerides, and proteins for storage of fuels and information). In catabolism, water is used to break bonds in order to generate smaller molecules (e.g., glucose, fatty acids, and amino acids to be used for fuels for energy use or other purposes). Without water, these particular metabolic processes could not exist.

Water is fundamental to photosynthesis and respiration. Photosynthetic cells use the sun's energy to split off water's hydrogen from oxygen.[64] Hydrogen is combined with CO_2 (absorbed from air or water) to form glucose and release oxygen.[citation needed] All living cells use such fuels and oxidize the hydrogen and carbon to capture the sun's energy and reform water and CO_2 in the process (cellular respiration).

Water is also central to acid-base neutrality and enzyme function. An acid, a hydrogen ion (H^+, that is, a proton) donor, can be neutralized by a base, a proton acceptor such as a hydroxide ion (OH^-) to form water. Water is considered to be neutral, with a pH (the negative log of the hydrogen ion concentration) of 7. Acids have pH values less than 7 while bases have values greater than 7.

Yorum

Bitkilerde fotosentez ile oluşan suyun hidrolize olması ile oksijen kaynağının temelidir. Bitki açısından karalar, ağaçlar önemli iken, denizde de plankton olmaktadır. Denizdeki plankton oksijen kaynağının %50 üzeridir. Yağmur ormanlarının ise %10-20 gibi tutmaktadır.

Akvaryumda bazı bitkiler güneş ışığı alması ile yukarı doğru ip gibi oksijen çıkardıkları görülen bir boyuttur.

Aquatic life forms

Earth surface waters are filled with life. The earliest life forms appeared in water; nearly all fish live exclusively in water, and there are many types of marine mammals, such as dolphins and whales. Some kinds of animals, such as amphibians, spend portions of their lives in water and portions on land. Plants such as kelp and algae grow in the water and are the basis for some underwater ecosystems. Plankton is generally the foundation of the ocean food chain.

Aquatic vertebrates must obtain oxygen to survive, and they do so in various ways. Fish have gills instead of lungs, although some species of fish, such as the lungfish, have both. Marine mammals, such as dolphins, whales, otters, and seals need to surface periodically to breathe air. Some amphibians are able to absorb oxygen through their skin. Invertebrates exhibit a wide range of modifications to survive in poorly oxygenated waters including breathing tubes (see insect and mollusc siphons) and gills (*Carcinus*). However, as invertebrate life evolved in an aquatic habitat most have little or no specialization for respiration in water.

Yorum

Karadaki yaşamdan daha çok, geniş bir yaşamın denizde olduğu açık ve nettir.

Effects on human civilization

Civilization has historically flourished around rivers and major waterways; Mesopotamia, the so-called cradle of civilization, was situated between the major rivers Tigris and Euphrates; the ancient society of the Egyptians depended entirely upon the Nile. The early Indus Valley Civilization (c. 3300 BCE to 1300 BCE) developed along the Indus River and tributaries that flowed out of the Himalayas. Rome was also founded on the banks of the Italian river Tiber. Large metropolises like Rotterdam, London, Montreal, Paris, New York City, Buenos Aires, Shanghai, Tokyo, Chicago, and Hong Kong owe their success in part to their easy accessibility via water and the resultant expansion of trade. Islands with safe water ports, like Singapore, have flourished for the same reason. In places such as North Africa and the Middle East, where water is more scarce, access to clean drinking water was and is a major factor in human development.

Yorum

İnsanlar yaşayabilecekleri yerlerde bulunur, bir yaşam oluşturur ve burada medeniyeler kurarlar. İlk arkeolojik insanın, Homo sapiens, sapiens, Nil nehrinin çıkış yerlerinde olup, daha sonra Kuzey Afrika'da toplanmışlar, Sahra Çölü oluşması ile de bir dalı Anadolu'dan, diğer dal Kafkasya'dan, üçüncü dal de, Afrika'dan, sarı ırk denilerek, Çin ve Okyanusya'ya yayılmışlardır.

Su sadece içilmesi değil, ürün yetiştirmek açısından da önemlidir.

Health and pollution

Water fit for human consumption is called drinking water or potable water. Water that is not potable may be made potable by filtration or distillation, or by a range of other methods. More than 660 million people do not have access to safe drinking water.[65][66]
Water that is not fit for drinking but is not harmful to humans when used for swimming or bathing is called by various names other than potable or drinking water, and is sometimes called safe water, or "safe for bathing". Chlorine is a skin and mucous membrane irritant that is used to make water safe for bathing or drinking. Its use is highly technical and is usually monitored by government regulations (typically 1 part per million (ppm) for drinking water, and 1–2 ppm of chlorine not yet reacted with impurities for bathing water). Water for bathing may be maintained in satisfactory microbiological condition using chemical disinfectants such as chlorine or ozone or by the use of ultraviolet light.
In the US, non-potable forms of wastewater generated by humans may be referred to as grey water, which is treatable and thus easily able to be made potable again, and blackwater, which generally contains sewage and other forms of waste which require further treatment in order to be made reusable. Greywater composes 50–80% of residential wastewater generated by a household's sanitation equipment (sinks, showers, and kitchen runoff, but not toilets, which generate blackwater.) These terms may have different meanings in other countries and cultures.
Freshwater is a renewable resource, recirculated by the natural hydrologic cycle, but pressures over access to it result from the naturally uneven distribution in space and time, growing economic demands by agriculture and industry, and rising populations. Currently, nearly a billion people around the world lack access to safe, affordable water. In 2000, the United Nations established the Millennium Development Goals for water to halve by 2015 the proportion of people worldwide without access to safe water and sanitation. Progress toward that goal was uneven, and in 2015 the UN committed to the Sustainable Development Goals of achieving universal access to safe and affordable water and sanitation by 2030. Poor water quality and bad sanitation are deadly; some five million deaths a year are caused by water-related diseases. The World Health Organization estimates that safe water could prevent 1.4 million child deaths from diarrhoea each year.[67]
In the developing world, 90% of all wastewater still goes untreated into local rivers and streams.[68] Some 50 countries, with roughly a third of the world's population, also suffer from medium or high water stress and 17 of these extract more water annually than is recharged through their natural water cycles.[69] The strain not only affects surface freshwater bodies like rivers and lakes, but it also degrades groundwater resources.

Yorum

İçilebilir su ile kullanılabilir suyun özellikleri farklıdır. Suyun içine klor katılması ile içilebilir olamaz. Ayrıca klor istenen değil, ozon daha tercih edilen olmaktadır. Kaynak suyu sınırlı olması nedeniyle, ayrıca derin kuyu sularının çıkarılması ötesinde, su iktisatlı olmalıdır.

Mutfakta sebzeler için parçalayıcılar ile atık su içinde katı kutular dışında olanlar da atılmaktadır. Bu daha büyük boru sistemi ile beklenmesi ile oluşan metanın açısından daha dikkatli olmayı gerekli kılıyor.

Atık suların nehirlere atılması, kolay gibi görünse de oluşturduğu, çevre kirliliği boyutu derinleştirmektedir. Uzaklaştırma artık kaybolması değil, sorunu ağırlaştırmaktadır.

Human uses
Agriculture

The most substantial human use of water is for agriculture, including irrigated agriculture, which accounts for as much as 80 to 90 percent of total human water consumption.[71] In the United States, 42% of freshwater withdrawn for use is for irrigation, but the vast majority of water "consumed" (used and not returned to the environment) goes to agriculture.[72]
Access to fresh water is often taken for granted, especially in developed countries that have build sophisticated water systems for collecting, purifying, and delivering water, and removing wastewater. But growing economic, demographic, and climatic pressures are increasing concerns about water issues, leading to increasing competition for fixed water resources, giving rise to the concept of peak water.[73] As populations and economies continue to grow, consumption of water-thirsty meat expands, and new demands rise for biofuels or new water-intensive industries, new water challenges are likely.[74]
An assessment of water management in agriculture was conducted in 2007 by the International Water Management Institute in Sri Lanka to see if the world had sufficient water to provide food for its growing population.[75] It assessed the current availability of water for agriculture on a global scale and mapped out locations suffering from water scarcity. It found that a fifth of the world's people, more than 1.2 billion, live in areas of physical water scarcity, where there is not enough water to meet all demands. A further 1.6 billion people live in areas experiencing economic water scarcity, where the lack of investment in water or insufficient human capacity make it impossible for authorities to satisfy the demand for water. The report found that it would be possible to produce the food required in the future, but that continuation of today's food production and environmental trends would lead to crises in many parts of the world. To avoid a global water crisis, farmers will have to strive to increase productivity to meet growing demands for food, while industries and cities find ways to use water more efficiently.[76]

Water scarcity is also caused by production of water intensive products. For example, cotton: 1 kg of cotton—equivalent of a pair of jeans—requires 10.9 cubic meters (380 cu ft) water to produce. While cotton accounts for 2.4% of world water use, the water is consumed in regions that are already at a risk of water shortage. Significant environmental damage has been caused: for example, the diversion of water by the former Soviet Union from the Amu Darya and Syr Darya rivers to produce cotton was largely responsible for the disappearance of the Aral Sea.[77]

Yorum

Su kullanımı; bitki ve hayvanların da su gereksinimi olduğu bellidir, ayrıca onların korunma ve bakımında da su gereklidir, temizlik açısından da yer almaktadır. Bundan daha önemli suyun damlalık ile uygulanması yerine serbest tarlaya su salınımı arasında belirgin fark vardır.

