ᘓ **covalent bond:** when two atoms share a pair of valence electrons ᘓ **molecule:** consists of two or more atoms held together by covalent bonds ᘓ **single bond:** (H-H) ᘓ **double bond:** (H=H)ᘓ **electronegativity:** the attraction of a particular atom for shared electrons ᘓ **nonpolar covalent bond:** if one element is more electronegative, it pulls the shared electrons closer to itself, creating a **polar covalent bond** ᘓ

Ionic Bonds

ᘓ **Ion:** charged atomᘓ **cation:** a positively charged atom ᘓ **anion:** negatively charged atom ᘓ **ionic bond:** holds atoms together due to attraction of opposite charges ᘓ **ionic compounds:** 3D crystalline lattice arrangement held together by electrical attractions.ᘓ Slats have strong ionic bonds when dry, but the crystal dissolves in waterᘓ

Weak Chemical Bonds

Hydrogen Bonds

ᘓ **Hydrogen bond:** a hydrogen atom that is covalently bonded to an electronegative atom has a partial positive charge and can be attracted to another nearby electronegative atom. ᘓ

Vans der Waals Interactions

ᘓ **van der Waals interactions:** all atoms and molecules are attracted to each other when in close contact ᘓ

Molecular Shape and Function

ᘓ A molecule's characteristic size and shape affect how it interacts with other molecules. A carbon atom bonded to four other atoms has a tetrahedral shape. ᘓ

2.4 Chemical Reactions make and break chemical bonds

ᘓ Chemical reactions involve the making or breaking of chemical bonds. Matter is conserved in chemical reactions. ᘓ **Chemical equilibrium** is reached when the forward and reverse reactions proceed at the same rate, and the relative concentrations of reactants and products no longer change. ᘓ

2.5 Hydrogen bonding gives water properties that help make life possible on Earth

ᘓ **Polar molecule:** a V-shaped water molecule with a slight positive charge on each hydrogen atom and a slight negative charge with each oxygen atom. ᘓ

Cohesion of Water Molecules

ᘓ **cohesion** creates a more structurally close organized liquid ᘓ **adhesion:** ᘓ **surface tension:**

Moderation of Temperature by Water

Temperature and Heat

ᘓ **kinetic energy:** ᘓ **thermal energy:** ᘓ **temperature:** ᘓ **heat:** ᘓ **calorie:** ᘓ **kilocalorie:** ᘓ **joule:** ᘓ

Water' High Specific Heat

ᘓ **specific heat** ᘓ

Evaporative Cooling

ᘓ **heat of vaporization:** ᘓ **evaporative cooling:** ᘓ

Floating of Lice on Liquid Water

Water: The Solvent of Life

ᘓ **solution:** ᘓ **solvent:**

Hydrophilic and Hydrophobic Substances

Solute Concentration in Aqueous Solutions

Acids and Bases

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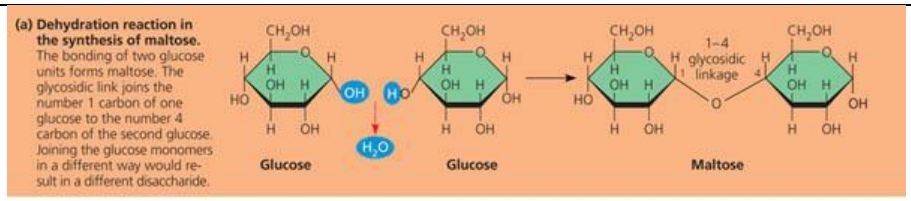


Polysaccharides

ᔓ **Polysaccharides:** are storage or structural macromolecules. ᔓ

Storage Polysaccharides:

ᔓ **Starch:** a storage molecule in plants, is a polymer made of glucose molecules joined by 1-4 linkages that give starch a helical shape.

