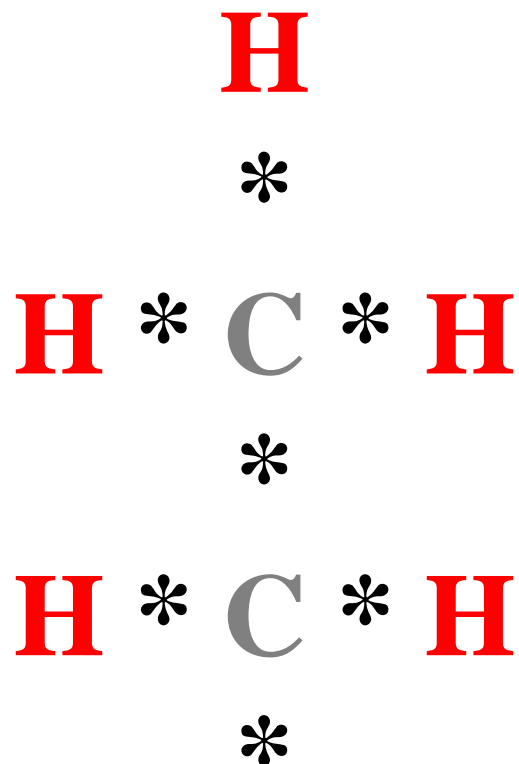


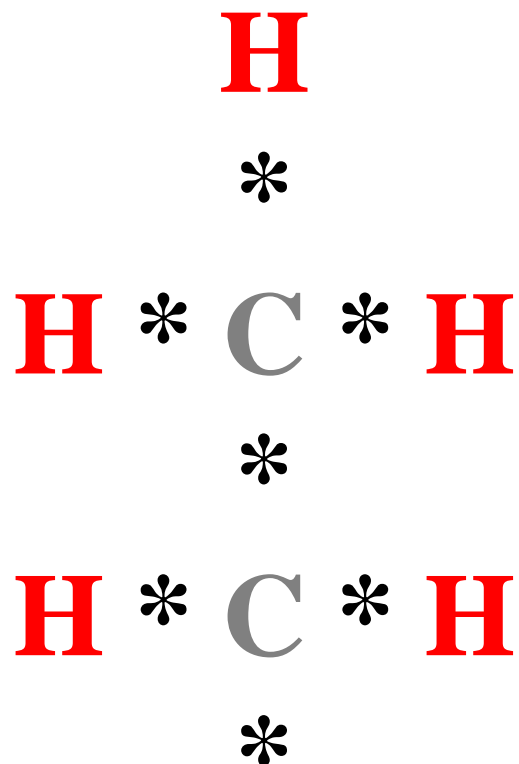
* = BOND

ETHANE (C₂H₆)



* = BOND

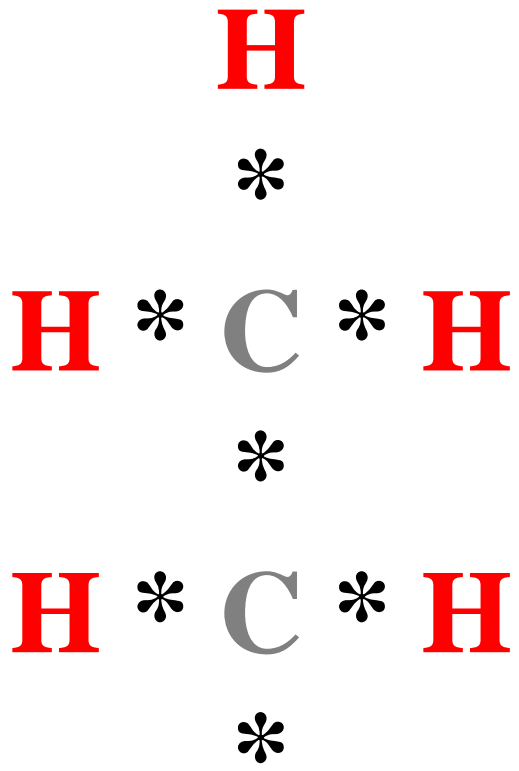
ETHANE (C₂H₆)



* = BOND

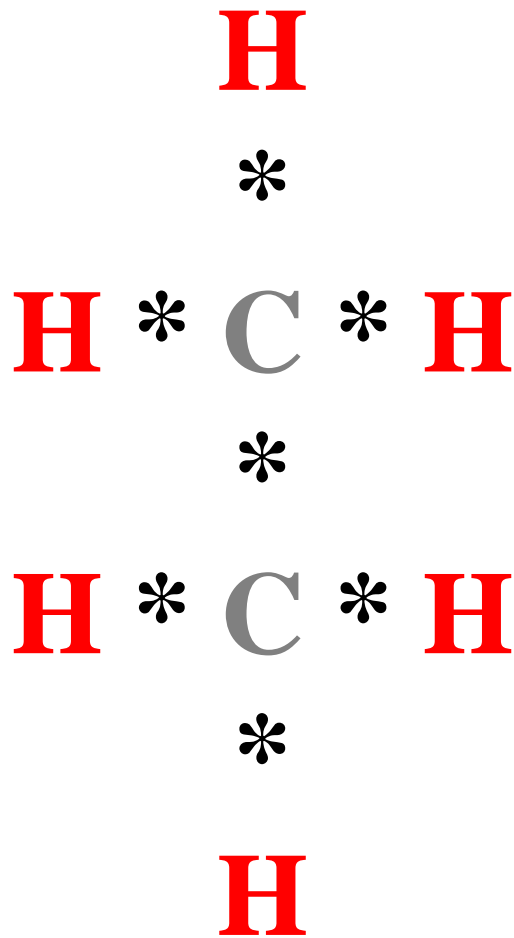
OH = HYDROXYL GROUP

C2H6O1



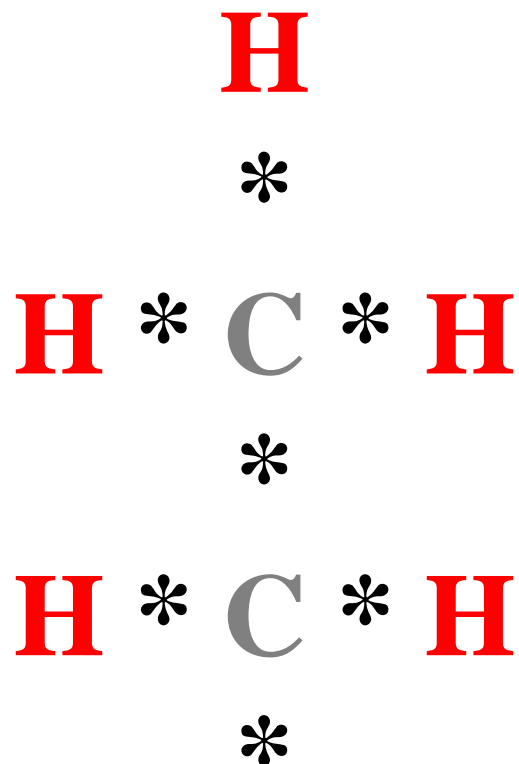
OH

ETHANOL (C₂H₆O₁)



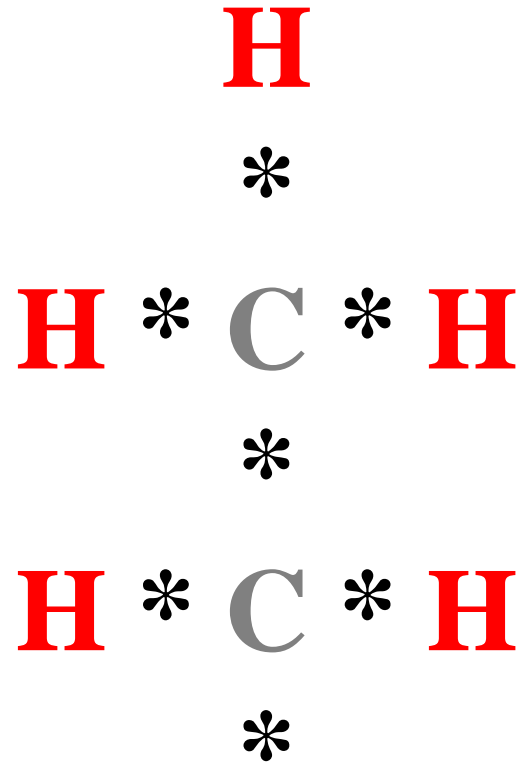
* = BOND

ETHANE (C₂H₆)