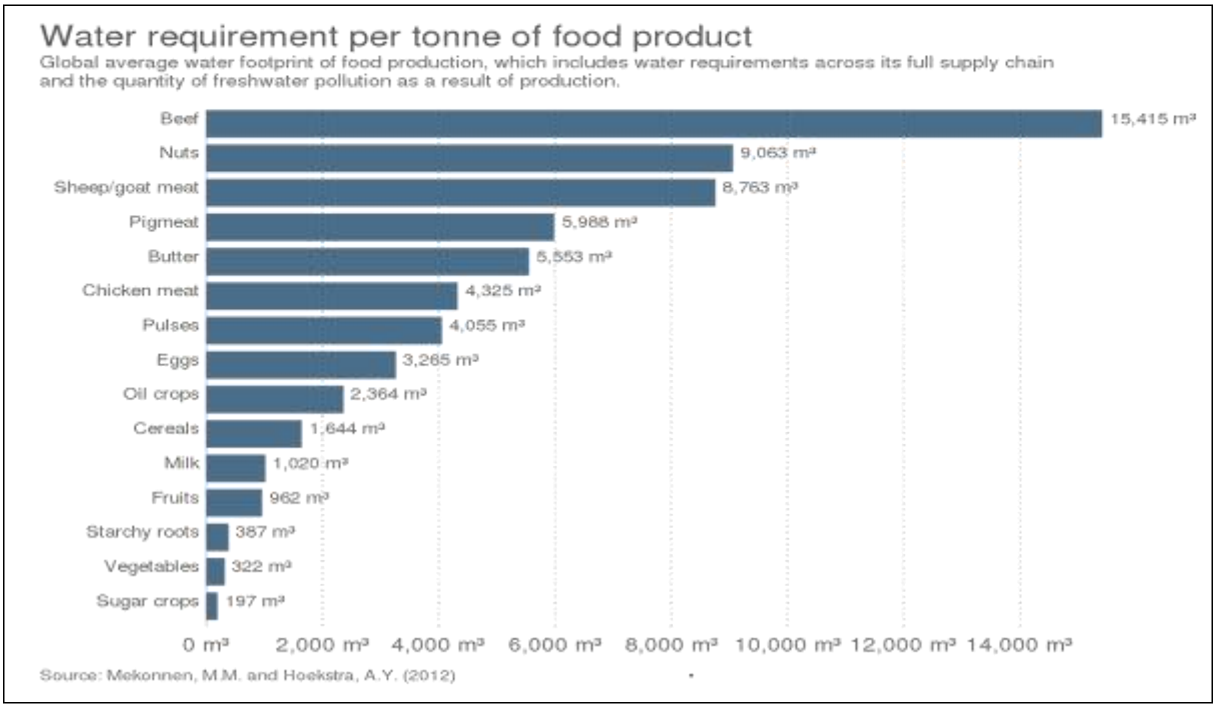
As a scientific standard

On 7 April 1795, the gram was defined in France to be equal to "the absolute weight of a volume of pure water equal to a cube of one-hundredth of a meter, and at the temperature of melting ice".[78] For practical purposes though, a metallic reference standard was required, one thousand times more massive, the kilogram. Work was therefore commissioned to determine precisely the mass of one liter of water. In spite of the fact that the decreed definition of the gram specified water at 0 °C (32 °F)—a highly reproducible *temperature*—the scientists chose to redefine the standard and to perform their measurements at the temperature of highest water *density*, which was measured at the time as 4 °C (39 °F).[79]
The Kelvin temperature scale of the SI system was based on the triple point of water, defined as exactly 273.16 K (0.01 °C; 32.02 °F), but as of May 2019 is based on the Boltzmann constant instead. The scale is an absolute temperature scale with the same increment as the Celsius temperature scale, which was originally defined according to the boiling point (set to 100 °C (212 °F)) and melting point (set to 0 °C (32 °F)) of water.
Natural water consists mainly of the isotopes hydrogen-1 and oxygen-16, but there is also a small quantity of heavier isotopes oxygen-18, oxygen-17, and hydrogen-2 (deuterium). The percentage of the heavier isotopes is very small, but it still affects the properties of water. Water from rivers and lakes tends to contain less heavy isotopes than seawater. Therefore, standard water is defined in the Vienna Standard Mean Ocean Water specification.

Yorum

Su hakkında sunulan boyutlar distile ve saf su ile ilintilidir, saf su olmayacağı için her su ve ortam değişmektedir. Deniz seviyesi üstünde de kaynama noktası düşüktür. Bu açıdan pratik gerçek ile teorik bilimsel farklı olmaktadır.

Ürün elde etmek için Suyun Kullanılması



Grafik/Şekil 4: Su kullanımı, ürün elde etmek için kullanılan su

Birçok nehrin yanında kuru ve çıplak arazilerin olması, tarım yerine suyun bir bakıma tarlaları yıkama işlemi yapılmaktadır.

Unutmamak gerekir ki, hayvancılık için bunları besleyecek bitkiler de yetiştirilmelidir.

For drinking
The human body contains from 55% to 78% water, depending on body size.[80] To function properly, the body requires between one and seven liters (0.22 and 1.54 imp gal; 0.26 and 1.85 U.S. gal)[citation needed] of water per day to avoid dehydration; the precise amount depends on the level of activity, temperature, humidity, and other factors. Most of this is ingested through foods or beverages other than drinking straight water. It is not clear how much water intake is needed by healthy people, though the British Dietetic Association advises that 2.5 liters of total water daily is the minimum to maintain proper hydration, including 1.8 liters (6 to 7 glasses) obtained directly from beverages.[81] Medical literature favors a lower consumption, typically 1 liter of water for an average male, excluding extra requirements due to fluid loss from exercise or warm weather.[82]
Healthy kidneys can excrete 0.8 to 1 liter of water per hour, but stress such as exercise can reduce this amount. People can drink far more water than necessary while exercising, putting them at risk of water intoxication (hyperhydration), which can be fatal.[83][84] The popular claim that "a person should consume eight glasses of water per day" seems to have no real basis in science.[85] Studies have shown that extra water intake, especially up to 500 milliliters (18 imp fl oz; 17 U.S. fl oz) at mealtime was associated with weight loss.[86][87][88][89][90][91] Adequate fluid intake is helpful in preventing constipation.[92]
An original recommendation for water intake in 1945 by the Food and Nutrition Board of the United States National Research Council read: "An ordinary standard for diverse persons is 1 milliliter for each calorie of food. Most of this quantity is contained in prepared foods."[93] The latest dietary reference intake report by the United States National Research Council in general recommended, based on the median total water intake from US survey data (including food sources): 3.7 liters (0.81 imp gal; 0.98 U.S. gal) for men and 2.7 liters (0.59 imp gal; 0.71 U.S. gal) of water total for women, noting that water contained in food provided approximately 19% of total water intake in the survey.[94]
Specifically, pregnant and breastfeeding women need additional fluids to stay hydrated. The Institute of Medicine (US) recommends that, on average, men consume 3 liters (0.66 imp gal; 0.79 U.S. gal) and women 2.2 liters (0.48 imp gal; 0.58 U.S. gal); pregnant women should increase intake to 2.4 liters (0.53 imp gal; 0.63 U.S. gal) and breastfeeding women should get 3 liters (12 cups), since an especially large amount of fluid is lost during nursing.[95] Also noted is that normally, about 20% of water intake comes from food, while the rest comes from drinking water and beverages (caffeinated included). Water is excreted from the body in multiple forms; through urine and feces, through sweating, and by exhalation of water vapor in the breath. With physical exertion and heat exposure, water loss will increase and daily fluid needs may increase as well.
Humans require water with few impurities. Common impurities include metal salts and oxides, including copper, iron, calcium and lead,[96] and/or harmful bacteria, such as *Vibrio*. Some solutes are acceptable and even desirable for taste enhancement and to provide needed electrolytes.[97]
The single largest (by volume) freshwater resource suitable for drinking is Lake Baikal in Siberia.[98]

Yorum

Belirli oranda sıvı gereksinimi, her bireyin bedeni ötesinde, yaşam hızı ve birçok faktör ile ilintilidir. Böbreğin sıvı dengesini ayarlaması ile bu sorun olmadığı görülmektedir. Dolayısıyla böbreklerin etkin ve verimli çalışması ile denge oluşmaktadır.

Su ile birlikte alınan elektrolitlerin önemi de belirgindir. Bunları miktar olarak alma ötesinde bir dengesi olduğu da bilinmelidir. Kalsiyum iki değerlikli ve tüm kasılmalar dahil, kemik yapısında da olur. Bu açıdan serbest elektrolit olarak, bir madde ile bağlı yanında kemikte bir çözülmez depo oluşturur. Hücre içinde ise Magnezyum, bunların yanında Fosfor ve Çinko, hatta çözülmemesi için Flor önemlidir. Kısaca fosfor ile kalsiyum birlikte ele alınmalıdır. Sonuçta bir su içindeki Na, K dışında diğerleri de bir dengede olmalıdır.

