- Do sugary drinks cause hyperactivity?

2.1 A Definition of Life

- **Other attributes of living organisms:**
  - Growth, Movement, Reproduction
  - Response to external stimuli
  - Metabolism (all chemical processes in cells)
  - can maintain **homeostasis**
  - can evolve (by passing on genes to the next generation)
  - require liquid **water**

2.2 The Properties of water

- **Elements:** fundamental forms of matter
  - **Atoms:** the smallest units of an element
    - Atoms are composed of **protons**, **neutrons**, and **electrons**

2.2 The Properties of water

- The electrons in water are not shared equally, this makes a **polar** molecule:
  - The oxygen side is slightly negative because it pulls the electrons harder. Oxygen is **electronegative**
  - The hydrogen side is slightly positive because the hydrogen has a weaker pull
- When molecules have no charges, they are **nonpolar**

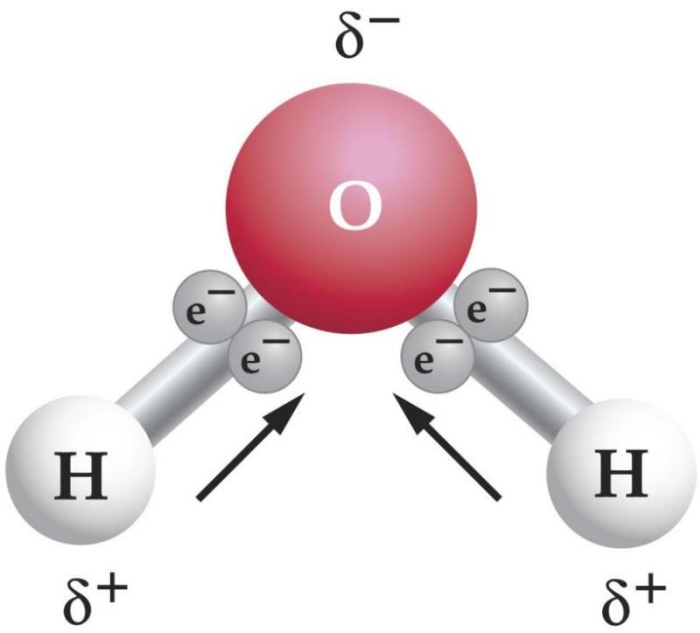
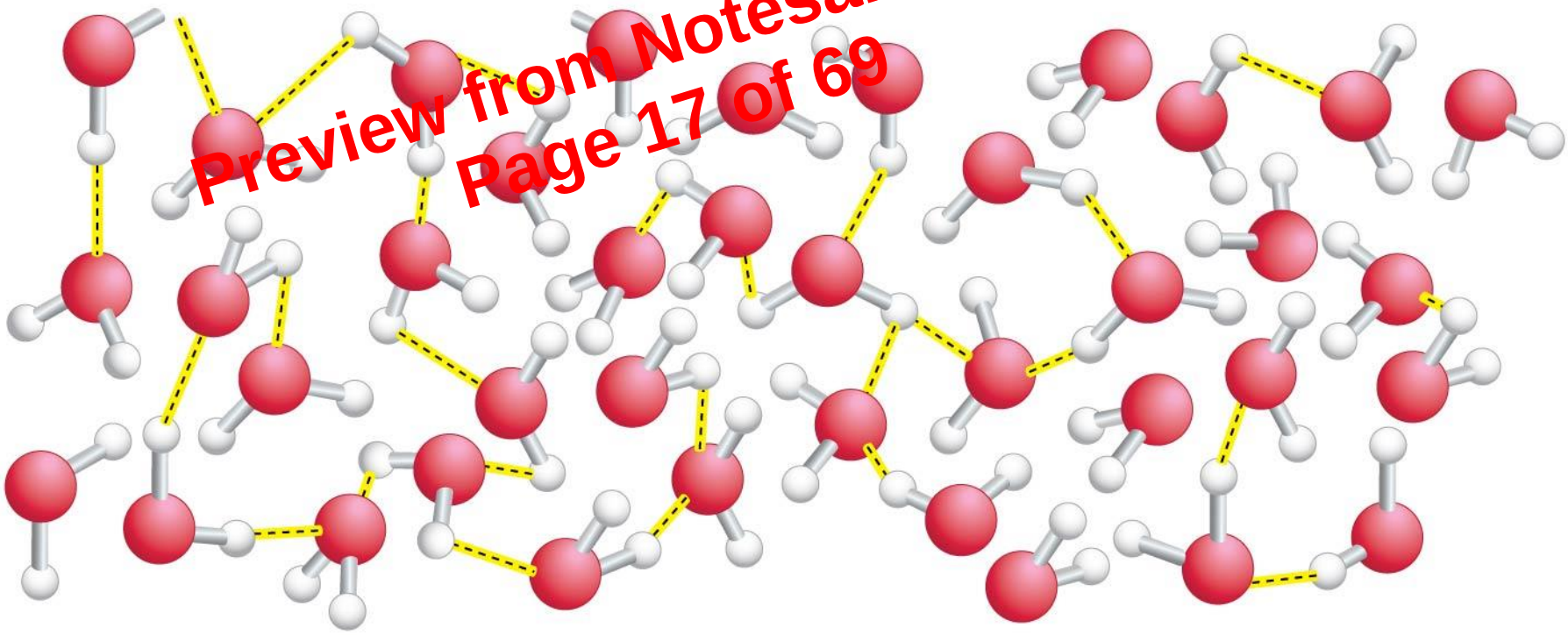