* = BOND

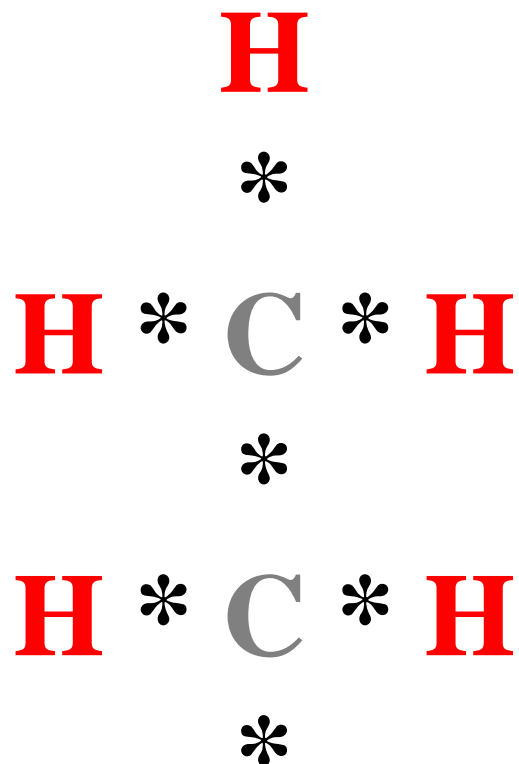
ETHANE (C₂H₆)



* = BOND

NH₂ = AMINO GROUP

C₂H₇N₁



* = BOND

NH₂ = AMINO GROUP

ETHYL AMINE (C₂H₇N₁)