Tüm bunların yanında, genel listeden değil, hekimlik ve diyetisyenlerin etkin olması, hemşire boyutu da işin içine katılması gereklidir. Metabolizma boyutu ile de çoklu bir uzmanlık konusu olmaktadır.

Washing
The propensity of water to form solutions and emulsions is useful in various washing processes. Washing is also an important component of several aspects of personal body hygiene. Most of the personal water use is due to showering, doing the laundry and dishwashing, reaching hundreds of liters per day per person in developed countries.

Yorum

Birçok memlekette arabaların yıkanması daha önemli sarfiyat olarak ele alınmaktadır. Bir espri olarak, Amerika'da zenginin arabası yıkanır, fakirin arabasını ise yağmur yıkar denilir.

İnsanların yıkanması da farklıdır. Ülkemizde baş ve beden birliktedir, tümü yıkanır ve durulanır. Batı Ülkelerinde beden ayrı yıkanır ve sadece duş alınması yeterli görülür. Bazı yerlerde de küvete sabun/duş jeli konulur ve istirahat edilir, sonra da kurulanır, durulanma gerek duyulmaz. Bu açıdan kültürlere göre farklı yıkanma usulleri vardır. Bazı yerlerde ise sadece silinme yeterli görülmektedir.

Transportation
The use of water for transportation of materials through rivers and canals as well as the international shipping lanes is an important part of the world economy.

Yorum

Su yolu ile, gemiler ile seyahatin daha ucuz olması ve doğrudan hat üzerinde gidilmesi ile, tercih edilir. Bu açıdan ucuz ve etkin yol olarak yapılmaktadır. Bazı yerlerde yapılan kanalların da ekonomide etkin bir faydası olduğu açıktır.

Chemical uses

Water is widely used in chemical reactions as a solvent or reactant and less commonly as a solute or catalyst. In inorganic reactions, water is a common solvent, dissolving many ionic compounds, as well as other polar compounds such as ammonia and compounds closely related to water. In organic reactions, it is not usually used as a reaction solvent, because it does not dissolve the reactants well and is amphoteric (acidic *and* basic) and nucleophilic. Nevertheless, these properties are sometimes desirable. Also, acceleration of Diels-Alder reactions by water has been observed. Supercritical water has recently been a topic of research. Oxygen-saturated supercritical water combusts organic pollutants efficiently. Water vapor is used for some processes in the chemical industry. An example is the production of acrylic acid from acrolein, propylene and propane.[99][100][101][102] The possible effect of water in these reactions includes the physical-, chemical interaction of water with the catalyst and the chemical reaction of water with the reaction intermediates.

Yorum

Su, çözücü olarak en etkin ve kullanılabilir olmaktadır. Yağlı olanlar ve benzin içinde eriyenler farklıdır. Su, bi-fazik bir çekim gücü olması ile elektrostatik dinamik bir sıvıdır.

Durgun su içinde organik madde çürümesi ile oluşan amonyum oranı yaşamı tanımlamaktadır. Bir durgun su, örneğin akvaryumda, nitrit ve nitrat dengesi kurulduktan sonra sağlıklı olduğu söylenebilir. Amonyum ise öldürücüdür.

Su dengesi oluşmasında, putrefiye bakteri yerine yoğurt bakterilerinin durgun sularda, barajlarda önemli yeri vardır. Canlılığın 10-15 cm altında oluşması bu sayede oluşmaktadır.

Heat exchange

Water and steam are a common fluid used for heat exchange, due to its availability and high heat capacity, both for cooling and heating. Cool water may even be naturally available from a lake or the sea. It's especially effective to transport heat through vaporization and condensation of water because of its large latent heat of vaporization. A disadvantage is that metals commonly found in industries such as steel and copper are oxidized faster by untreated water and steam. In almost all thermal power stations, water is used as the working fluid (used in a closed-loop between boiler, steam turbine, and condenser), and the coolant (used to exchange the waste heat to a water body or carry it away by evaporation in a cooling tower). In the United States, cooling power plants is the largest use of water.[103]

In the nuclear power industry, water can also be used as a neutron moderator. In most nuclear reactors, water is both a coolant and a moderator. This provides something of a passive safety measure, as removing the water from the reactor also slows the nuclear reaction down. However other methods are favored for stopping a reaction and it is preferred to keep the nuclear core covered with water so as to ensure adequate cooling.

Yorum

Suyun bir özelliği de gerek nem gerek bitkiler ile bir sıcaklıkta etkileşim olmaktadır Ormanların daha serin olması, karbondioksiti çekmesi ile nem ve yağmur çekebilmektedir. Bu açıdan yeşillik nemi çeker, özellikle sabah nemi birçok böcek için önemlidir.

Fire considerations

Water has a high heat of vaporization and is relatively inert, which makes it a good fire extinguishing fluid. The evaporation of water carries heat away from the fire. It is dangerous to use water on fires involving oils and organic solvents because many organic materials float on water and the water tends to spread the burning liquid.

Use of water in fire fighting should also take into account the hazards of a steam explosion, which may occur when water is used on very hot fires in confined spaces, and of a hydrogen explosion, when substances which react with water, such as certain metals or hot carbon such as coal, charcoal, or coke graphite, decompose the water, producing water gas.

The power of such explosions was seen in the Chernobyl disaster, although the water involved did not come from fire-fighting at that time the reactor's own water cooling system. A steam explosion occurred when the extreme overheating of the core caused water to flash into steam. A hydrogen explosion may have occurred as a result of a reaction between steam and hot zirconium.

Some metallic oxides, most notably those of alkali metals and alkaline earth metals, produce so much heat on reaction with water that a fire hazard can develop. The alkaline earth oxide quicklime is a mass-produced substance that is often transported in paper bags. If these are soaked through, they may ignite as their contents react with water.[104]

Yorum

Su söndürücü olarak bazı kimyasallarda kullanılmaz. Ayrıca bazı teknik malzemeleri söndürmek için su kullanılması onları bozacaktır.

Su ile söndürülemeyecek olanlar mutlaka bilgilendirme ve yangın söndürücü olmalıdır. Her mutfakta tercih edilen, 6kg büyük ve özel yandın söndürücü olmalıdır, tercih toz değil, gazdır.

Recreation

Humans use water for many recreational purposes, as well as for exercising and for sports. Some of these include swimming, waterskiing, boating, surfing and diving. In addition, some sports, like ice hockey and ice skating, are played on ice. Lakesides, beaches and water parks are popular places for people to go to relax and enjoy recreation. Many find the sound and appearance of flowing water to be calming, and fountains and other water features are popular decorations. Some keep fish and other flora and fauna inside aquariums or ponds for show, fun, and companionship. Humans also use water for snow sports i.e. skiing, sledding, snowmobiling or snowboarding, which require the water to be frozen.

Yorum

Su, aynı zamanda sosyal açıdan da bir tatil ve dinlenme boyutudur. Bunların faydalanılması için, su kenarlarında özel tatil yerleri ve imkanlar yaratılmalıdır.

Dağlarda olan kar, buz, kayak ve diğer spor imkanları da dikkate alınmalıdır.

Water industry

The water industry provides drinking water and wastewater services (including sewage treatment) to households and industry. Water supply facilities include water wells, cisterns for rainwater harvesting, water supply networks, and water purification facilities, water tanks, water towers, water pipes including old aqueducts. Atmospheric water generators are in development.

Drinking water is often collected at springs, extracted from artificial borings (wells) in the ground, or pumped from lakes and rivers. Building more wells in adequate places is thus a possible way to produce more water, assuming the aquifers can supply an adequate flow. Other water sources include rainwater collection. Water may require purification for human consumption. This may involve the removal of undissolved substances, dissolved substances and harmful microbes. Popular methods are filtering with sand which only removes undissolved material, while chlorination and boiling kill harmful microbes. Distillation does all three functions. More advanced techniques exist, such as reverse osmosis. Desalination of abundant seawater is a more expensive solution used in coastal arid climates.

The distribution of drinking water is done through municipal water systems, tanker delivery or as bottled water. Governments in many countries have programs to distribute water to the needy at no charge.

Reducing usage by using drinking (potable) water only for human consumption is another option. In some cities such as Hong Kong, seawater is extensively used for flushing toilets citywide in order to conserve freshwater resources.

Polluting water may be the biggest single misuse of water; to the extent that a pollutant limits other uses of the water, it becomes a waste of the resource, regardless of benefits to the polluter. Like other types of pollution, this does not enter standard accounting of market costs, being conceived as externalities for which the market cannot account. Thus other people pay the price of water pollution, while the private firms' profits are not redistributed to the local population, victims of this pollution. Pharmaceuticals consumed by humans often end up in the waterways and can have detrimental effects on aquatic life if they bioaccumulate and if they are not biodegradable.

