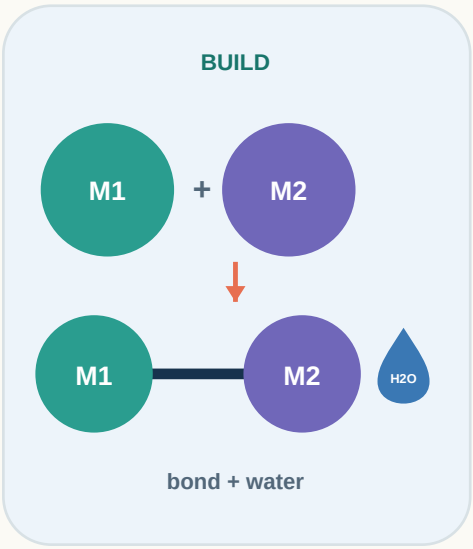
AP BIOLOGY | UNIT 1

TOPIC 1.3

Introduction to Biological Macromolecules

Cells build and break large molecules by moving the components of water across covalent bonds.



THE CORE CAUSAL CHAIN

MONOMERS
smaller units

→

DEHYDRATION
remove H and OH

→

COVALENT BOND
units connected

→

POLYMER
larger molecule

BY THE END, YOU SHOULD BE ABLE TO...

1. Distinguish a monomer from a polymer.
2. Model dehydration synthesis as a bond-building reaction.
3. Model hydrolysis as a water-using bond-breaking reaction.

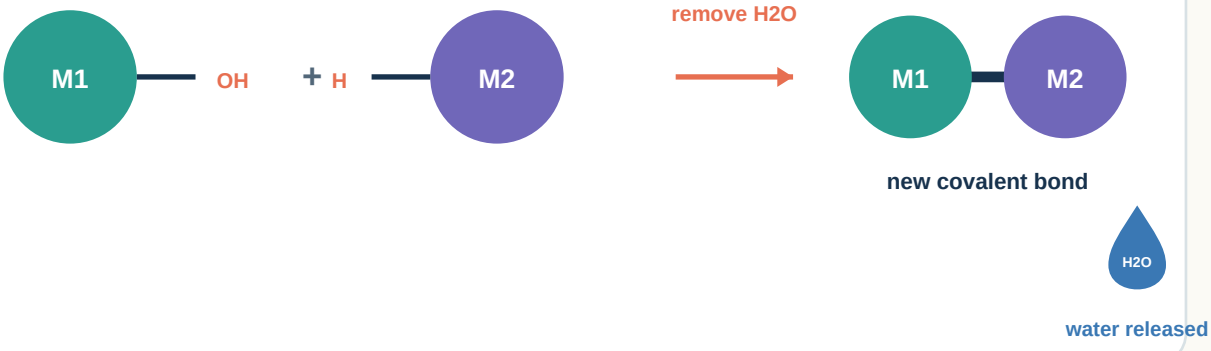
BIG IDEA

Dehydration synthesis removes the equivalent of water to form a covalent bond. Hydrolysis adds water across a bond to split a larger molecule.

1 Dehydration synthesis builds

A hydrogen ion and hydroxyl group are removed; the remaining monomers form a covalent bond.

REACTION MODEL



THREE STEPS

1 REMOVE H
One monomer loses a hydrogen ion.

2 REMOVE OH
The other loses a hydroxyl group.

3 JOIN
A covalent bond forms and water is released.

REPEATED JOINING = POLYMERIZATION



Each added monomer forms another covalent bond.

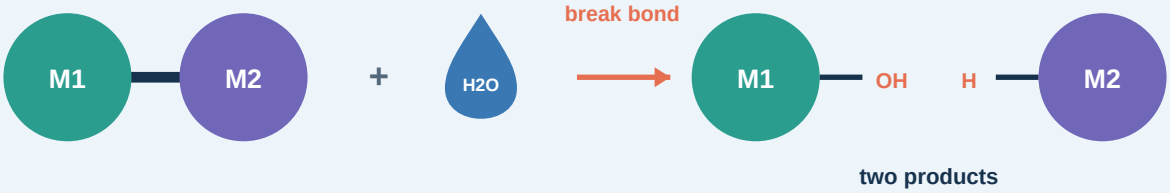
MEMORY SHORTCUT

BUILD = take water out. Dehydration synthesis produces water while connecting smaller molecules.

2 Hydrolysis breaks

Water is added across a covalent bond; H attaches to one product and OH attaches to the other.

REACTION MODEL



water supplies H and OH

THREE STEPS

1 ADD WATER

H2O becomes a reactant at the bond.

2 BREAK BOND

The covalent link between units is cleaved.

3 CAP PRODUCTS

H and OH complete the two smaller molecules.

BUILD VS. BREAK

FEATURE	DEHYDRATION SYNTHESIS	HYDROLYSIS
Effect	Joins smaller molecules	Separates a larger molecule
Water	Released as a product	Used as a reactant
Covalent bond	Formed	Broken

COMMON ERRORS

Dehydration synthesis does not mean a cell simply dries out. Hydrolysis does not mean a polymer merely dissolves; water participates in the reaction.