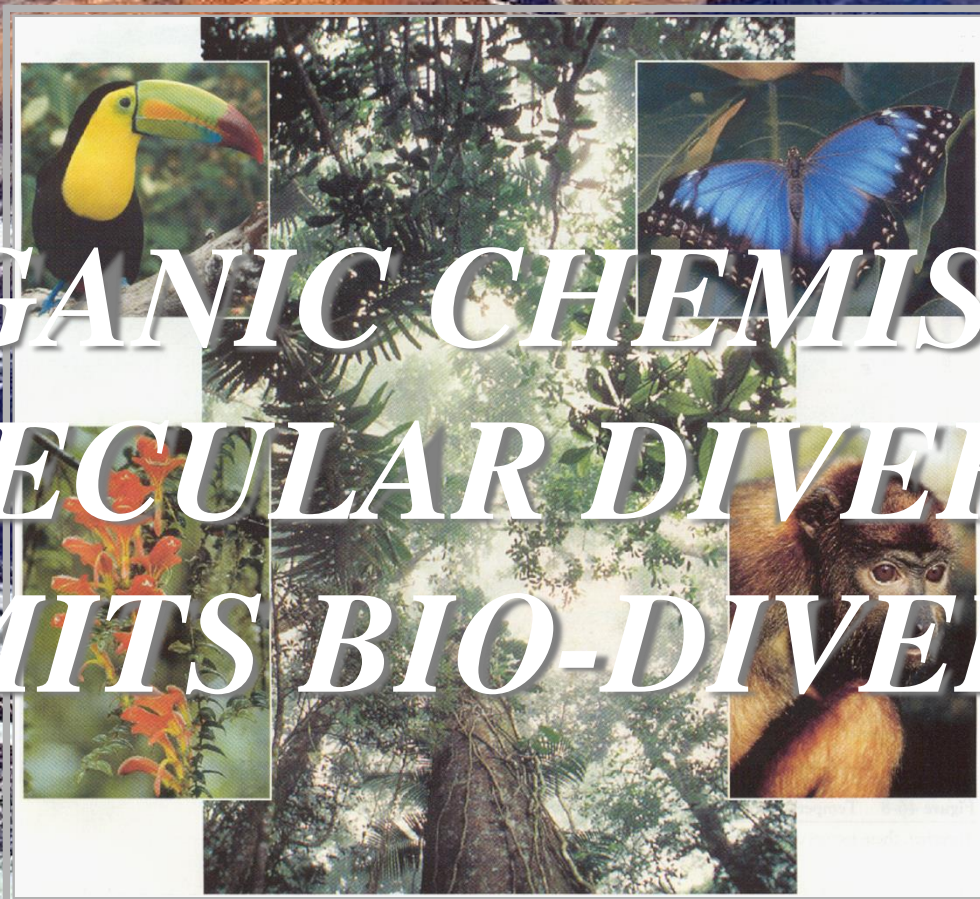
*ORGANIC
CHEMISTRY
HIGHLY
COMPLEX*

NUCLEUS

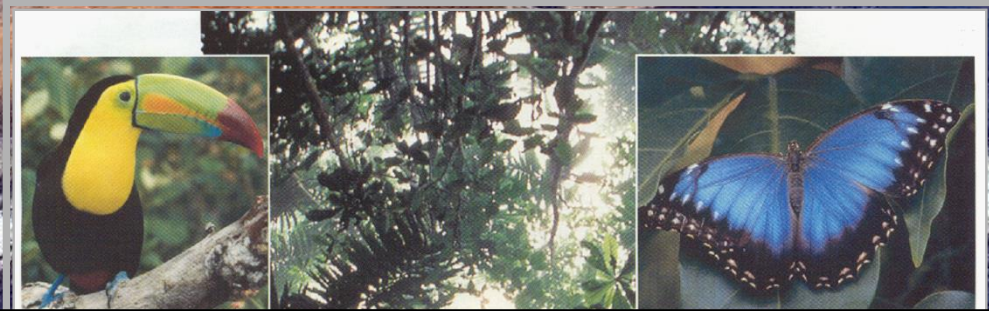


10

*ORGANIC CHEMISTRY
MOLECULAR DIVERSITY
PERMITS BIO-DIVERSITY*



EARTH



~10 MILLION SPECIES



EARTH

CHAPTER 05

MACROMOLECULES

MACROMOLECULES

MACROMOLECULES

MACROMOLECULES

**LARGE
ORGANIC MOLECULES**

MACROMOLECULE



MACROMOLECULE EXAMPLE

PHOTOSYNTHESIS

G



WATER

CO₂

LIGHT ENERGY

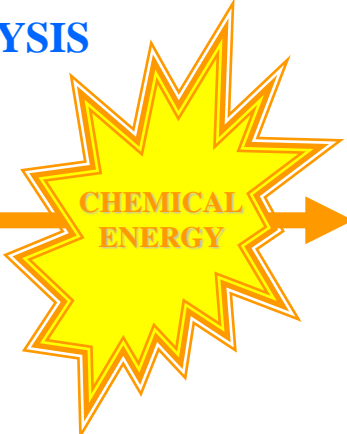
PHOTO

ATMOSPHERE

E- PHOTOLYSIS



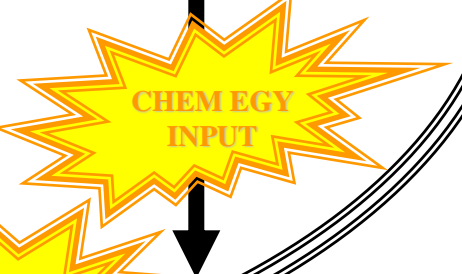
LT RXT
THYLAKOID



DK RXT
STROMA

CHLOROPLAST

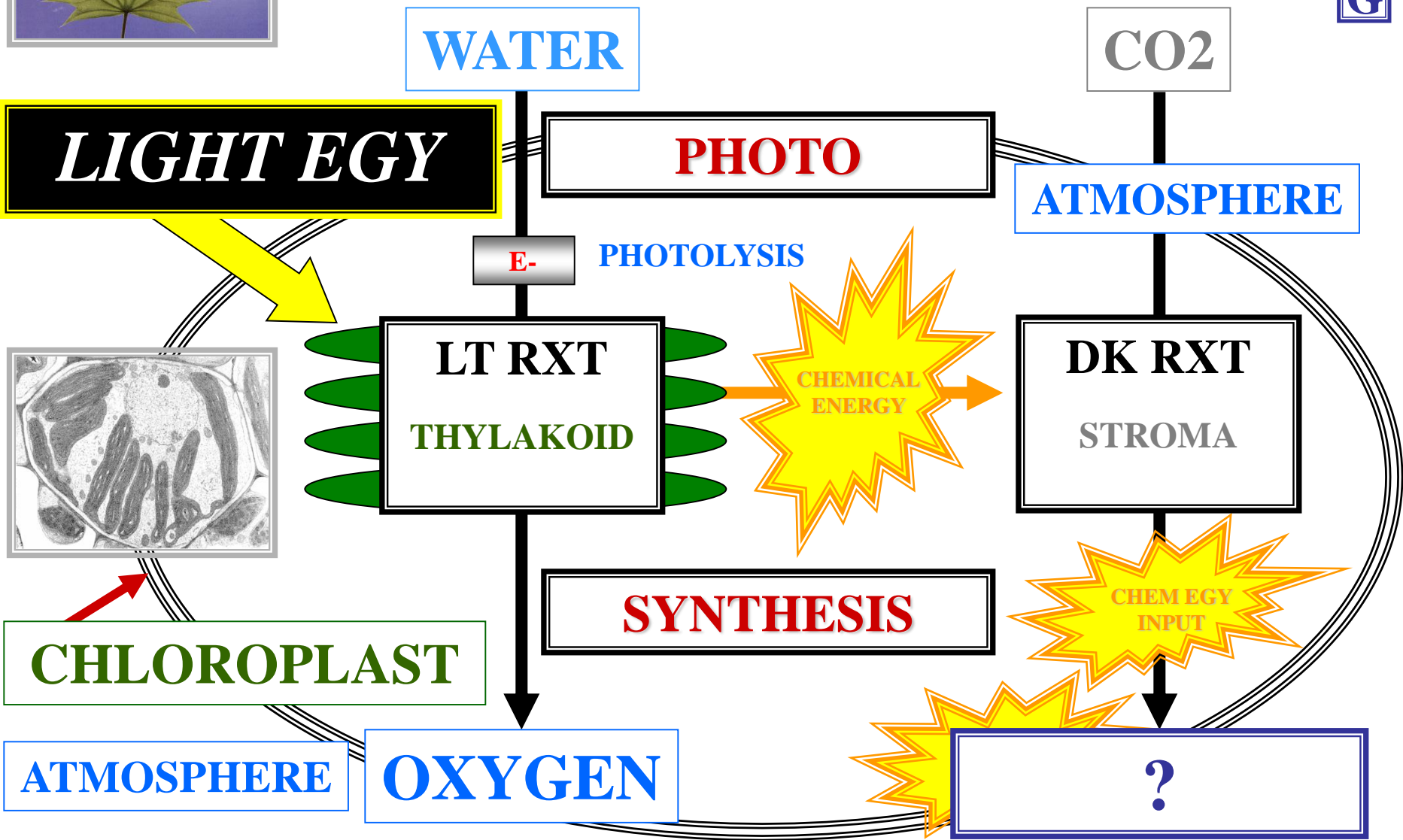
SYNTHESIS



ATMOSPHERE

OXYGEN

?



PHOTOSYNTHESIS



G
+

WATER

CO₂

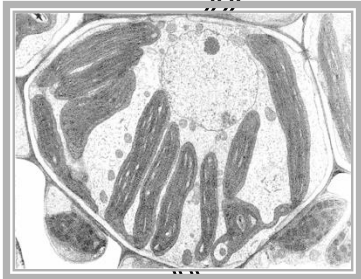
LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT
THYLAKOID