Municipal and industrial wastewater are typically treated at wastewater treatment plants. Mitigation of polluted surface runoff is addressed through a variety of prevention and treatment techniques. (*See* Surface runoff#Mitigation and treatment.)

Yorum

Yüzme havuzlarında klor yerine ozon kullanılmalı, bu şekilde birçok yerdeki plastik malzemenin bozulması önlenmektedir. Bunun ötesinde de ozon yine yüksek düzeyde değil, dozu azaltılacak şekilde olmalıdır.

Industrial applications

Many industrial processes rely on reactions using chemicals dissolved in water, suspension of solids in water slurries or using water to dissolve and extract substances, or to wash products or process equipment. Processes such as mining, chemical pulping, pulp bleaching, paper manufacturing, textile production, dyeing, printing, and cooling of power plants use large amounts of water, requiring a dedicated water source, and often cause significant water pollution.

Water is used in power generation. Hydroelectricity is electricity obtained from hydropower. Hydroelectric power comes from water driving a water turbine connected to a generator. Hydroelectricity is a low-cost, non-polluting, renewable energy source. The energy is supplied by the motion of water. Typically a dam is constructed on a river, creating an artificial lake behind it. Water flowing out of the lake is forced through turbines that turn generators.

Pressurized water is used in water blasting and water jet cutters. Also, high pressure water guns are used for precise cutting. It works very well, is relatively safe, and is not harmful to the environment. It is also used in the cooling of machinery to prevent overheating, or prevent saw blades from overheating.

Water is also used in many industrial processes and machines, such as the steam turbine and heat exchanger, in addition to its use as a chemical solvent. Discharge of untreated water from industrial uses is pollution. Pollution includes discharged solutes (chemical pollution) and discharged coolant water (thermal pollution). Industry requires pure water for many applications and utilizes a variety of purification techniques both in water supply and discharge.

Yorum

Su, olan yerlerde yaşam olacaktır.

Su ayrıca endüstride ilk kullanılan güç, su buharı olmuştur. Bu yine farklı boyutlarda kullanılmaktadır.

Food processing

Boiling, steaming, and simmering are popular cooking methods that often require immersing food in water or its gaseous state, steam.[105] Water is also used for dishwashing. Water also plays many critical roles within the field of food science.

Solutes such as salts and sugars found in water affect the physical properties of water. The boiling and freezing points of water are affected by solutes, as well as air pressure, which is in turn affected by altitude. Water boils at lower temperatures with the lower air pressure that occurs at higher elevations. One mole of sucrose (sugar) per kilogram of water raises the boiling point of water by 0.51 °C (0.918 °F), and one mole of salt per kg raises the boiling point by 1.02 °C (1.836 °F); similarly, increasing the number of dissolved particles lowers water's freezing point.[106]

Solutes in water also affect water activity that affects many chemical reactions and the growth of microbes in food.[107] Water activity can be described as a ratio of the vapor pressure of water in a solution to the vapor pressure of pure water.[106] Solutes in water lower water activity—this is important to know because most bacterial growth ceases at low levels of water activity.[107] Not only does microbial growth affect the safety of food, but also the preservation and shelf life of food.

Water hardness is also a critical factor in food processing and may be altered or treated by using a chemical ion exchange system. It can dramatically affect the quality of a product, as well as playing a role in sanitation. Water hardness is classified based on concentration of calcium carbonate the water contains. Water is classified as soft if it contains less than 100 mg/l (UK)[108] or less than 60 mg/l (US).[109]

According to a report published by the Water Footprint organization in 2010, a single kilogram of beef requires 15 thousand liters (3.3×10^3 imp gal; 4.0×10^3 U.S. gal) of water; however, the authors also make clear that this is a global average and circumstantial factors determine the amount of water used in beef production.[110]

Yorum

Tuzlu veya şekerli suyun özellikleri değişmektedir. Bu açıdan su ile birlikte bazı eşyaların, tıbbi malzemelerin sterilize edilmesi, yiyeceklerin konserve olması gibi birçok işlerde kullanılmaktadır. Bu açıdan dikkat edilecek, su ve maddenin birlikte uyum içinde olacağı ve buna göre yapılanma gerekir.

Konserve yaparken uzun süre yüksek ısıda tutulması, sporlu bakterileri öldürmekte ve bozulmayı önlemektedir. Turşu yaptıktan sonra da bozulma değil, işlemin biyolojik olarak durması için kapalı, basınçlı sistem faydalı olmaktadır.

Medical use

Water for injection is on the World Health Organization's list of essential medicines.[111]

Distribution in nature

In the universe

Much of the universe's water is produced as a byproduct of star formation. The formation of stars is accompanied by a strong outward wind of gas and dust. When this outflow of material eventually impacts the surrounding gas, the shock waves that are created compress and heat the gas. The water observed is quickly produced in this warm dense gas.[113]

On 22 July 2011, a report described the discovery of a gigantic cloud of water vapor containing "140 trillion times more water than all of Earth's oceans combined" around a quasar located 12 billion light years from Earth. According to the researchers, the "discovery shows that water has been prevalent in the universe for nearly its entire existence".[114][115]

Water has been detected in interstellar clouds within our galaxy, the Milky Way.[116] Water probably exists in abundance in other galaxies, too, because its components, hydrogen, and oxygen, are among the most abundant elements in the universe. Based on models of the formation and evolution of the Solar System and that of other star systems, most other planetary systems are likely to have similar ingredients.

Yorum

İçecek suyun şişe sularında olan kapaklara göre ayırımı yapılmaktadır.

Su, bizim Dünyamız dışında da vardır. Birçok yıldızda su, sıcak nedeni ile buhar şeklinde gözlenmektedir.

Water vapor

Water is present as vapor in:

- Atmosphere of the Sun: in detectable trace amounts[117]
- Atmosphere of Mercury: 3.4%, and large amounts of water in Mercury's exosphere[118]
- Atmosphere of Venus: 0.002%[119]
- Earth's atmosphere: ≈0.40% over full atmosphere, typically 1–4% at surface; as well as that of the Moon in trace amounts[120]
- Atmosphere of Mars: 0.03%[121]
- Atmosphere of Ceres[122]
- Atmosphere of Jupiter: 0.0004%[123] – in ices only; and that of its moon Europa[124]
- Atmosphere of Saturn – in ices only; Enceladus: 91%[125] and Dione (exosphere)[citation needed]
- Atmosphere of Uranus – in trace amounts below 50 bar
- Atmosphere of Neptune – found in the deeper layers[126]
- Extrasolar planet atmospheres: including those of HD 189733 b[127] and HD 209458 b,[128] Tau Boötis b,[129] HAT-P-11b,[130][131] XO-1b, WASP-12b, WASP-17b, and WASP-19b.[132]
- Stellar atmospheres: not limited to cooler stars and even detected in giant hot stars such as Betelgeuse, Mu Cephei, Antares and Arcturus.[131][133]

- Circumstellar disks: including those of more than half of T Tauri stars such as AA Tauri[131] as well as TW Hydrae,[134][135] IRC +10216[136] and APM 08279+5255,[114][115] VY Canis Majoris and S Persei.[133]

Yorum

Yıldızların atmosferinde su vardır ama canlı olduğuna dair bir kanıt yoktur, yalnız Dünya boyutunda eklemesi ile yaşanabilir boyutlardan söz edilebilir, bir genetik canlı gitmedikçe onlarda yaşam beklenmez. Bizden geçiş olmalıdır.

Liquid water

Liquid water is present on Earth, covering 71% of its surface.[3] Liquid water is also occasionally present in small amounts on Mars.[137] Scientists believe liquid water is present in the Saturnian moons of Enceladus, as a 10-kilometre thick ocean approximately 30–40 kilometres below Enceladus' south polar surface,[138][139] and Titan, as a subsurface layer, possibly mixed with ammonia.[140] Jupiter's moon Europa has surface characteristics which suggest a subsurface liquid water ocean.[141] Liquid water may also exist on Jupiter's moon Ganymede as a layer sandwiched between high pressure ice and rock.[142]

Yorum

Bazı uydularda da su sıvı olarak gözlenmektedir, Mars gibi olanlarda da daha derinde gizlendiği, yüzeyde ise jeolojik olarak su aşınması görülmektedir.

Water ice

- Mars: under the regolith and at the poles.[143][144]
- Earth–Moon system: mainly as ice sheets on Earth and in Lunar craters and volcanic rocks[145] NASA reported the detection of water molecules by NASA's Moon Mineralogy Mapper aboard the Indian Space Research Organization's Chandrayaan-1 spacecraft in September 2009.[146]
- Ceres[147][148][149]
- Jupiter's moons: Europa's surface and also that of Ganymede[150] and Callisto[151][152]
- Saturn: in the planet's ring system[153] and on the surface and mantle of Titan[154] and Enceladus[155]
- Pluto–Charon system[153]
- Comets[156][157] and other related Kuiper belt and Oort cloud objects[158]

And is also likely present on:

- Mercury's poles[159]
- Tethys[160]

Yorum

Buz da donmuş su, yine bir su varlığı, yaşanabilecek ortamdan söz edilebilir.

