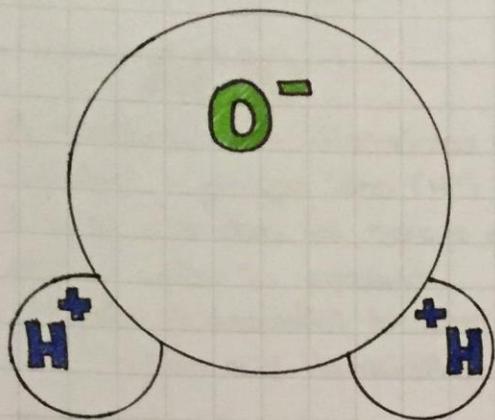


WATER (H₂O)



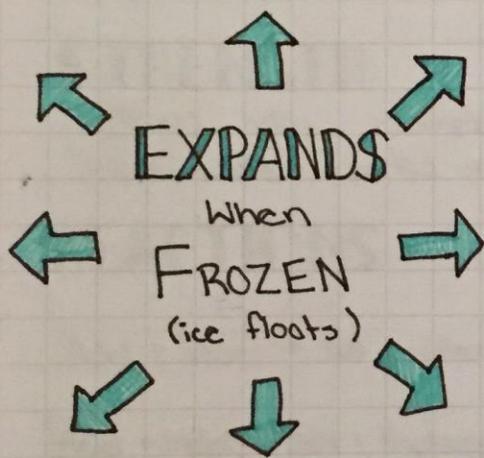
HYDROGEN BONDS

* **Opposite** charges attract

* In H₂O electrons spend more time around the oxygen atom than the hydrogen atom.
- Making oxygen slightly negative

↳ Water is **POLAR**

PROPERTIES



HEAT

ABSORBS heat from **warm** air

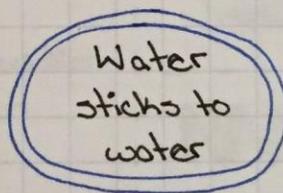
RELEASES heat from **cool** air

(more moderate temps near water)

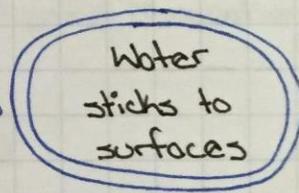
EVAPORATIVE COOLING

- sweating and transpiration

COHESIVE



ADHESIVE



SURFACE TENSION

• How difficult it is to **break** or **stretch** the surface
• H-bonds hold water molecules together so tightly that the water's surface **acts like a membrane**

HYDROPHILIC

Having a tendency to **mix** with, **dissolve** in or be **wetted** by water

HYDROPHOBIC

Tendency of nonpolar substances to **aggregate** in aqueous solution and **exclude water molecules**
(Don't care about water)

CAPILLARY ACTION

attraction is so great that water will climb in defiance of the force of gravity

• If a **capillary tube** is made out of a **polar substance** (glass), **water will climb** up without needing to be pumped

Chapter 3 questions done by Muhammad aljahalin

1) The partial charges on a water molecule occur because of -----:

- A) The high electronegativity of hydrogen
- B) The achievement of a stable configuration by one atom of a bond but not by the other partner
- C) Widespread ionization
- D) Covalent bonding
- E) The unequal sharing of electrons between the hydrogen and the oxygen atoms of a water molecule

ANSWER E

2) Transformation of material from liquid to gaseous state is known as

- A. Evaporation
- B. Vaporization
- C. Boiling
- D. Condensation
- E.A+B

ANSWER E

3) Water is able to form hydrogen bonds because

- A) oxygen has a valence of 2.
- B) the water molecule is shaped like a tetrahedron.
- C) the bonds that hold together the atoms in a water molecule are polar covalent bonds.
- D) the oxygen atom in a water molecule has a weak positive charge.
- E) each of the hydrogen atoms in a water molecule is weakly negative in charge.

Answer: C

4) Which of the following statements correctly defines a kilocalorie?

- A) the amount of heat required to raise the temperature of 1 g of water by 1°F
- B) the amount of heat required to raise the temperature of 1 g of water by 1°C
- C) the amount of heat required to raise the temperature of 1 kg of water by 1°F
- D) the amount of heat required to raise the temperature of 1 kg of water by 1°C
- E) the amount of heat required to raise the temperature of 1,000 g of water by 1°F

Answer: D

5) What gives rise to the cohesiveness of water molecules?