CHEMICAL
ENERGY

DK RXT
STROMA

CHLOROPLAST

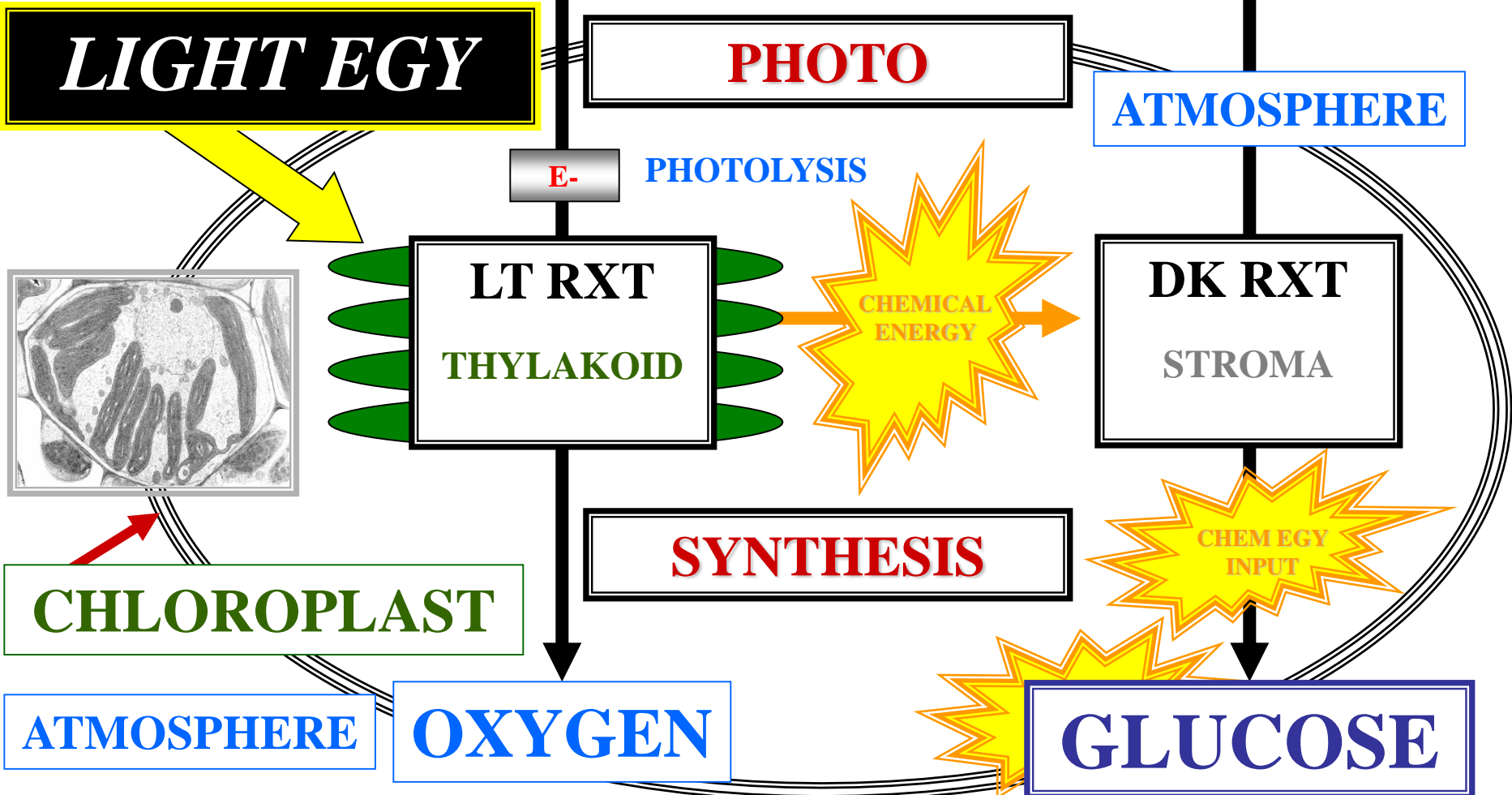
SYNTHESIS

CHEMICAL
INPUT

ATMOSPHERE

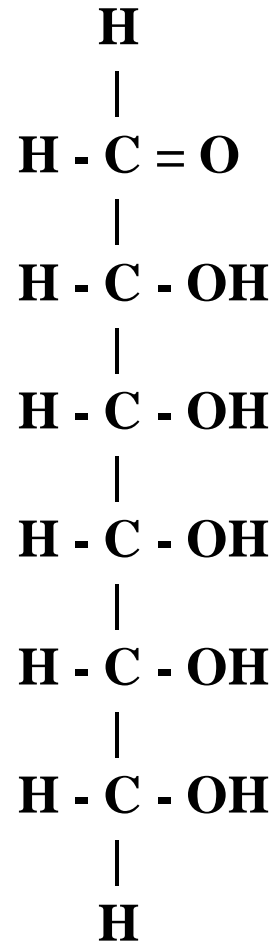
OXYGEN

GLUCOSE





MACROMOLECULE



GLUCOSE

QUESTION

**WHAT TYPE OF
BIOLOGIST
WOULD STUDY
MACROMOLECULES?**

QUESTION

ANSWER

PHYSIOLOGIST

ANSWER

PHYSIOLOGIST



PHYSIOLOGIST

STUDIES

BIOCHEMISTRY

STUDIES

MACROMOLECULES

PHYSIOLOGIST

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES

CARBOHYDRATES

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES

CARBOHYDRATES
LIPIDS

**MACROMOLECULE
CLASSES**

MACROMOLECULE CLASSES

CARBOHYDRATES

LIPIDS

PROTEINS

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES



CARBOHYDRATES

LIPIDS

PROTEINS

NUCLEIC ACIDS

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES



CARBOHYDRATES – COMPRISED SUGARS

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES



CARBOHYDRATES – COMPRISED SUGARS