Exotic forms

Water and other volatiles probably comprise much of the internal structures of Uranus and Neptune and the water in the deeper layers may be in the form of ionic water in which the molecules break down into a soup of hydrogen and oxygen ions, and deeper still as superionic water in which the oxygen crystallises but the hydrogen ions float about freely within the oxygen lattice.[161]

Yorum

Su moleküllerinin iyon şeklinde de olması gözlenmiştir.

Water and planetary habitability

The existence of liquid water, and to a lesser extent its gaseous and solid forms, on Earth are vital to the existence of life on Earth as we know it. The Earth is located in the habitable zone of the Solar System; if it were slightly closer to or farther from the Sun (about 5%, or about 8 million kilometers), the conditions which allow the three forms to be present simultaneously would be far less likely to exist.[162][163]

Earth's gravity allows it to hold an atmosphere. Water vapor and carbon dioxide in the atmosphere provide a temperature buffer (greenhouse effect) which helps maintain a relatively steady surface temperature. If Earth were smaller, a thinner atmosphere would allow temperature extremes, thus preventing the accumulation of water except in polar ice caps (as on Mars).[*citation needed*]

The surface temperature of Earth has been relatively constant through geologic time despite varying levels of incoming solar radiation (insolation), indicating that a dynamic process governs Earth's temperature via a combination of greenhouse gases and surface or atmospheric albedo. This proposal is known as the Gaia hypothesis.[*citation needed*]

The state of water on a planet depends on ambient pressure, which is determined by the planet's gravity. If a planet is sufficiently massive, the water on it may be solid even at high temperatures, because of the high pressure caused by gravity, as it was observed on exoplanets Gliese 436 b[164] and GJ 1214 b.[165]

Law, politics, and crisis

Water politics is politics affected by water and water resources. For this reason, water is a strategic resource in the globe and an important element in many political conflicts. It causes health impacts and damage to biodiversity.

Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation.[166] However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability.[167] A report, issued in November 2009, suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%.[168]

1.6 billion people have gained access to a safe water source since 1990.[169] The proportion of people in developing countries with access to safe water is calculated to have improved from 30% in 1970[170] to 71% in 1990, 79% in 2000 and 84% in 2004.[166]

A 2006 United Nations report stated that "there is enough water for everyone", but that access to it is hampered by mismanagement and corruption.[171] In addition, global initiatives to improve the efficiency of aid delivery, such as the Paris Declaration on Aid Effectiveness, have not been taken up by water sector donors as effectively as they have in education and health, potentially leaving multiple donors working on overlapping projects and recipient governments without empowerment to act.[172]
The authors of the 2007 Comprehensive Assessment of Water Management in Agriculture cited poor governance as one reason for some forms of water scarcity. Water governance is the set of formal and informal processes through which decisions related to water management are made. Good water governance is primarily about knowing what processes work best in a particular physical and socioeconomic context. Mistakes have sometimes been made by trying to apply 'blueprints' that work in the developed world to developing world locations and contexts. The Mekong river is one example; a review by the International Water Management Institute of policies in six countries that rely on the Mekong river for water found that thorough and transparent cost-benefit analyses and environmental impact assessments were rarely undertaken. They also discovered that Cambodia's draft water law was much more complex than it needed to be.[173]
The UN World Water Development Report (WWDR, 2003) from the World Water Assessment Program indicates that, in the next 20 years, the quantity of water available to everyone is predicted to decrease by 30%. 40% of the world's inhabitants currently have insufficient fresh water for minimal hygiene. More than 2.2 million people died in 2000 from waterborne diseases (related to the consumption of contaminated water) or drought. In 2004, the UK charity WaterAid reported that a child dies every 15 seconds from easily preventable water-related diseases; often this means lack of sewage disposal.[citation needed]
Organizations concerned with water protection include the International Water Association (IWA), WaterAid, Water 1st, and the American Water Resources Association. The International Water Management Institute undertakes projects with the aim of using effective water management to reduce poverty. Water related conventions are United Nations Convention to Combat Desertification (UNCCD), International Convention for the Prevention of Pollution from Ships, United Nations Convention on the Law of the Sea and Ramsar Convention. World Day for Water takes place on 22 March[174] and World Oceans Day on 8 June.[175]
In culture

Yorum

Su, toplum, tutumlar ve medeniyet açısından çok önemli olduğu giderek artmaktadır.

Art and activism
Painter and activist Fredericka Foster curated *The Value of Water*, at the Cathedral of St. John the Divine in New York City,[182] which anchored a year long initiative by the Cathedral on our dependence on water.[183][184] The largest exhibition to ever appear at the Cathedral,[185] it featured over forty artists, including Jenny Holzer, Robert Longo, Mark Rothko, William Kentridge, April Gornik, Kiki Smith, Pat Steir, William Kentridge, Alice Dalton Brown, Teresita Fernandez and Bill Viola.[186][187] The Think About Water water advocacy website was created by Foster to highlight artists who use water as their subject or medium.
Dihydrogen monoxide parody
Water's technically correct but rarely used chemical name, "dihydrogen monoxide", has been used in a series of hoaxes and pranks that mock scientific illiteracy. This began in 1983, when an April Fools' Day article appeared in a newspaper in Durand, Michigan. The false story consisted of safety concerns about the substance.[188]

Yorum

Su birçok sanatsal eserde konu edilmektedir. Ayrıca hemen her doğa fotoğrafında arka planda bir su, şelale veya çeşme vardır. Ayrıca çeşmelere dilek atarak bir kutsallık kazandırılmaktadır. Bu paralar aynı zamanda önemli gelir kaynağı da olduğu unutulmamalıdır.

Kısaca su resim ve sanat boyutunda da önemli bir detaydır.

Bazı uzay hikayelerinde gizli bir boyut kazandırmak için, *di-hidrojen monoksit* denilmesi de ayrı bir özellik katmaktadır.

Properties of water. Wikipedia[3]

Water (H_2O) is a polar inorganic compound that is at room temperature a tasteless and odorless liquid, which is nearly colorless apart from an inherent hint of blue. It is by far the most studied chemical compound[18] and is described as the "universal solvent"[19] and the "solvent of life."[20] It is the most abundant substance on the surface of Earth[21] and the only common substance to exist as a solid, liquid, and gas on Earth's surface.[22] It is also the third most abundant molecule in the universe (behind molecular hydrogen and carbon monoxide).[21]
Water molecules form hydrogen bonds with each other and are strongly polar. This polarity allows it to dissociate ions in salts and bond to other polar substances such as alcohols and acids, thus dissolving them. Its hydrogen bonding causes its many unique properties, such as having a solid form less dense than its liquid form,[c] a relatively high boiling point of 100 °C for its molar mass, and a high heat capacity.
Water is amphoteric, meaning that it can exhibit properties of an acid or a base, depending on the pH of the solution that it is in; it readily produces both H^+ and OH^- ions.[c] Related to its amphoteric character, it undergoes self-ionization. The product of the activities, or approximately, the concentrations of H^+ and OH^- is a constant, so their respective concentrations are inversely proportional to each other.[23]
Physical properties
Water is the chemical substance with chemical formula H_2O; one molecule of water has two hydrogen atoms covalently bonded to a single oxygen atom.[24] Water is a tasteless, odorless liquid at ambient temperature and pressure. Liquid water has weak absorption bands at wavelengths of around 750 nm which cause it to appear to have a blue colour.[3] This can easily be observed in a water-filled bath or wash-basin whose lining is white. Large ice crystals, as in glaciers, also appear blue.

Under standard conditions, water is primarily a liquid, unlike other analogous hydrides of the oxygen family, which are generally gaseous. This unique property of water is due to hydrogen bonding. The molecules of water are constantly moving concerning each other, and the hydrogen bonds are continually breaking and reforming at timescales faster than 200 femtoseconds (2×10^{-13} seconds).[25] However, these bonds are strong enough to create many of the peculiar properties of water, some of which make it integral to life.

Water, ice, and vapour

Within the Earth's atmosphere and surface, the liquid phase is the most common and is the form that is generally denoted by the word "water". The solid phase of water is known as ice and commonly takes the structure of hard, amalgamated crystals, such as ice cubes, or loosely accumulated granular crystals, like snow. Aside from common hexagonal crystalline ice, other crystalline and amorphous phases of ice are known. The gaseous phase of water is known as water vapor (or steam). Visible steam and clouds are formed from minute droplets of water suspended in the air.