ᔓ **glycogen:** a highly branded polymer of glucose as an animal energy storage unitᔓ

Structural Polysaccharides:

ᔓ **Cellulose:** the major component of plant cell walls, differs from starch and glycogen by the configuration of the ring form of glucose and the resulting geometry of the glycoside bonds.ᔓ

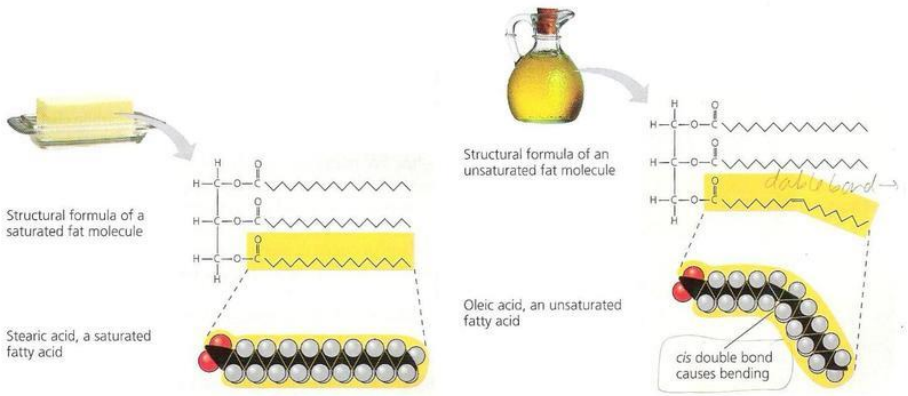
What is a function of a lipid?

3.4 Lipids are a diverse group of hydrophobic molecules

ᔓ **lipids:** do not form polymers, mix poorly with water

Fats

ᔓ **fat:** composed of fatty acids attached to the glycerol ᔓ **saturated fatty acid:** have no double bonds in their carbon chains ᔓ **unsaturated fatty acid:** fatty acids with double bonds ᔓ fats are excellent energy storage molecules, containing twice the energy of carbohydrates such as starch. ᔓ



▲ **Figure 5.12 Examples of saturated and unsaturated fats and fatty acids.** The structural formula for each fat follows a common chemical convention of omitting the carbons and attached hydrogens of the hydrocarbon regions. In the space-filling models of the fatty acids, black = carbon, gray = hydrogen, and red = oxygen.

Phospholipids

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	☙ **Golgi apparatus:** consists of a stack of flattened sacs ☙ The Golgi apparatus of plant cells manufactures some polysaccharides, such as pectin's ☙ Golgi products are sorted into vesicles ☙ **Lysosomes: Digestive Compartments** ☙ **lysosomes:** membrane - enclosed sacs containing hydrolytic enzymes that digest macromolecules ☙ **phagocytosis** ☙ **Vacuoles: Diverse Maintenance Compartments** ☙ **Vacuoles:** large vesicles ☙ food vacuoles are formed as result of phagocytosis ☙ contractile vacuoles pump excess water out of freshwater protists ☙ vacuole sin lants may stores organic compound and inorganic ion for the cell **The Endomembrane System: A Review** **4.5 Mitochondria and Chloroplasts change energy from one form to another** **The Evolutionary Origins of Mitochondria and Chloroplasts** **Mitochondria: Chemical Energy Conversion** **Chloroplasts: Capture of Light Energy** **Peroxisomes: Oxidation** **4.6 The cytoskeleton is a network of fibbers that organizes structures and activities in the cell** **Roles of the Cytoskeleton: Support and Motility** **Components of the Cytoskeleton** **Microtubules** **Centrosomes and Centrioles** **Cilia and Flagella** **Microfilaments (Actin Filaments)** **Intermediate Filaments** **4.7 Extracellular components and connections between cells help coordinate cellular activities** **Cell Walls of Plants** **The Extracellular Matric (ECM) of Animal Cells** **Cell Junctions** **Plasmodesmata in Plant Cells** **Tight Junction, Desmosomes, and Gap Junctions in Animal Cells** **The Cell: A living unit greater than the Sum of its Parts**