LIPIDS – COMPRISED FATTY ACIDS

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES



CARBOHYDRATES – COMPRISED SUGARS
LIPIDS – COMPRISED FATTY ACIDS
PROTEINS – COMPRISED AMINO ACIDS

MACROMOLECULE CLASSES

MACROMOLECULE CLASSES



- CARBOHYDRATES – COMPRISED SUGARS
- LIPIDS – COMPRISED FATTY ACIDS
- PROTEINS – COMPRISED AMINO ACIDS
- NUCLEIC ACIDS – COMPRISED NUCLEOTIDES

MACROMOLECULE CLASSES

MONOMERS
VS
POLYMERS

MONOMER

MONOMER

POLYMER SUBUNIT

MONOMER

POLYMER

POLYMER

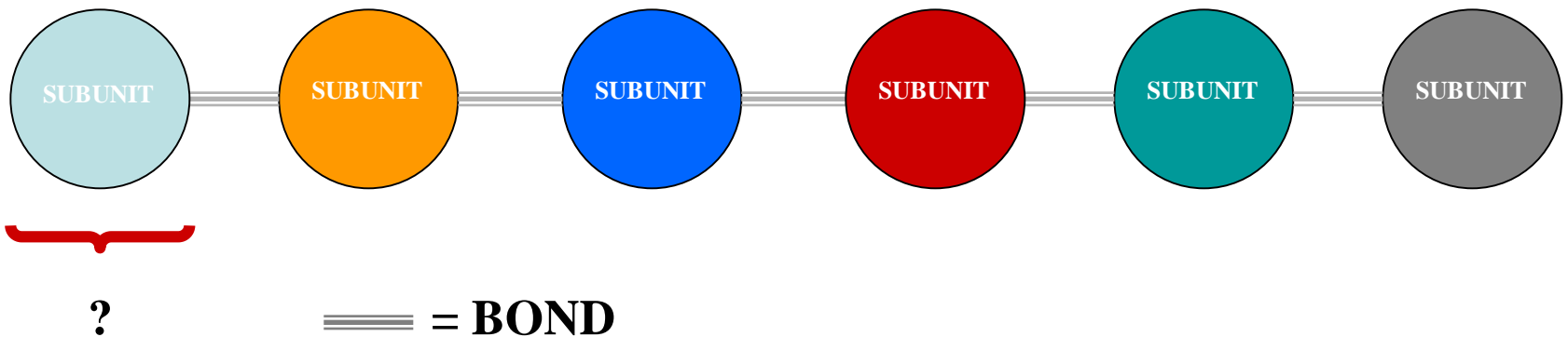
MONOMER ASSEMBLAGE

POLYMER



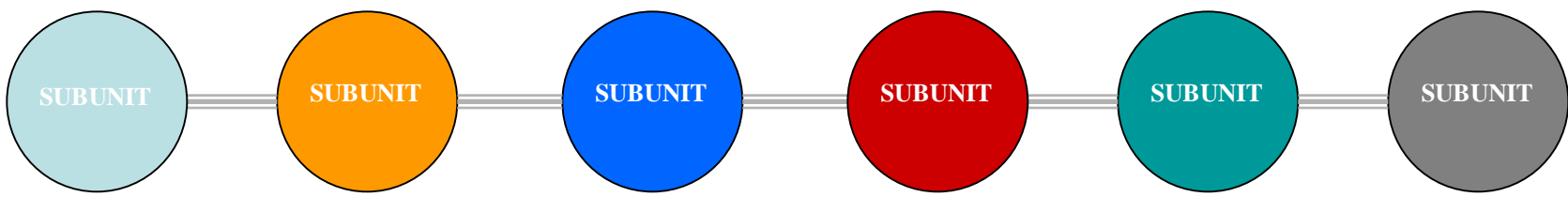
MONOMIERS VS POLYMIERS APPLIED

MACROMOLECULE MONOMER VS POLYMER



MACROMOLECULE

MACROMOLECULE MONOMER VS POLYMER

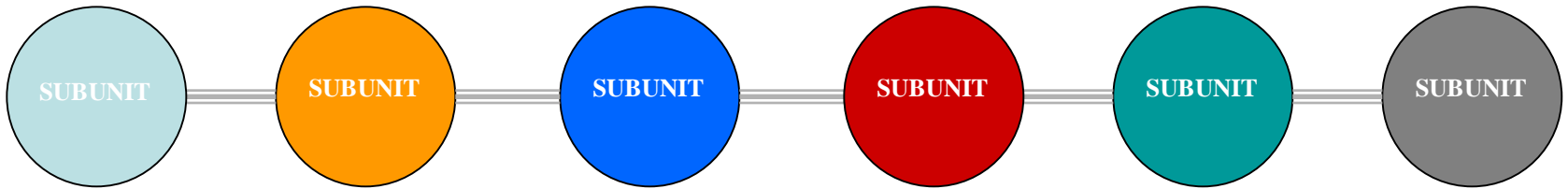


MONOMER **== = BOND**



MACROMOLECULE

MACROMOLECULE MONOMER VS POLYMER



MONOMER

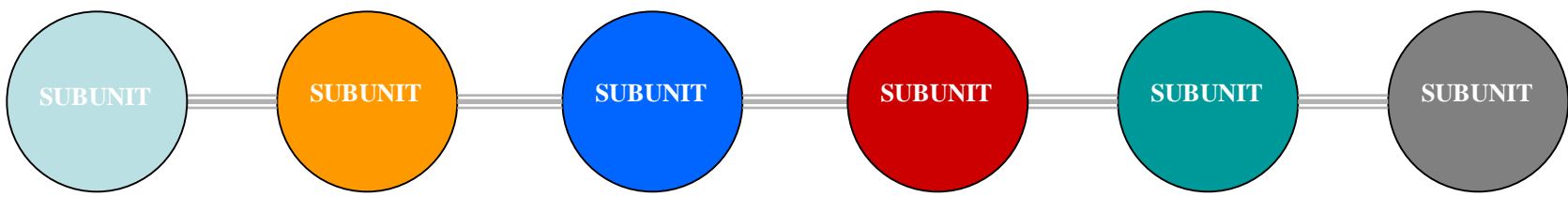
== = BOND



?



