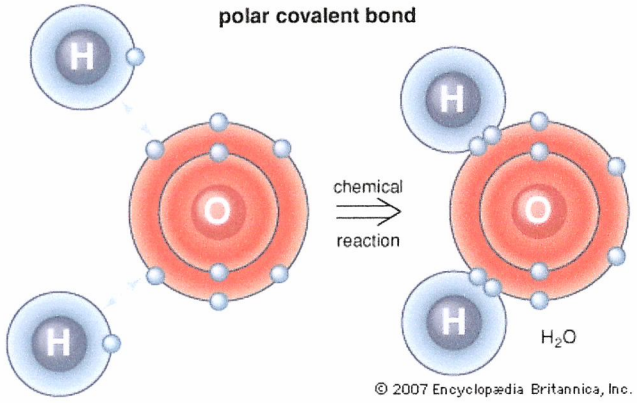
Consolidation Worksheet on Water

Water is the most abundant molecule in cells, whole organisms and on earth. This is a consequence of its unique physical and chemical properties.

Chemical structure of the molecule



Describe how the hydrogen and oxygen atoms are bonded together

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Are the electrons in the bond shared equally, very unequally or slightly unequally?

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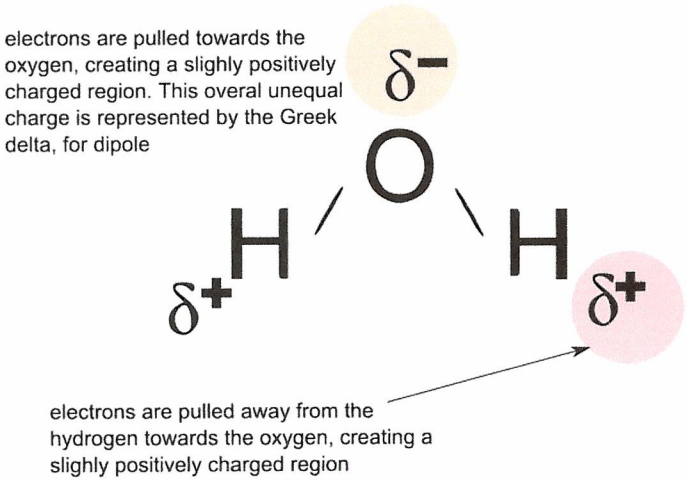
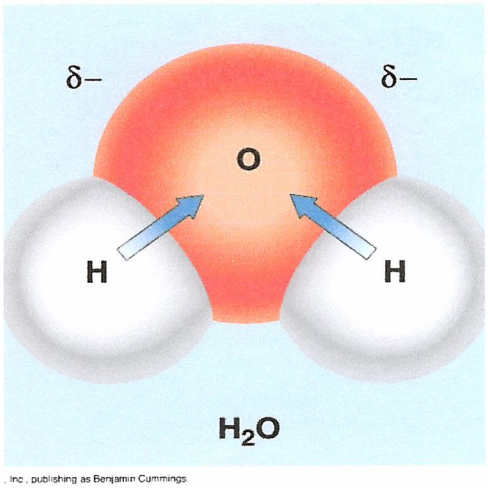
Polarity of water molecules





What is the overall charge on a water molecule? _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Why is the molecule described as a dipole?

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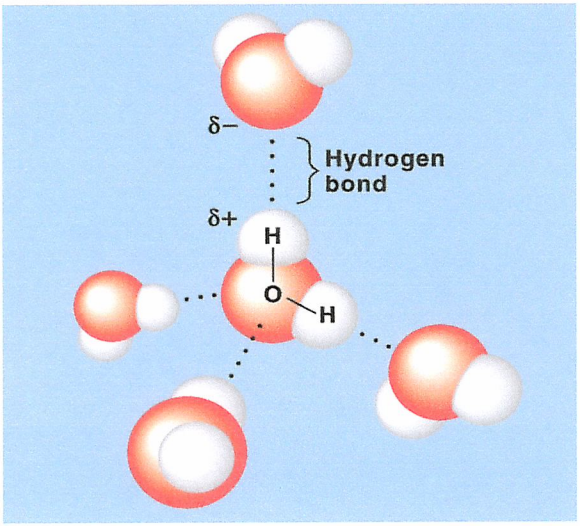

What are H bonds? Explain how Hydrogen bonds form between water molecules.

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How strong are the bonds?