Figure 2.4

(b) Bonds between many water molecules



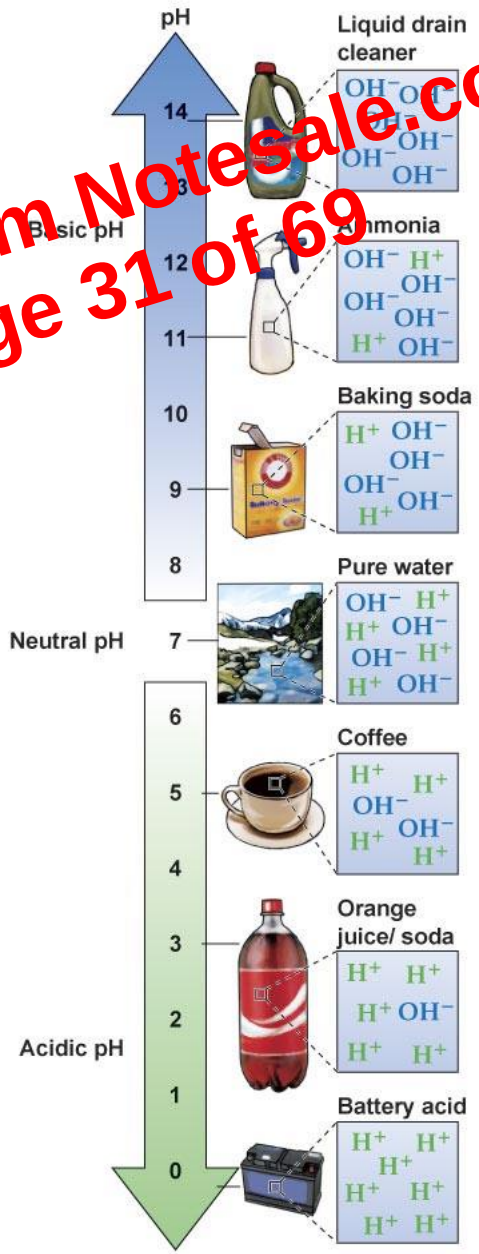
Chemical bonds

- Chemical bonds usually involve the sharing or transfer of electrons
- Carbon is often involved because it can bond with up to 4 elements.
- The perfect TinkerToy! Fig. 2.7