MACROMOLECULE MONOMER VS POLYMER



MONOMER

== = BOND



POLYMER



**CONDENSATION
REACTION
VS
HYDROLYSIS
REACTION**

CONDENSATION REACTION

CONDENSATION REACTION



CONDENSATION REACTION

MONOMER ADDED
TO POLYMER

CONDENSATION REACTION



CONDENSATION REACTION

MONOMER ADDED
TO POLYMER

COVALENT BOND FORMED

CONDENSATION REACTION

CONDENSATION REACTION

MONOMER ADDED

TO POLYMER

COVALENT BOND FORMED

DERIVING WATER

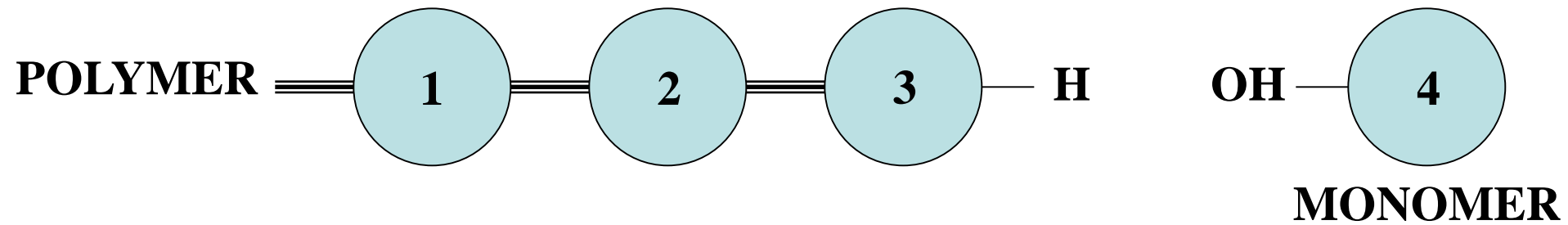
CONDENSATION REACTION



CONDENSATION REACTION APPLIED

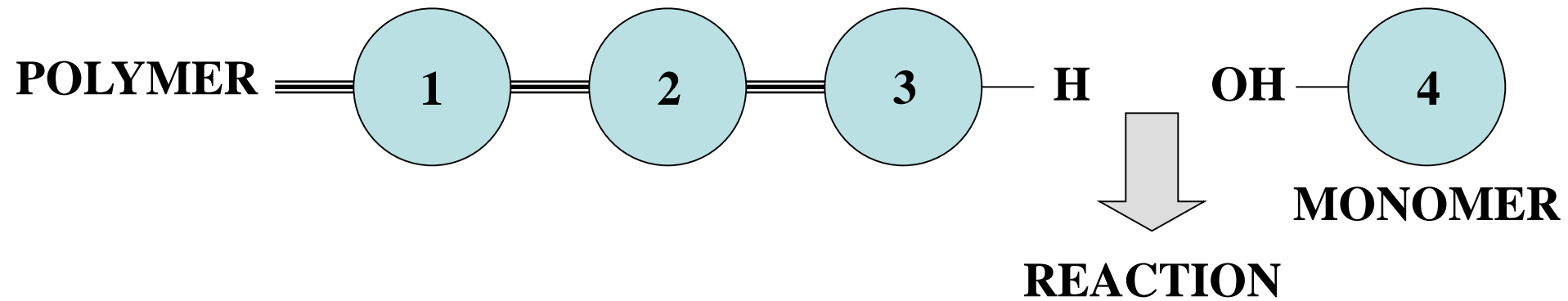


MACROMOLECULE CONDENSATION REACTION

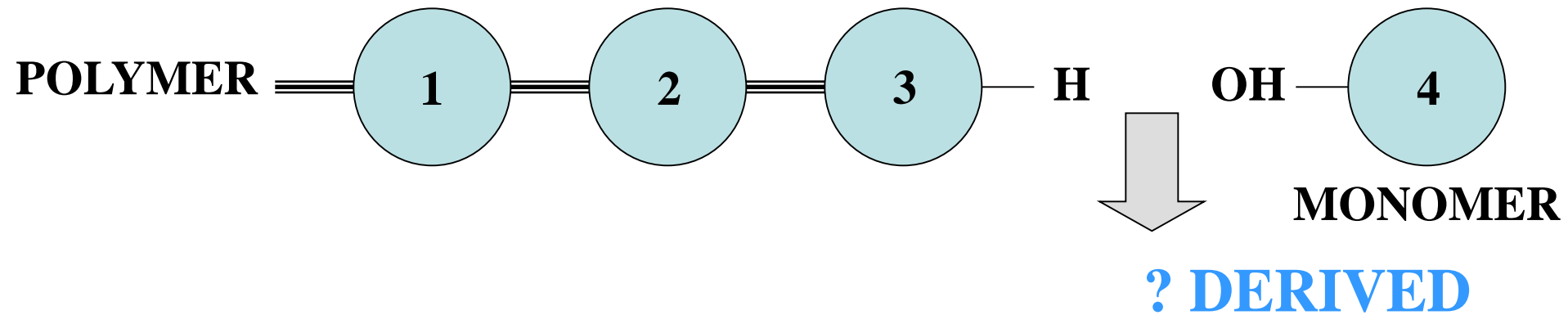




MACROMOLECULE CONDENSATION REACTION

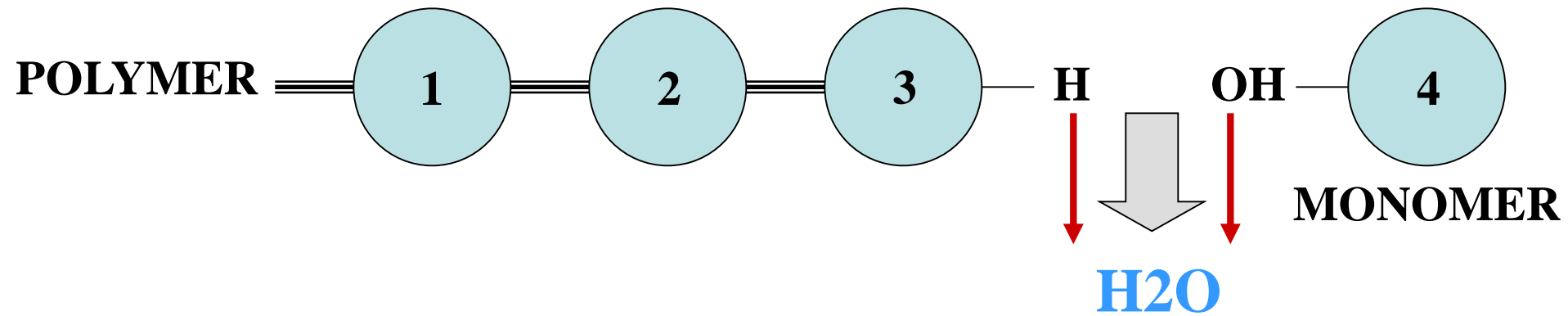


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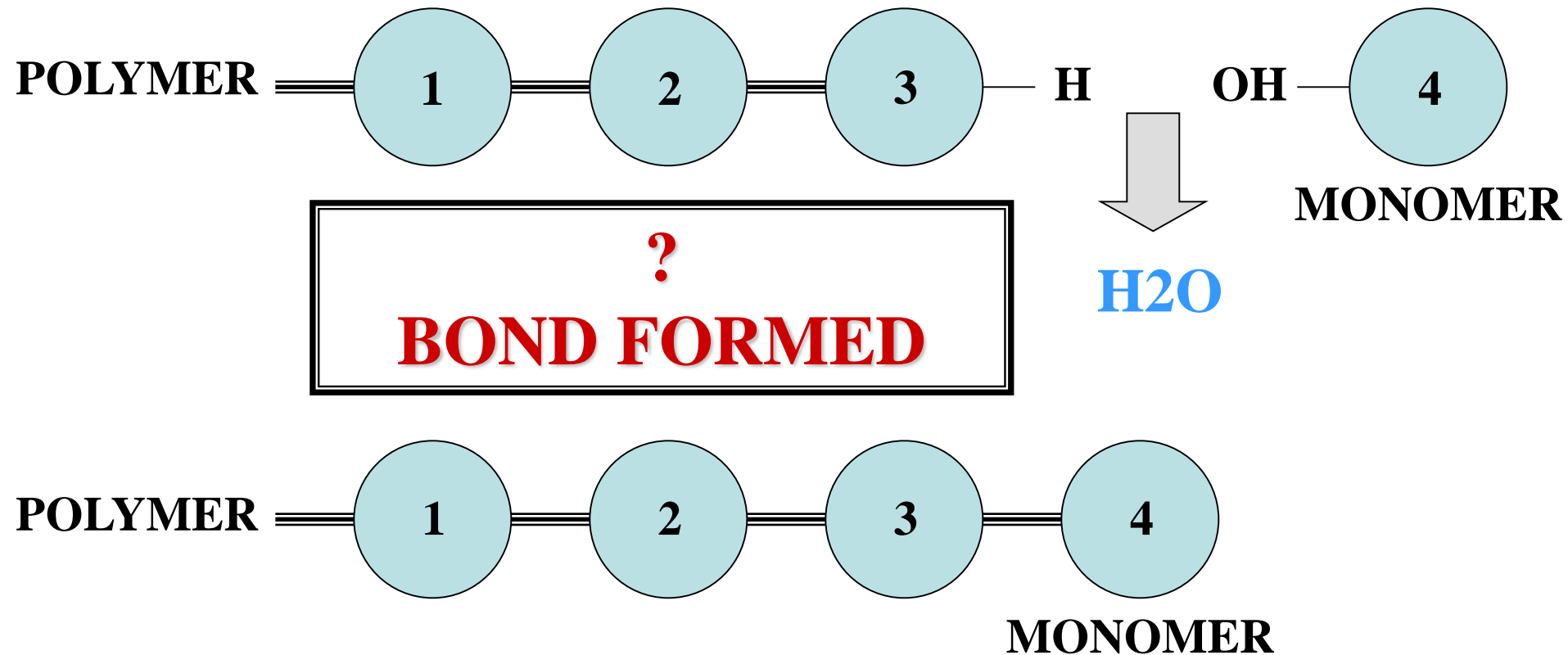