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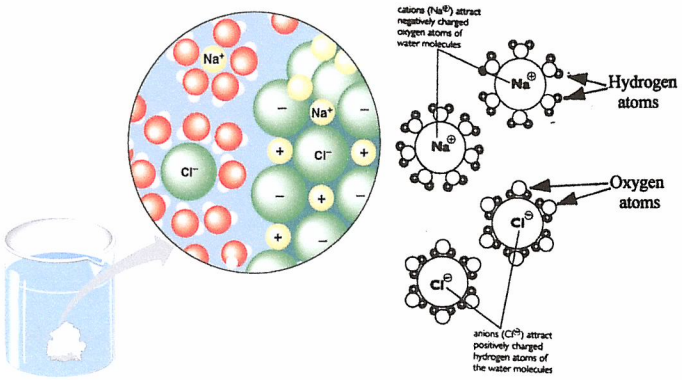
Draw below one water molecule. Show how it is bonded to three other molecules with intermolecular H bonds. You can be asked to do this in an exam.
Watch the following video on H bonds https://www.youtube.com/watch?v=PyC5r2mB4d4 before you do your drawing.

What is the 'sticking' together of water molecules called? ———————————————-

Properties that result from the structure

1. A solvent

Water is sometimes described as the universal solvent, allowing chemical reactions to take place in solution.



What type of substances can water dissolve?

What type of substances can water not dissolve?

In your own words describe how water dissolves an ionic solid such as sodium chloride

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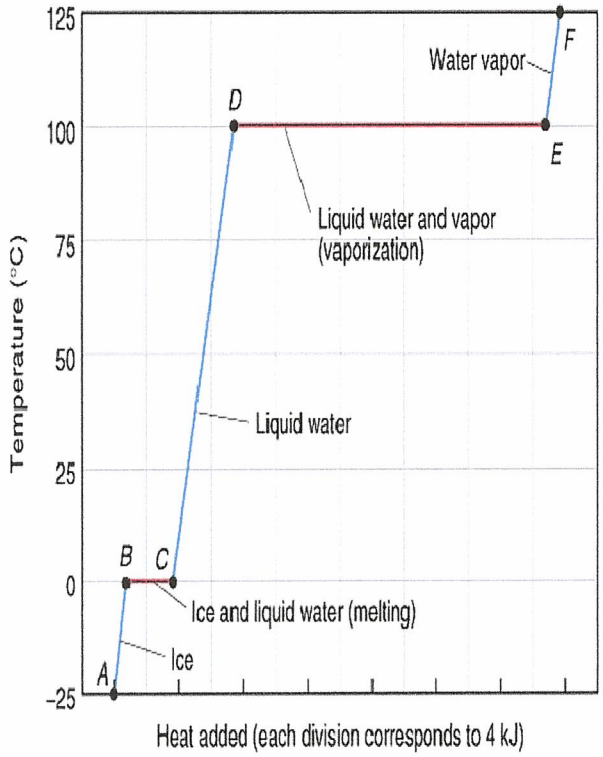
2. It has a high latent heat of vaporisation and can act as a coolant

Give two examples of how water is used as a coolant



What do we mean by the latent heat of vaporization?

Why is it so high for water?

Why is there a cooling effect when surface molecules of water evaporate?

3. Temperature Stabilizer (buffer)

What is specific heat capacity?

Why does water have such a high specific heat capacity?

How does this help aquatic environments?

Why else is this important for organisms?

4. Thermal Insulator

In aquatic environments why is it important that water is less dense as a solid than it is as a liquid?

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Why is it less dense as a solid?

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5. Transport

What property does cohesion lead to that is useful in tall trees?

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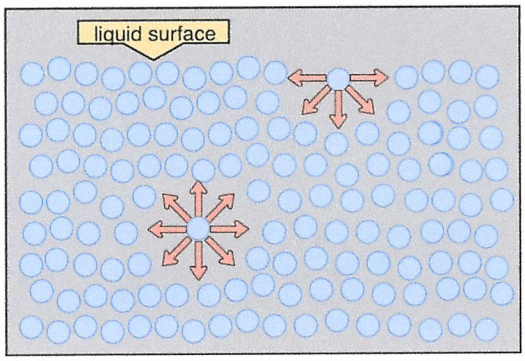

What property does cohesion lead to that allows animals such as pond skaters walk on the surface of water

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6. A metabolite

A metabolic reaction is a chemical reaction that happens in a living organism to keep it alive. The metabolism is the sum of all of the chemical reactions together. A metabolite is a substance involved in a metabolic reaction.

How is water involved in photosynthesis? Is it a reactant or a product? Write the word equation below.

_____

What about respiration?

_____

In the next topic you will learn about two further metabolic reactions that involve water - **Condensation and Hydrolysis**