Figure 2.12

The pH scale

The scale is a measure of the H+ ion concentration



Large amounts of OH^-

Equal amounts of OH^- and H^+

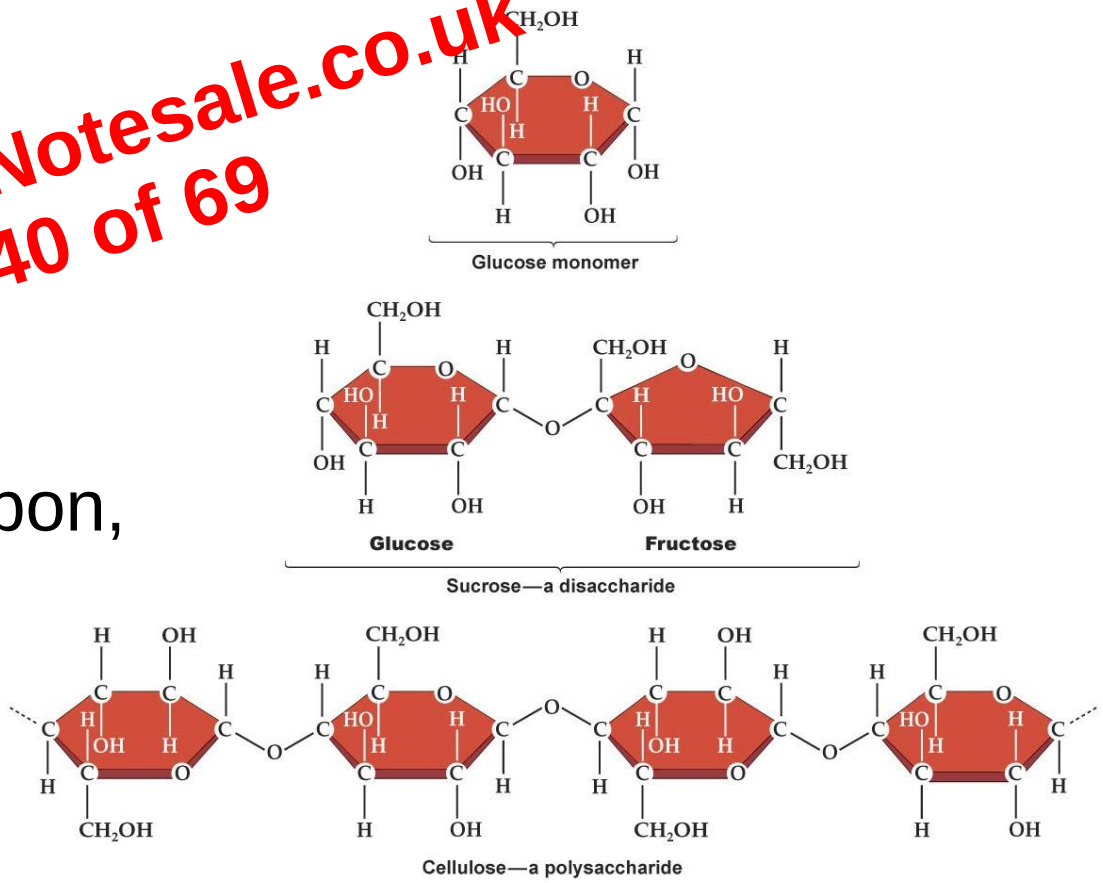
large amounts of H^+

Figure 2.12

2.4 Biological Macromolecules

Structure and Function of Carbohydrates

- **Carbohydrates:** molecules of carbon, oxygen, and hydrogen
- Major source of energy for cells

