بسم الله الرحمن الرحيم

A

# تلخيص لمادة

## علوم الحياة Bio101

## Campbell Biology

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إعداد الطالبة

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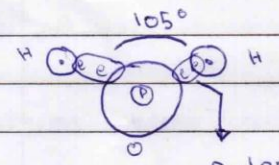
Chapter 3 :-

$\boxed{\text{living}} \xrightarrow{\text{needs}} \boxed{\text{environment}} \xrightarrow{\text{Fits For life}} \boxed{\text{water}}$

* 3/4 earth is water
* 70 - 95 % of cell is water
* water dissociate into → $OH^-$, → $H^+$
* water presents on earth as liquid or ice or vapor.
* it's physical states: 1) liquid 2) solid 3) gass
* it's shape is deceptively simple (شكلها غاية التركيب) wide V




Polar covalent bond

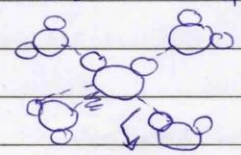
* why the bond is polar ?

because $O_2$ is more electronegative (أعلى كهربية) than $H_2$, so ē of covalent bond spend most time near to $O_2$

* توزيع الشحنات غير منتظم فيكون جزيء الماء روابط هيدروجينية
* polarity is the cause of hydrogen bond (H- bond)

* $H-\underset{H}{\overset{H}{C}}-H$ non-polar covalent bond.

* water is polar molecule = opposite ends have opposite charge
* 1 atom can make 4 H-bond



hydrogen bond (weak bond 1/10 covalent bond) at liquid state

stronger

* breaking H-bond needs energy / if it is Formed energy is released.
* the ecologist (عالم بيئة) Lawrence Henderson → high lights the importance of water.

* What makes water fits for life? (water properties)

1] cohision :- Force when atoms attract each other (because of it when we move an end all water molecules move)

* because of H-bond → water is liquid
→ water is cohisioned

* because water is cohisioned when molecules of surface is evaporated all atoms move up ward (water moves through conducting cells from roots to leaves)

* molecules in same mass usually share same physical properties.

* water is liquid at room tempreture.

* Adhesion :- attraction between different substances.

eg: water with plant cells.

* charged molecules :-

1] protein

2] nuclaic acid ⟶ could be surrounded by envelope of water.

3] cellilose

* What makes water move up-ward against gravity?

1] cohision 2] Adhesion : يلصق جزيئات الماء مع ساق النبات فيمنع رجوعها للأسفل مرة أخرى

* Surface tenssion : ~~mojan~~ measurment of how difficult is to break a surface

* Water has high surface tenssion because of H-bond which cause cohision so insects can walk on water.

2] maintains tempreture :- (water absorbs heat from warmer air and release stored heat

* it can absorb or release large amount of heat with only a little change in it's own tempreture.

* optimal tempreture (the best) = 20 - 30° C

1] high specific heat : the amount of heat that must be absorbed or lost for 1 g of water to change it's tempreture by 1 C°

* 1) it (high specific heat) helps marine to live in sea.

2] moderate weather in coastal areas (ساحلي)

3] ressist ~~[illegible]~~ change in tempreture (so heat stay in good range)

* iron = .1 cal (heat unit) = amount of heat released required to raise/cool temperature of 1g of iron by 1 c°.

* ethanol = .6 cal

* water = 1 cal (water has high specific heat) / 1 kcal = 1000 cal

* H-bond is the cause of high specific heat.

* H-bond is broken when it absorbs heat

* water is heat bank

~~* water saves land from high and low tempreture (in morning it absorbs most heat and at night when lands lose their heat~~

* evaporative cooling :- when a liquid evaporates it's remaining surface cools (this helps organisms and bodies of water to stabilize their tempreture.

* vaporation (liquid → gas) to happen heat must be absorbed (to evaporate 1g of water we need 580 cal)

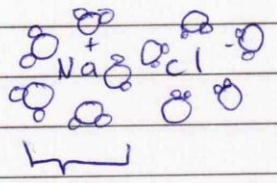
* water has high specific heat of evaporation.

* kinetic energy :- energy of motion
* heat ( total amount of kinetic energy ) / تعتمد على الحجم
* tempreture (average of kinetic energy) لا تعتمد على الحجم

3] at 4°c water has the greatest density
at 0°c there is no energy so H-bond will fix the position (it's more ordered = larger volume = less density)

4] water is a solvent for life
solute + $H_2O$ ⟶ Aqueos solution

* water is a polar solvent so the solute must be → polar, → ionic } (hydro-phillic)




hydration shell

* protein dissolves in water although its large polar molecule
* water is a good solvent because of its polarity
* Although cotton is hydrophilic, it doesn't dissolve in water because of it's large size.
* not all hydrophilic substances dissolve in water (it depends on size and nature)

* non-polar molecules = hydrophobic (attract each other by hydrophobic interaction)

pH → 0 acidic  the best pH for organizm = 6 - 7
→ 7
→ 14 basic

normal rain → pH ≈ 5.6 (slightly acidic) because it interact with $CO_2$ → Fuel Cemition of $CO_2$ / $SO_2$ / NO → pH ≈ 5.2
→ acid rain = acid precipitation

* For most living cells pH must stay near 7

* ocean acidification :- $CO_2 \xrightarrow{\text{dissolve}}$ sea $\xrightarrow{\text{form}}$ carbonic acid