Water also forms a supercritical fluid. The critical temperature is 647 K and the critical pressure is 22.064 MPa. In nature this only rarely occurs in extremely hostile conditions. A likely example of naturally occurring supercritical water is in the hottest parts of deep water hydrothermal vents, in which water is heated to the critical temperature by volcanic plumes and the critical pressure is caused by the weight of the ocean at the extreme depths where the vents are located. This pressure is reached at a depth of about 2200 meters: much less than the mean depth of the ocean (3800 meters).[26]

Heat capacity and heats of vaporization and fusion

Water has a very high specific heat capacity of 4184 J/(kg·K) at 25 °C – the second-highest among all the heteroatomic species (after ammonia), as well as a high heat of vaporization (40.65 kJ/mol or 2257 kJ/kg at the normal boiling point), both of which are a result of the extensive hydrogen bonding between its molecules. These two unusual properties allow water to moderate Earth's climate by buffering large fluctuations in temperature. Most of the additional energy stored in the climate system since 1970 has accumulated in the oceans.[27]

The specific enthalpy of fusion (more commonly known as latent heat) of water is 333.55 kJ/kg at 0 °C: the same amount of energy is required to melt ice as to warm ice from −160 °C up to its melting point or to heat the same amount of water by about 80 °C. Of common substances, only that of ammonia is higher. This property confers resistance to melting on the ice of glaciers and drift ice. Before and since the advent of mechanical refrigeration, ice was and still is in common use for retarding food spoilage.

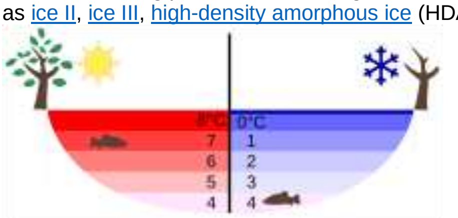
The specific heat capacity of ice at −10 °C is 2030 J/(kg·K)[28] and the heat capacity of steam at 100 °C is 2080 J/(kg·K).[29]

Density of water and ice

The density of water is about 1 gram per cubic centimetre (62 lb/cu ft): this relationship was originally used to define the gram.[30] The density varies with temperature, but not linearly: as the temperature increases, the density rises to a peak at 3.98 °C (39.16 °F) and then decreases;[31] this is unusual.[d] Regular, hexagonal ice is also less dense than liquid water—upon freezing, the density of water decreases by about 9%.[34][e]

These effects are due to the reduction of thermal motion with cooling, which allows water molecules to form more hydrogen bonds that prevent the molecules from coming close to each other.[31] While below 4 °C the breakage of hydrogen bonds due to heating allows water molecules to pack closer despite the increase in the thermal motion (which tends to expand a liquid), above 4 °C water expands as the temperature increases.[31] Water near the boiling point is about 4% less dense than water at 4 °C (39 °F).[34][f]

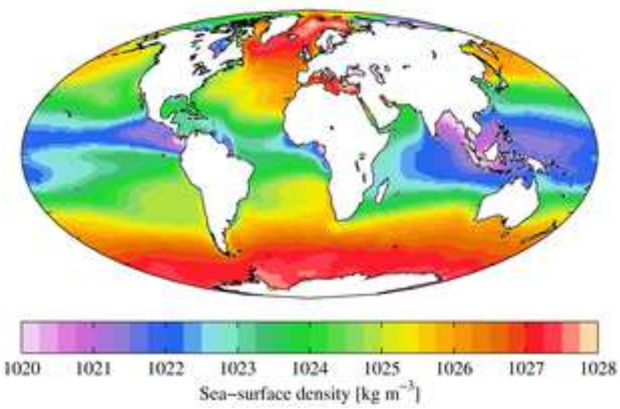
Under increasing pressure, ice undergoes a number of transitions to other polymorphs with higher density than liquid water, such as ice II, ice III, high-density amorphous ice (HDA), and very-high-density amorphous ice (VHDA).[35][36]



Temperature distribution in a lake in summer and winter

The unusual density curve and lower density of ice than of water is vital to life—if water were most dense at the freezing point, then in winter the very cold water at the surface of lakes and other water bodies would sink, lakes could freeze from the bottom up, and all life in them would be killed.[34] Furthermore, given that water is a good thermal insulator (due to its heat capacity), some frozen lakes might not completely thaw in summer.[34] The layer of ice that floats on top insulates the water below.[37] Water at about 4 °C (39 °F) also sinks to the bottom, thus keeping the temperature of the water at the bottom constant (see diagram).[34]

Density of saltwater and ice



WOA surface density

The density of saltwater depends on the dissolved salt content as well as the temperature. Ice still floats in the oceans, otherwise, they would freeze from the bottom up. However, the salt content of oceans lowers the freezing point by about 1.9 °C[38] (see here for explanation) and lowers the temperature of the density maximum of water to the former freezing point at

0 °C. This is why, in ocean water, the downward convection of colder water is *not* blocked by an expansion of water as it becomes colder near the freezing point. The oceans' cold water near the freezing point continues to sink. So creatures that live at the bottom of cold oceans like the Arctic Ocean generally live in water 4 °C colder than at the bottom of frozen-over fresh water lakes and rivers.
As the surface of saltwater begins to freeze (at −1.9 °C[38] for normal salinity seawater, 3.5%) the ice that forms is essentially salt-free, with about the same density as freshwater ice. This ice floats on the surface, and the salt that is "frozen out" adds to the salinity and density of the seawater just below it, in a process known as *brine rejection*. This denser saltwater sinks by convection and the replacing seawater is subject to the same process. This produces essentially freshwater ice at −1.9 °C[38] on the surface. The increased density of the seawater beneath the forming ice causes it to sink towards the bottom. On a large scale, the process of brine rejection and sinking cold salty water results in ocean currents forming to transport such water away from the Poles, leading to a global system of currents called the thermohaline circulation.

Yorum

Suyun tuz ve ısı durumuna göre fiziksel özellikleri farklı olmaktadır, bu bir dinamizm geçirmektedir. Elektron yapısı dinamizm ile esnekliğin aktif olduğu açıktır.
Soğuk su en altta artı4 derece ile balıklar yaşamaktadır. Çok sıcak ortamda da üst ve alt bölgede farklı ısı, iç dalga ile sıcaklık alta inmez. Bu açıdan alt zeminin sıcaklık görmesi, ilk bahar ve sonbaharda olmaktadır.

Miscibility and condensation
Water is miscible with many liquids, including ethanol in all proportions. Water and most oils are immiscible usually forming layers according to increasing density from the top. This can be predicted by comparing the polarity. Water being a relatively polar compound will tend to be miscible with liquids of high polarity such as ethanol and acetone, whereas compounds with low polarity will tend to be immiscible and poorly soluble such as with hydrocarbons.
As a gas, water vapor is completely miscible with air. On the other hand, the maximum water vapor pressure that is thermodynamically stable with the liquid (or solid) at a given temperature is relatively low compared with total atmospheric pressure. For example, if the vapor's partial pressure is 2% of atmospheric pressure and the air is cooled from 25 °C, starting at about 22 °C water will start to condense, defining the dew point, and creating fog or dew. The reverse process accounts for the fog burning off in the morning. If the humidity is increased at room temperature, for example, by running a hot shower or a bath, and the temperature stays about the same, the vapor soon reaches the pressure for phase change and then condenses out as minute water droplets, commonly referred to as steam.
A saturated gas or one with 100% relative humidity is when the vapor pressure of water in the air is at equilibrium with vapor pressure due to (liquid) water; water (or ice, if cool enough) will fail to lose mass through evaporation when exposed to saturated air. Because the amount of water vapor in the air is small, relative humidity, the ratio of the partial pressure due to the water vapor to the saturated partial vapor pressure, is much more useful. Vapor pressure above 100% relative humidity is called super-saturated and can occur if the air is rapidly cooled, for example, by rising suddenly in an updraft.[g]
Vapor pressure
Compressibility
The compressibility of water is a function of pressure and temperature. At 0 °C, at the limit of zero pressure, the compressibility is 5.1×10^{-10} Pa^{-1}. At the zero-pressure limit, the compressibility reaches a minimum of 4.4×10^{-10} Pa^{-1} around 45 °C before increasing again with increasing temperature. As the pressure is increased, the compressibility decreases, being 3.9×10^{-10} Pa^{-1} at 0 °C and 100 megapascals (1,000 bar).[39]
The bulk modulus of water is about 2.2 GPa.[40] The low compressibility of non-gases, and of water in particular, leads to their often being assumed as incompressible. The low compressibility of water means that even in the deep oceans at 4 km depth, where pressures are 40 MPa, there is only a 1.8% decrease in volume.[40]
The bulk modulus of water ice ranges from 11.3 GPa at 0 K up to 8.6 GPa at 273 K.[41] The large change in the compressibility of ice as a function of temperature is the result of its relatively large thermal expansion coefficient compared to other common solids.
Triple point
The temperature and pressure at which ordinary solid, liquid, and gaseous water coexist in equilibrium is a triple point of water. Since 1954, this point had been used to define the base unit of temperature, the kelvin[42][43] but, starting in 2019, the kelvin is now defined using the Boltzmann constant, rather than the triple point of water.[44]
Due to the existence of many polymorphs (forms) of ice, water has other triple points, which have either three polymorphs of ice or two polymorphs of ice and liquid in equilibrium.[43] Gustav Heinrich Johann Apollon Tammann in Göttingen produced data on several other triple points in the early 20th century. Kamb and others documented further triple points in the 1960s.[45][46][47]
Melting point
The melting point of ice is 0 °C (32 °F; 273 K) at standard pressure; however, pure liquid water can be supercooled well below that temperature without freezing if the liquid is not mechanically disturbed. It can remain in a fluid state down to its homogeneous nucleation point of about 231 K (−42 °C; −44 °F).[49] The melting point of ordinary hexagonal ice falls slightly under moderately high pressures, by 0.0073 °C (0.0131 °F)/atm[h] or about 0.5 °C (0.90 °F)/70 atm[i][50] as the stabilization energy of hydrogen bonding is exceeded by intermolecular repulsion, but as ice transforms into its polymorphs (see crystalline states of ice) above 209.9 MPa (2,072 atm), the melting point increases markedly with pressure, i.e., reaching 355 K (82 °C) at 2.216 GPa (21,870 atm) (triple point of Ice VII[51]).
Electrical properties
Electrical conductivity
Pure water containing no exogenous ions is an excellent insulator, but not even "deionized" water is completely free of ions. Water undergoes auto-ionization in the liquid state when two water molecules form one hydroxide anion (OH^-) and one hydronium cation (H_3O^+).
Because water is such a good solvent, it almost always has some solute dissolved in it, often a salt. If water has even a tiny amount of such an impurity, then the ions can carry charges back and forth, allowing the water to conduct electricity far more readily.
It is known that the theoretical maximum electrical resistivity for water is approximately 18.2 MΩ·cm (182 kΩ·m) at 25 °C.[52] This figure agrees well with what is typically seen on reverse osmosis, ultra-filtered and deionized ultra-pure water systems used, for