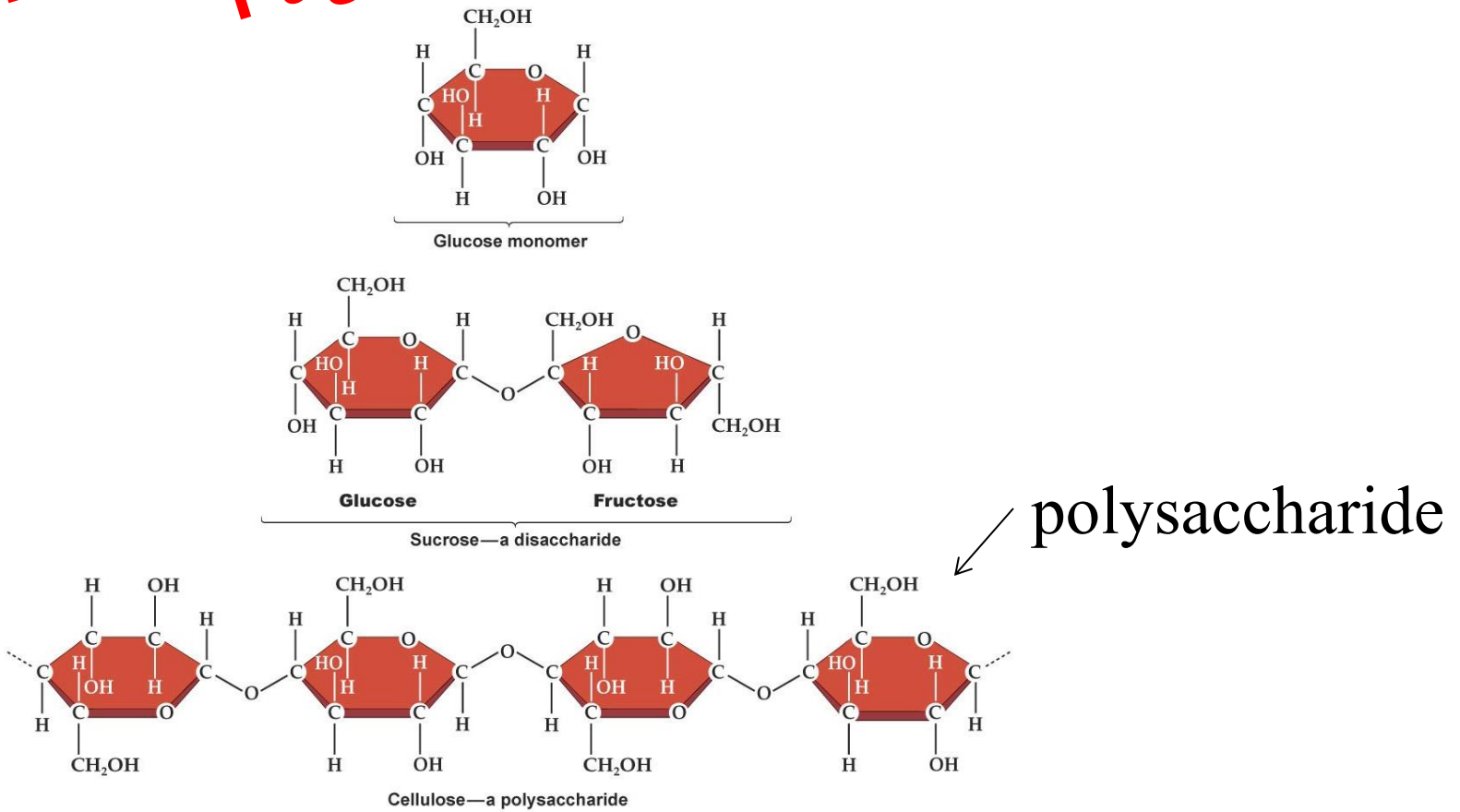


Note: Monomer = small molecule

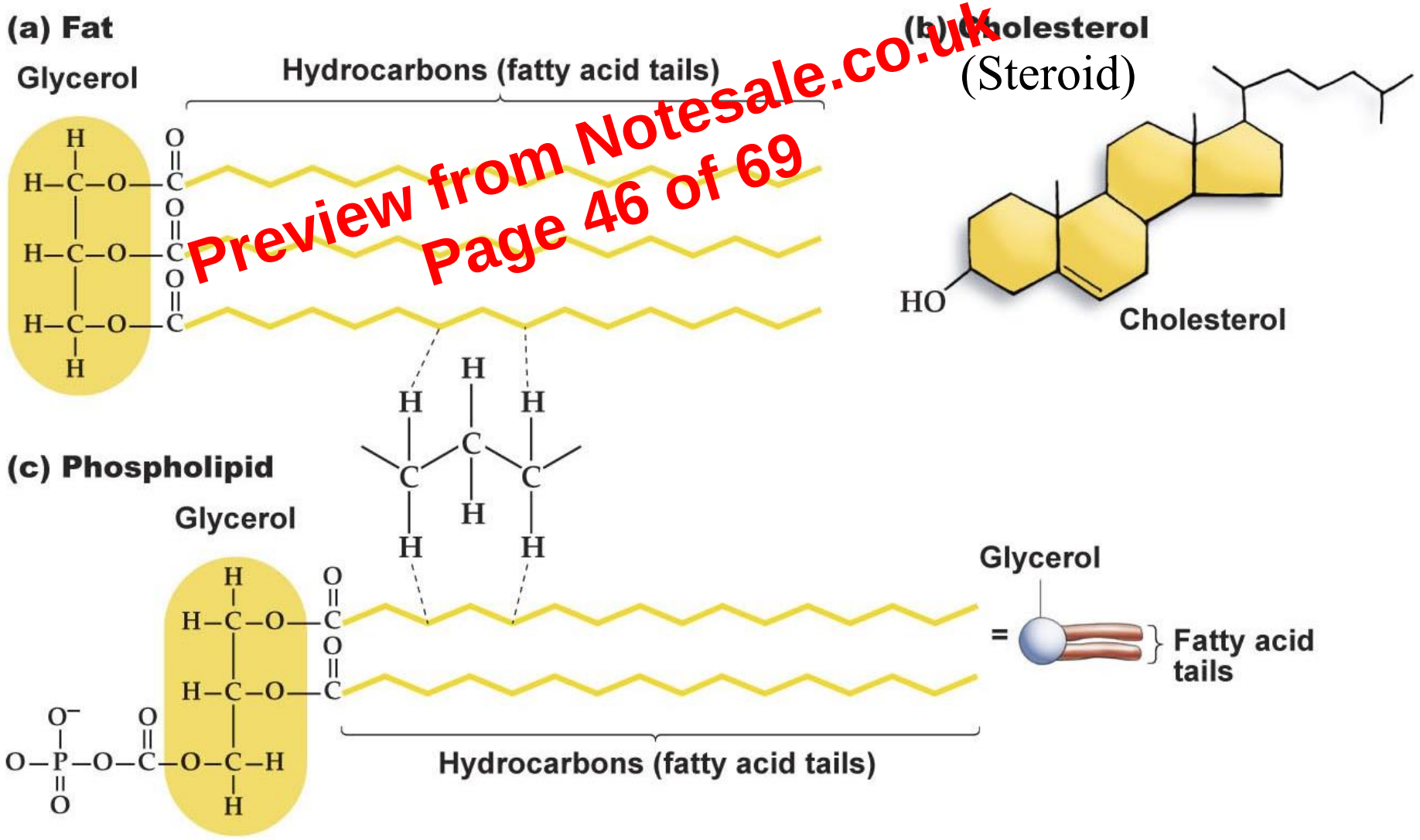
Figure 2.12

2.4 Biological Macromolecules

- **Carbohydrates** are polymers of single sugar molecules (monomers). Sugars are also known as saccharides.



Three types of fat



2.4 Biological Macromolecules

Structure and Function of Nucleic Acids

- Nucleotides are of two types: **RNA** and **DNA**, depending on the sugar.
- DNA is the hereditary material in nearly all organisms.