

Introduction to Botany. Lecture 5

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- 1 Questions and answers
 - Quiz
- 2 Basics of life
 - Chemistry of life



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Questions and answers

Quiz



Final question (2 points)

Which of plants₂ are not plants₁?



Final question (2 points)

Which of plants₂ are not plants₁?

Full parasites.



Basics of life

Chemistry of life



Very basics of chemistry

- Atoms
 - Protons
 - Neutrons
 - Electrons
- Atomic weight
- Isotopes
- Elements
- Periodic table: rows and columns
- Chemical bonds: ionic, covalent, hydrogen
- Valence and group
- Molecules
- Molecular weight



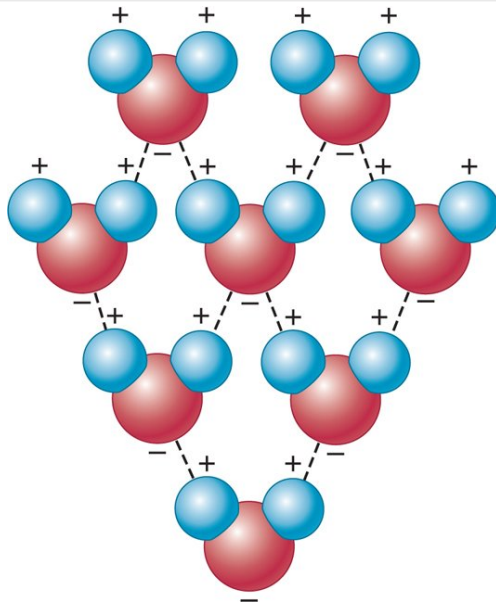
Molar mass, mole and molar concentration

- Molar mass is a gram equivalent of molecular mass
- For example, molecular mass of salt (NaCl) is $23 + 35^1 = 58$ Da. We take “Da” out and replace it with “g” (grams). Therefore, 1 mole of salt is 58 g.
- Every mole contains $6.02214078 \times 10^{23}$ molecules (Avogadro’s number)
- Concentration is the density of dissolved substance
- In water solution, 1 M (1 molar) concentration of salt means that in 1 liter of distilled water 58 g of salt was diluted
- If we take half of this water, concentration will still be 1 M whereas amount of diluted salt will decrease twice

¹ If we accept that atomic mass of chlorine is 35.



Water with hydrogen bonds



Acids and bases. Ions

- Acids: take out H^+ cation (proton), like
 $HCl \rightarrow H^+ + Cl^-$
or
 $H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$
- Bases: take out OH^- anion (hydroxyl)
 $NaOH \rightarrow Na^+ + OH^-$



Concentration of protons, and pH and acidity

- If concentration of protons is 0.1 M (1×10^{-1} , 0.1 g of protons in 1 l of water), this is an extremely acidic solution
- In distilled water, concentration of protons is equal to 1×10^{-7} (0.0000001) M
- This is because water molecules can (rarely) dissociate: $\text{H}_2\text{O} \rightarrow \text{H}^+ + \text{OH}^-$
- pH of distilled water is equal to $-\log(10^{-7}) = -(-7) = 7$
- pH of the extremely acidic solution (first example) is 1



Final question (2 points)



Final question (2 points)

What is a molecular weight of sulfuric acid, H_2SO_4 ?



Summary

- Most important bonds: polar and non-polar covalent (intramolecular) and hydrogen (intermolecular)



For Further Reading



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Introduction to Botany [Electronic resource]. newblock Mode of access:

http://ashipunov.info/shipunov/school/biol_154