MACROMOLECULE CONDENSATION REACTION

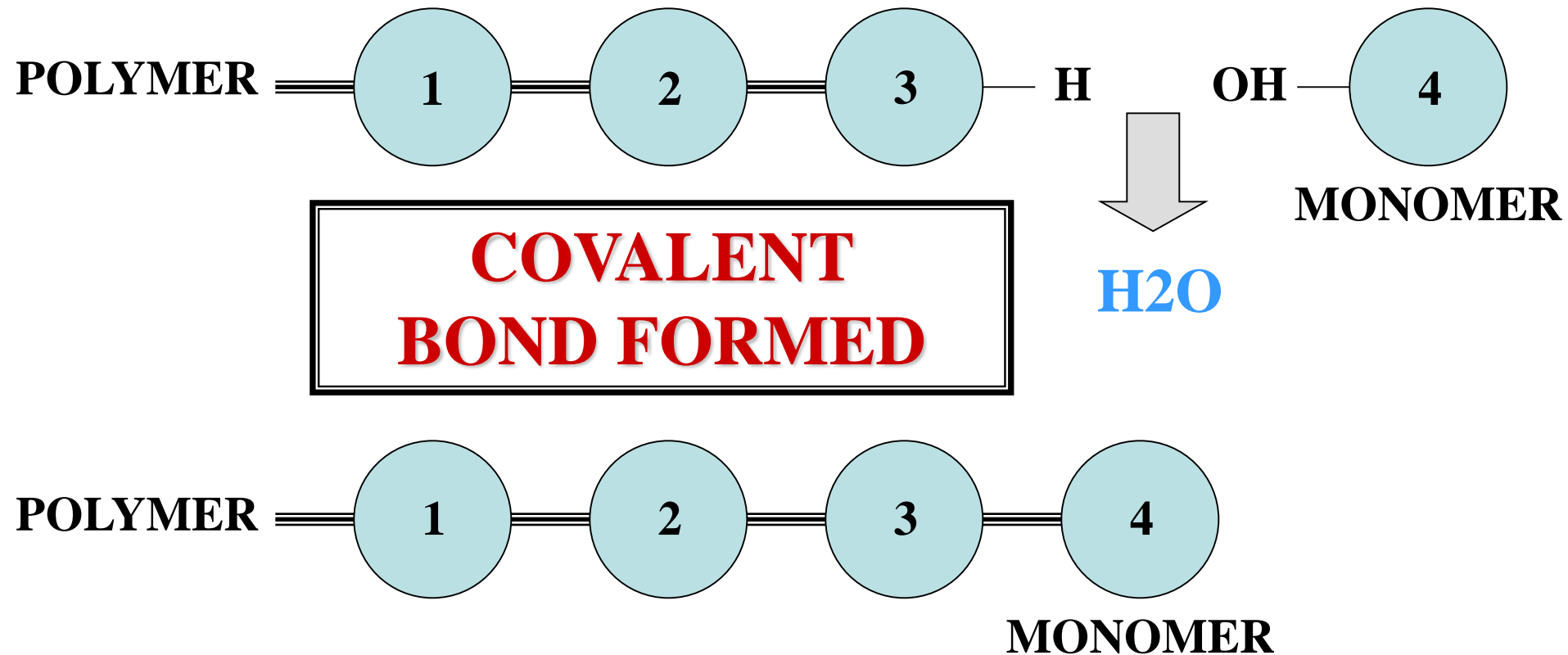


MACROMOLECULE CONDENSATION REACTION

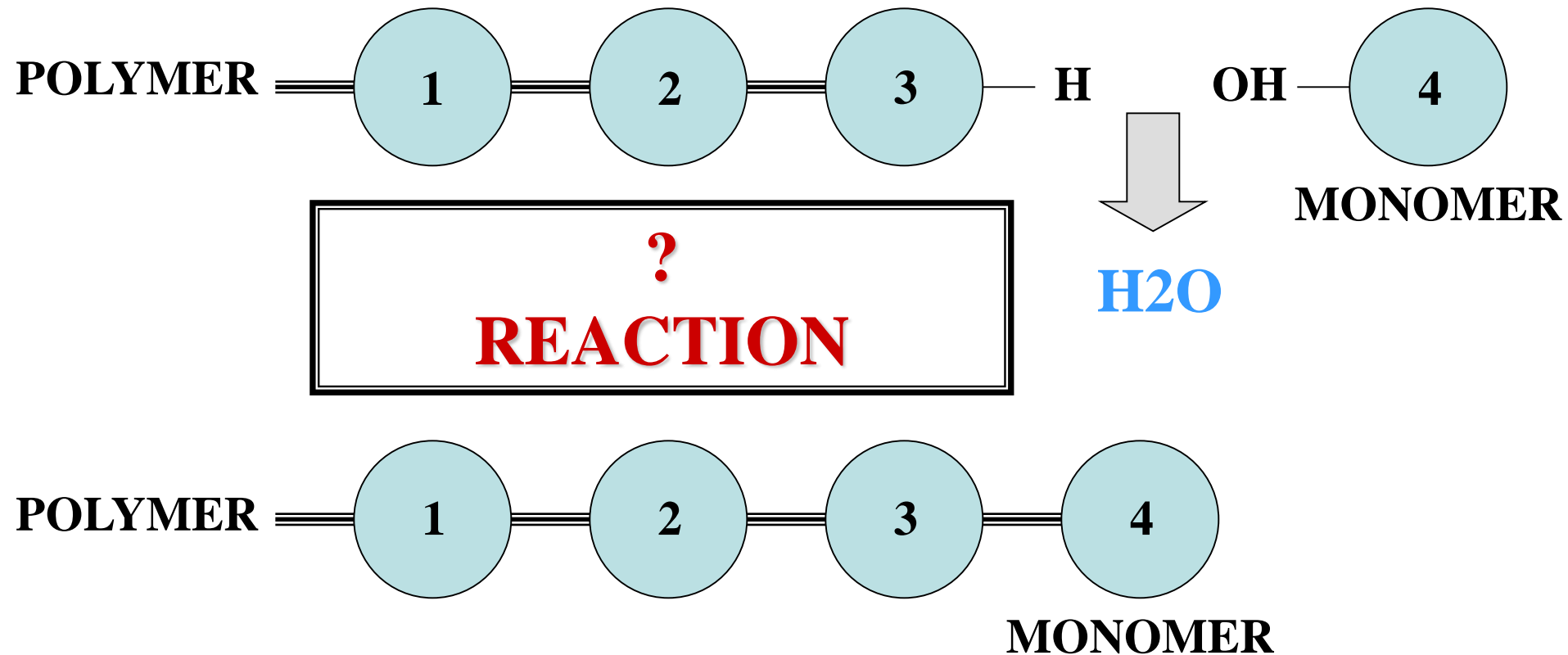




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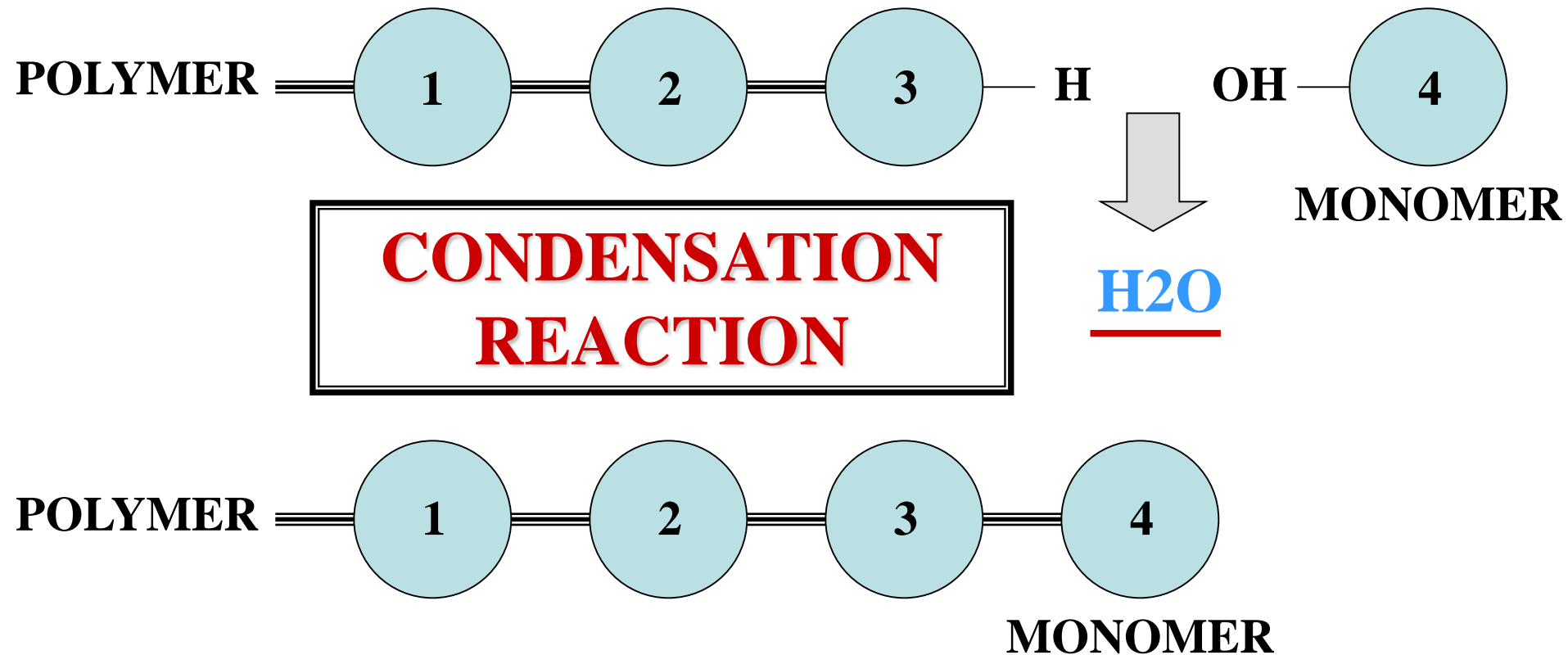