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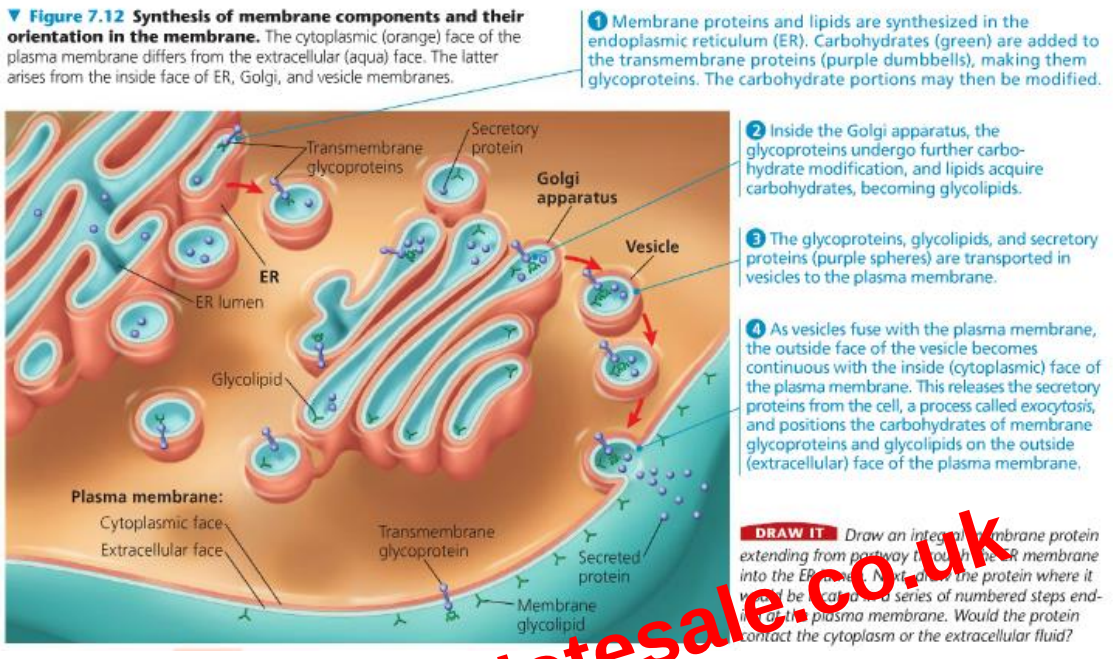
☙ **Glycolipids:** membrane carbohydrate bonded to a lipid ☙ **Glycoproteins:** carbohydrate bonded to a protein ☙ location of carbohydrates on cell membranes surface functions as a marker that distinguish one cell from another. ☙



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Synthesis and Sidedness of Membranes

☙ The asymmetric arrangement of proteins, lipids, and their associated carbohydrates in the plasma membrane is determined as the membrane is being built by the endoplasmic reticulum (ER) and Golgi apparatus ☙

5.2 Membrane Structure results in selective permeability

☙ The plasma membrane permits a regular exchange of nutrients, waste products, oxygen, and inorganic ions. ☙

The Permeability of the Lipid Bilayer

☙ Hydrophobic, nonpolar molecules (ex: hydrocarbons, CO2, and O2) can dissolve in and cross a membrane ☙ Polar, hydrophilic ion/molecules are "blocked" by the hydrophobic interior of the membrane and need transport proteins ☙ A charged atom or molecule and its surrounding shell of water are "more blocked/ stronger blocked?" by the hydrophobic interior of the membrane ☙

Transport Proteins

☙ **Transport Proteins** transports ions and molecules that cannot pass the membrane easily by themselves ☙ **Channel Proteins:** function by hacing a hydrophilic channel that certain molecules or atomic ions use as a tunnel through the membrane ☙ **Aquaporins:** channel proteins specifically for water molecules ☙ a transport protein is specific for the substance it translocates (moves) allowing only a certain substance to cross the membrane ☙ The selective permeability of a