instance, in semiconductor manufacturing plants. A salt or acid contaminant level exceeding even 100 parts per trillion (ppt) in otherwise ultra-pure water begins to noticeably lower its resistivity by up to several kΩ·m.[citation needed]
In pure water, sensitive equipment can detect a very slight electrical conductivity of 0.05501 ± 0.0001 μS/cm at 25.00 °C.[52] Water can also be electrolyzed into oxygen and hydrogen gases but in the absence of dissolved ions this is a very slow process, as very little current is conducted. In ice, the primary charge carriers are protons (see proton conductor).[53] Ice was previously thought to have a small but measurable conductivity of 1×10^{-10} S/cm, but this conductivity is now thought to be almost entirely from surface defects, and without those, ice is an insulator with an immeasurably small conductivity.[31]

Polarity and hydrogen bonding

An important feature of water is its polar nature. The structure has a bent molecular geometry for the two hydrogens from the oxygen vertex. The oxygen atom also has two lone pairs of electrons. One effect usually ascribed to the lone pairs is that the H–O–H gas-phase bend angle is 104.48°,[54] which is smaller than the typical tetrahedral angle of 109.47°. The lone pairs are closer to the oxygen atom than the electrons sigma bonded to the hydrogens, so they require more space. The increased repulsion of the lone pairs forces the O–H bonds closer to each other. [55]
Another consequence of its structure is that water is a polar molecule. Due to the difference in electronegativity, a bond dipole moment points from each H to the O, making the oxygen partially negative and each hydrogen partially positive. A large molecular dipole, points from a region between the two hydrogen atoms to the oxygen atom. The charge differences cause water molecules to aggregate (the relatively positive areas being attracted to the relatively negative areas). This attraction, hydrogen bonding, explains many of the properties of water, such as its solvent properties.[56]
Although hydrogen bonding is a relatively weak attraction compared to the covalent bonds within the water molecule itself, it is responsible for several of the water's physical properties. These properties include its relatively high melting and boiling point temperatures: more energy is required to break the hydrogen bonds between water molecules. In contrast, hydrogen sulfide (H_2S), has much weaker hydrogen bonding due to sulfur's lower electronegativity. H_2S is a gas at room temperature, despite hydrogen sulfide having nearly twice the molar mass of water. The extra bonding between water molecules also gives liquid water a large specific heat capacity. This high heat capacity makes water a good heat storage medium (coolant) and heat shield.

Cohesion and adhesion

Water molecules stay close to each other (cohesion), due to the collective action of hydrogen bonds between water molecules. These hydrogen bonds are constantly breaking, with new bonds being formed with different water molecules; but at any given time in a sample of liquid water, a large portion of the molecules are held together by such bonds.[57]
Water also has high adhesion properties because of its polar nature. On clean, smooth glass the water may form a thin film because the molecular forces between glass and water molecules (adhesive forces) are stronger than the cohesive forces.[citation needed] In biological cells and organelles, water is in contact with membrane and protein surfaces that are hydrophilic; that is, surfaces that have a strong attraction to water. Irving Langmuir observed a strong repulsive force between hydrophilic surfaces. To dehydrate hydrophilic surfaces—to remove the strongly held layers of water of hydration—requires doing substantial work against these forces, called hydration forces. These forces are very large but decrease rapidly over a nanometer or less.[58] They are important in biology, particularly when cells are dehydrated by exposure to dry atmospheres or to extracellular freezing.[59]

Surface tension

Water has an unusually high surface tension of 71.99 mN/m at 25 °C[60] which is caused by the strength of the hydrogen bonding between water molecules.[61] This allows insects to walk on water.[61]

Capillary action

Because water has strong cohesive and adhesive forces, it exhibits capillary action.[62] Strong cohesion from hydrogen bonding and adhesion allows trees to transport water more than 100 m upward.[61]

Water as a solvent

Presence of colloidal calcium carbonate from high concentrations of dissolved lime turns the water of Havasu Falls turquoise.
Water is an excellent solvent due to its high dielectric constant.[63] Substances that mix well and dissolve in water are known as hydrophilic ("water-loving") substances, while those that do not mix well with water are known as hydrophobic ("water-fearing") substances.[64] The ability of a substance to dissolve in water is determined by whether or not the substance can match or better the strong attractive forces that water molecules generate between other water molecules. If a substance has properties that do not allow it to overcome these strong intermolecular forces, the molecules are precipitated out from the water. Contrary to the common misconception, water and hydrophobic substances do not "repel", and the hydration of a hydrophobic surface is energetically, but not entropically, favorable.
When an ionic or polar compound enters water, it is surrounded by water molecules (hydration). The relatively small size of water molecules (~ 3 angstroms) allows many water molecules to surround one molecule of solute. The partially negative dipole ends of the water are attracted to positively charged components of the solute, and vice versa for the positive dipole ends.
In general, ionic and polar substances such as acids, alcohols, and salts are relatively soluble in water, and non-polar substances such as fats and oils are not. Non-polar molecules stay together in water because it is energetically more favorable for the water molecules to hydrogen bond to each other than to engage in van der Waals interactions with non-polar molecules.
An example of an ionic solute is table salt; the sodium chloride, NaCl, separates into Na^+ cations and Cl^- anions, each being surrounded by water molecules. The ions are then easily transported away from their crystalline lattice into solution. An example of a nonionic solute is table sugar. The water dipoles make hydrogen bonds with the polar regions of the sugar molecule (OH groups) and allow it to be carried away into solution.

Quantum tunneling

The quantum tunneling dynamics in water was reported as early as 1992. At that time it was known that there are motions which destroy and regenerate the weak hydrogen bond by internal rotations of the substituent water monomers.[65] On 18 March 2016, it was reported that the hydrogen bond can be broken by quantum tunneling in the water hexamer. Unlike previously reported tunneling motions in water, this involved the concerted breaking of two hydrogen bonds.[66] Later in the same year, the discovery of the quantum tunneling of water molecules was reported.[67]

Electromagnetic absorption

Water is relatively transparent to visible light, near ultraviolet light, and far-red light, but it absorbs most ultraviolet light, infrared light, and microwaves. Most photoreceptors and photosynthetic pigments utilize the portion of the light spectrum that is transmitted well through water. Microwave ovens take advantage of water's opacity to microwave radiation to heat the water inside of foods. Water's light blue colour is caused by weak absorption in the red part of the visible spectrum.[3][68]
Structure
A single water molecule can participate in a maximum of four hydrogen bonds because it can accept two bonds using the lone pairs on oxygen and donate two hydrogen atoms. Other molecules like hydrogen fluoride, ammonia, and methanol can also form

hydrogen bonds. However, they do not show anomalous thermodynamic, kinetic or structural properties like those observed in water because none of them can form four hydrogen bonds: either they cannot donate or accept hydrogen atoms, or there are steric effects in bulky residues. In water, intermolecular tetrahedral structures form due to the four hydrogen bonds, thereby forming an open structure and a three-dimensional bonding network, resulting in the anomalous decrease in density when cooled below 4 °C. This repeated, constantly reorganizing unit defines a three-dimensional network extending throughout the liquid. This view is based upon neutron scattering studies and computer simulations, and it makes sense in the light of the unambiguously tetrahedral arrangement of water molecules in ice structures.