- A) hydrophobic interactions
- B) nonpolar covalent bonds
- C) ionic bonds
- D) hydrogen bonds
- E) both A and C

Answer: D

6) Water's high specific heat is mainly a consequence of the :

- A) small size of the water molecules.
- B) high specific heat of oxygen and hydrogen atoms.
- C) absorption and release of heat when hydrogen bonds break and form.
- D) fact that water is a poor heat conductor.

E) inability of water to dissipate heat into dry air.

Answer: C

7) Which type of bond must be broken for water to vaporize?

- A) ionic bonds
- B) nonpolar covalent bonds
- C) polar covalent bonds
- D) hydrogen bonds
- E) covalent bonds

Answer: D

8) The sphere of water molecule around an ions is known as

- A. Hydration shell
- B. Cohesion
- C. Adhesion
- D. Surface tension

ANSWER A

9) which the following is not property of liquid water

- A. Ice has a lower density than liquid water
- B. Liquid water has high surface tension
- C. Can form hydrogen bond with other water molecules
- D. Has low specific heat
- E. None of the above

ANSWER D

10) Water molecules are able to form hydrogen bonds with?

- A. compounds that have polar covalent bonds.

- B. oils.
- C. oxygen gas (O₂ molecules).
- D. chloride ions.
- E. any compound that is not soluble in water.

ANSWER A

11) Adhesion is best described as?

- A. the clinging of one substance to another substance
- B. the process that contributes to the transport of water and dissolved nutrients in plants by causing water molecules to tug on other water molecules
- C. a property of water that helps moderate Earth's temperature
- D. the process by which a crystalline lattice forms
- E. None of the listed responses is Correct.

answer A

12) Sweating has a cooling effect because of water's high?

- A. surface tension
- B. density
- C. heat of vaporization
- D. buffering capacity
- E. specific heat

ANSWER C

13) Hydration shell can be form around:

- A. Ion
- B. Sugar
- C. Oil
- D. Glucose

E. All of them except (c)

ANSWER E

14) Which of the following is true about electronegativity of oxygen and hydrogen?

- A. Hydrogen is more electronegative than oxygen
- B. Oxygen is more electronegative than hydrogen
- C. Oxygen and hydrogen have the same electronegativity
- D. Oxygen and water don't have significant electronegativity in water

ANSWER B

15) Some evaporation can occur at -----:

- A. High temperature
- B. Low temperature
- C. Any temperature
- D. At 100C
- E. None of the above

ANSWER C

16) Hydrophobic substances such as vegetable oil are

- A) nonpolar substances that repel water molecules.
- B) nonpolar substances that have an attraction for water molecules.
- C) polar substances that repel water molecules.
- D) polar substances that have an affinity for water.
- E) charged molecules that hydrogen-bond with water molecules.

Answer: A

17) How many molecules of glycerol (C₃H₈O₃) would be present in 1 L of a 1 M glycerol solution?

- A) 1
- B) 14
- C) 92
- D) 1×10^7
- E) 6.02×10^{23}

Answer: E

18) The nutritional information on a cereal box shows that one serving of a dry cereal has 200 kilocalories. If one were to burn one serving of the cereal, the amount of heat given off would be sufficient to raise the temperature of 20 kg of water how many degrees Celsius?

- A) 0.2°C
- B) 1.0°C
- C) 2.0°C
- D) 10.0°C
- E) 20.0°C

Answer: D

19) The formation of ice during colder weather helps temper the seasonal transition to winter. This is mainly because?

- A. there is less evaporative cooling of lakes.
- B. ice is warmer than the winter air.
- C. the formation of hydrogen bonds absorbs heat.
- D. the formation of hydrogen bonds releases heat.
- E. ice melts each autumn afternoon

ANSWER D

20) A strong acid like HCl?

- A. ionizes completely in an aqueous solution.
- B. increases the pH when added to an aqueous solution.
- C. reacts with strong bases to create a buffered solution.
- D. is a strong buffer at low pH.
- E. both ionizes completely in aqueous solutions and is strong buffer at low pH.

ANSWER A