However, there is an alternative theory for the structure of water. In 2004, a controversial paper from Stockholm University suggested that water molecules in the liquid state typically bind not to four but only two others; thus forming chains and rings. The term "string theory of water" (which is not to be confused with the string theory of physics) was coined. These observations were based upon X-ray absorption spectroscopy that probed the local environment of individual oxygen atoms.[69]

Molecular structure

The repulsive effects of the two lone pairs on the oxygen atom cause water to have a bent, not linear, molecular structure,[70] allowing it to be polar. The hydrogen-oxygen-hydrogen angle is 104.45°, which is less than the 109.47° for ideal sp^3 hybridization. The valence bond theory explanation is that the oxygen atom's lone pairs are physically larger and therefore take up more space than the oxygen atom's bonds to the hydrogen atoms.[71] The molecular orbital theory explanation (Bent's rule) is that lowering the energy of the oxygen atom's nonbonding hybrid orbitals (by assigning them more s character and less p character) and correspondingly raising the energy of the oxygen atom's hybrid orbitals bonded to the hydrogen atoms (by assigning them more p character and less s character) has the net effect of lowering the energy of the occupied molecular orbitals because the energy of the oxygen atom's nonbonding hybrid orbitals contributes completely to the energy of the oxygen atom's lone pairs while the energy of the oxygen atom's other two hybrid orbitals contributes only partially to the energy of the bonding orbitals (the remainder of the contribution coming from the hydrogen atoms' 1s orbitals).

Chemical properties

Self-ionization

In liquid water there is some self-ionization giving hydronium ions and hydroxide ions.

Geochemistry

The action of water on rock over long periods of time typically leads to weathering and water erosion, physical processes that convert solid rocks and minerals into soil and sediment, but under some conditions chemical reactions with water occur as well, resulting in metasomatism or mineral hydration, a type of chemical alteration of a rock which produces clay minerals. It also occurs when Portland cement hardens.

Water ice can form clathrate compounds, known as clathrate hydrates, with a variety of small molecules that can be embedded in its spacious crystal lattice. The most notable of these is methane clathrate, 4 $CH_4 \cdot 23H_2O$, naturally found in large quantities on the ocean floor.

Acidity in nature

Reactions

Acid-base reactions

Ligand chemistry

Water in redox reactions

Electrolysis

History

Henry Cavendish showed that water was composed of oxygen and hydrogen in 1781.[92] The first decomposition of water into hydrogen and oxygen, by electrolysis, was done in 1800 by English chemist William Nicholson and Anthony Carlisle.[92][93] In 1805, Joseph Louis Gay-Lussac and Alexander von Humboldt showed that water is composed of two parts hydrogen and one part oxygen.[94]

Gilbert Newton Lewis isolated the first sample of pure heavy water in 1933.[95]

The properties of water have historically been used to define various temperature scales. Notably, the Kelvin, Celsius, Rankine, and Fahrenheit scales were, or currently are, defined by the freezing and boiling points of water. The less common scales of Delisle, Newton, Réaumur and Rømer were defined similarly. The triple point of water is a more commonly used standard point today.

Nomenclature

The accepted IUPAC name of water is *oxidane* or simply *water*,[96] or its equivalent in different languages, although there are other systematic names which can be used to describe the molecule. Oxidane is only intended to be used as the name of the mononuclear parent hydride used for naming derivatives of water by substituent nomenclature.[97] These derivatives commonly have other recommended names. For example, the name hydroxyl is recommended over *oxidanyl* for the –OH group. The name oxane is explicitly mentioned by the IUPAC as being unsuitable for this purpose, since it is already the name of a cyclic ether also known as tetrahydropyran.[98][99]

The simplest systematic name of water is *hydrogen oxide*. This is analogous to related compounds such as hydrogen peroxide, hydrogen sulfide, and deuterium oxide (heavy water). Using chemical nomenclature for type I ionic binary compounds, water would take the name *hydrogen monoxide*,[100] but this is not among the names published by the International Union of Pure and Applied Chemistry (IUPAC).[96] Another name is *dihydrogen monoxide*, which is a rarely used name of water, and mostly used in the dihydrogen monoxide parody.

Other systematic names for water include *hydroxic acid*, *hydroxylic acid*, and *hydrogen hydroxide*, using acid and base names.[l] None of these exotic names are used widely. The polarized form of the water molecule, H^+OH^-, is also called hydron hydroxide by IUPAC nomenclature.[101]

Water substance is a term used for hydrogen oxide (H_2O) when one does not wish to specify whether one is speaking of liquid water, steam, some form of ice, or a component in a mixture or mineral.

Yorum

Su hakkında birçok detay bilgi olmaktadır. Bu makalede yer verilmiş ama konu ile ilgili yorum yapılmayacaktır.

Su, yapısı itibariyle birçok işlevde rolü olduğu dikkate alındığında hayran olmamak olası değildir.

Şişe Kapak Renkleri: kırmızı & mavi & beyaz & turuncu kapaklı su - ekşi sözlük (eksisozluk.com)[4]

İçilecek su alırken şişe kapak rengi ile genel bir kanı olması beklenilmiştir.

Mavi: doğal kaynak suyu, Beyaz: arıtılmış su, Kırmızı: gazlı su, Pembe: katkılı su, Na azaltılmış gibi özellikleri vardır.

Pembe kapaklı olarak, medikal bazı katkılar ile oluşmasını, özellikle çocuklar için suya kalsiyum, fosfor ve hatta flor katılması planlanmaktadır. Ancak bu suların tadı yumuşak su gibi olmayacaktır.

Şişelenmiş su seçerken dikkat etmeniz gereken 5 şey – Yeşilist | Herkes için yeşil (yesilist.com)[5]

Şişelenmiş su seçerken dikkat etmeniz gereken 5 şey
1-Doğru şişeyi seçin
2-Fiziksel özelliklerine dikkat edin
3-Etiketi inceleyin
4-Tadına bakın
5-Markanın etik ilkelerini göz önünde bulundurun

Yorum

Konu yorumlara açıktır, bu nedenle geniş incelenmelidir.
1-Doğru şişeyi seçin: İnsanların yaşına ve durumuna göre içeceği su miktarı önemlidir ve buna göre şişe seçmesi uygundur. Bir gençlerin yarım litre olan su şişesi uygundur. Çocuklarda da kola gündeme gelmeyeceği için yine yarım litre uygun olabilir. Buna karşın yaşlılarda 200mL hacimli olanlar daha uygundur.
2-Fiziksel özelliklerine dikkat edin: İnsanların gereksinimlerine göre sıvı almalıdır. Kaynak, yumuşak su yemek sonrası iyi iken, deniz kıyısında ise mineralli sıvı almalıdır. Ayrıca tansiyon açısından da sodyum azaltılmış veya olmayan su tercih nedenidir.
3-Etiketi inceleyin: İnsanlar genellikle dikkate almadan, markaya bakarak içmektedirler. Marka genel mi, yoksa farklı yapılarda mıdır, bu bakılmalıdır. Kola bile şekerli ve şekersiz olanlar ayrı olduğu gibi, eski, klasik kola ile yeni kolanın içerikleri farklıdır. Ancak bu farklılık genel kullanıcı açısından önemli düzeyde değildir.
4-Tadına bakın: İnsanlar suyu belirli bir markayı tercih ediyor ve içiyorsa, tat farklılığını algılayabilirler. Ancak, musluk suyu ile yumuşak su tattırdığımızda yabancıların algılamadığı genel bir bulgudur. Bunun suyun karışması veya ticari amaç ile kapağı açılı, açılmış, içine farklı sıvı konmasının önlenmesi açısından da bir uyarı olarak söylenmektedir.
5-Markanın etik ilkelerini göz önünde bulundurun: Zamanımızda Bakanlık tarafından izin verilmeyen sular satış sunulmamaktadır. Bu açıdan her şişe duyun kapağının kendiniz tarafından açılması ve bilmediğiniz marka ise standart Bakanlık onayına bakılmalıdır.

Özet

Su molekül olarak hem artı hem eksi çekim gücü ile kimyasal bağlı olmasına karşın, fiziksel çekim gücü ile devamlı itmesi ve çekmesi ile bir dinamizm oluşturmaktadır. İçinde eriyen molekülleri hem artı çekmesi, Hidrojenin Kloru çekmesi, Sodyumun da itmesi, oksijenin çekmesi ile, aynı düzeyde olmaması, arada olan açı ile de devamlı bir titreşim oluşturmaktadır. Saniyede milyon kez osilasyon olabilmektedir. Suyun ısı durumuna göre üç halinin de gözlenmesi, bunun doğada özellikleri ile de önemsenmelidir. Sosyal boyutu da önemli düzeyde ele alınmalıdır.
Tatlı su, kaynak suyunun Ülkemizde beğenilmesi, devamlı tercih edilmesi yanında, bazı mineral eksikliği açısından, kısıtlı kullanımı gündeme gelebilmektedir. Tuz açısından sodyum kısıtlı sular da oluşturulmuştur.

Yıkama suyu yanında endüstride de kullanılması, su kirliliği ve çevre felaketine de neden olabilmektedir.

İklimin ısınması ile birlikte, su kısıtlılığı gözlenmekte, ancak hızlı soğuma ile birlikte sel ve fırtına boyutunun da sık olması bir veri olarak gözlenmektedir.
Giderek suyun önemi artacaktır.

Kaynaklar

1)—Water. Wikipedia
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3)-- Properties of water. Wikipedia
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5)--- Şişelenmiş su seçerken dikkat etmeniz gereken 5 şey (yesilist.com)