MACROMOLECULE CONDENSATION REACTION



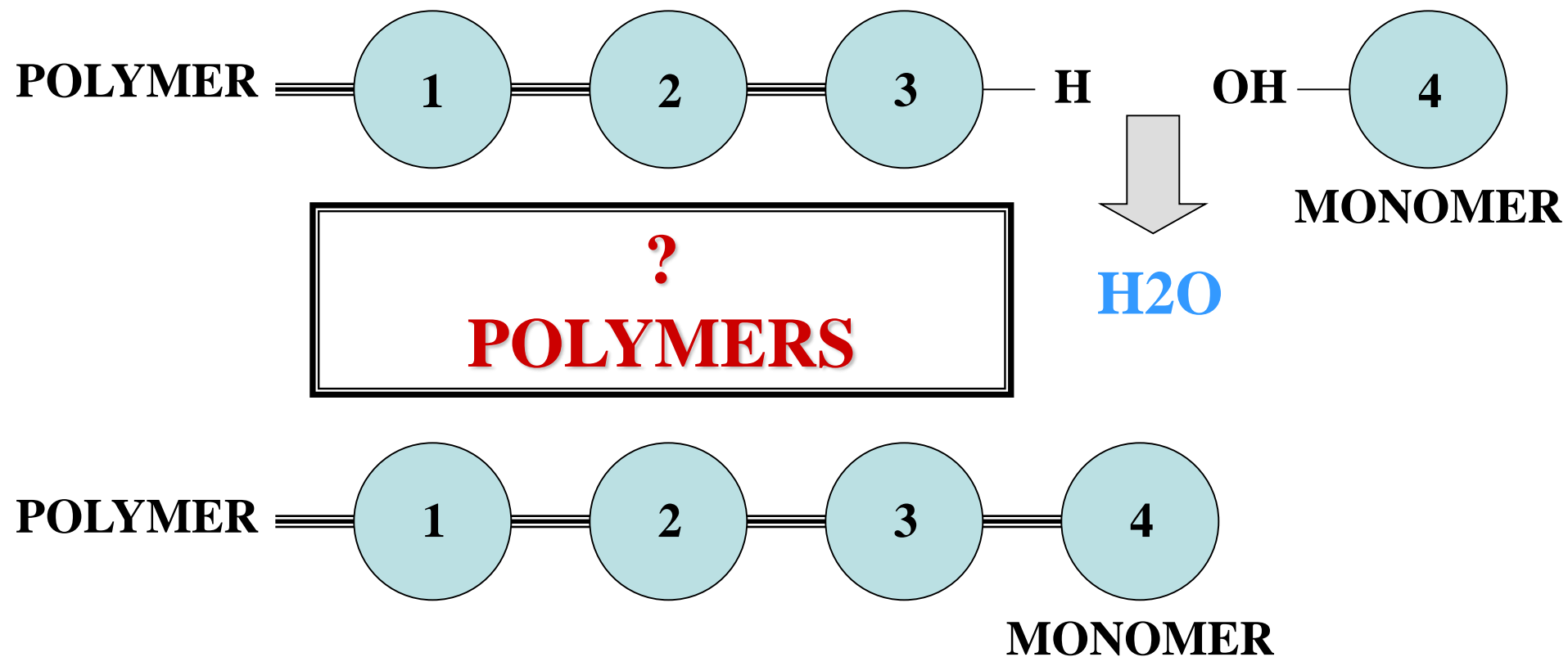


MACROMOLECULE CONDENSATION REACTION



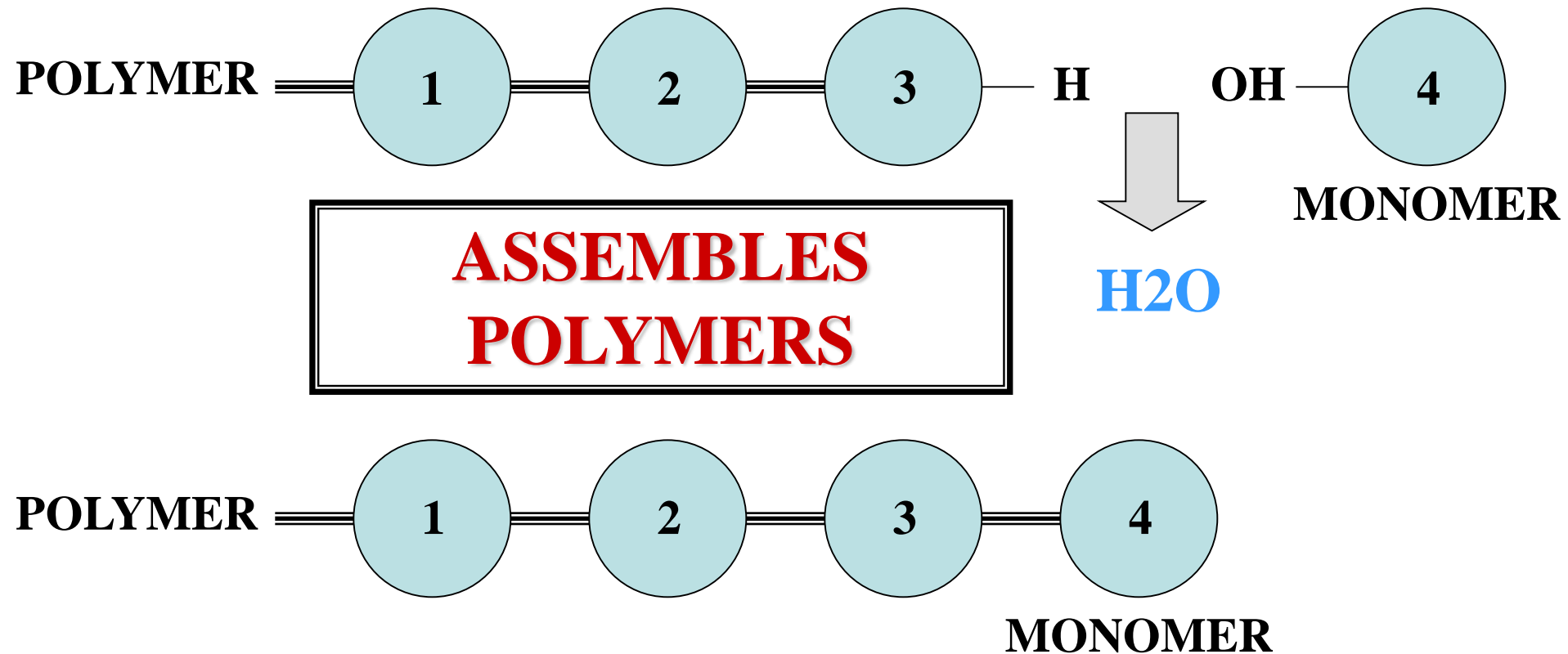


MACROMOLECULE CONDENSATION REACTION





MACROMOLECULE CONDENSATION REACTION



HYDROLYSIS REACTION

HYDROLYSIS REACTION



HYDROLYSIS REACTION

MONOMER REMOVED
FROM POLYMER

HYDROLYSIS REACTION



HYDROLYSIS REACTION

MONOMER REMOVED
FROM POLYMER

COVALENT BOND BROKEN

HYDROLYSIS REACTION


HYDROLYSIS REACTION

MONOMER REMOVED
FROM POLYMER

COVALENT BOND BROKEN

CONSUMING WATER

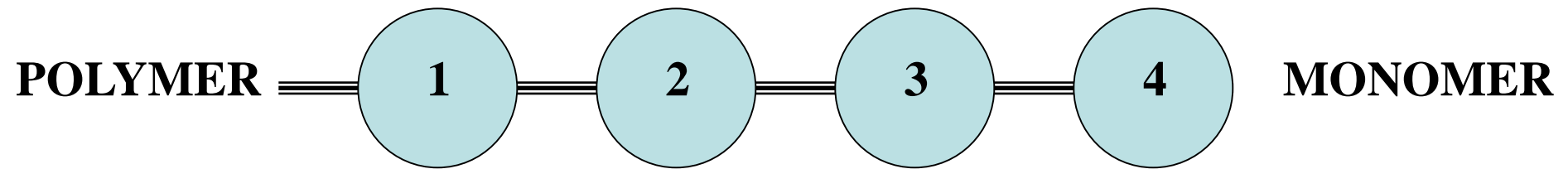
HYDROLYSIS REACTION



HYDROLYSIS REACTION APPLIED

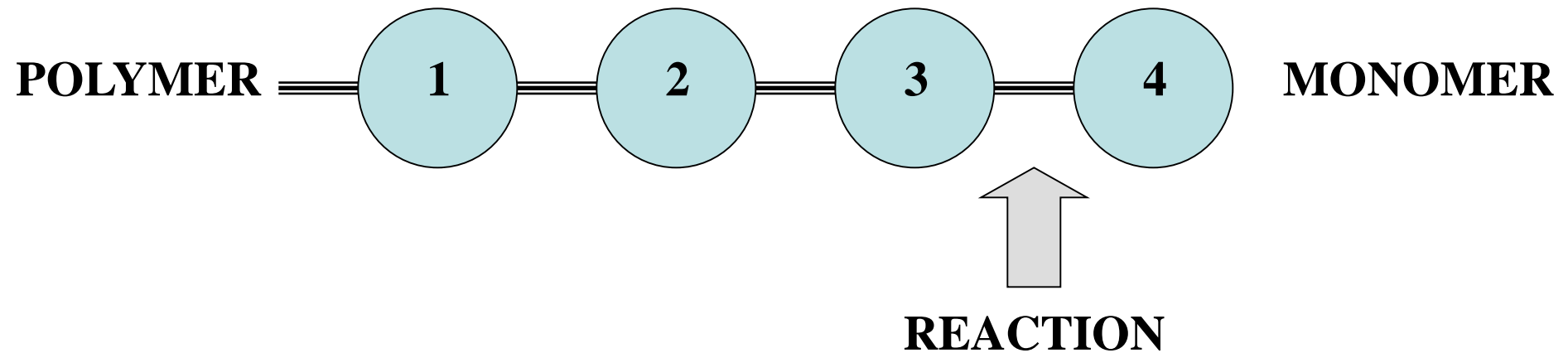


MACROMOLECULE HYDROLYSIS REACTION

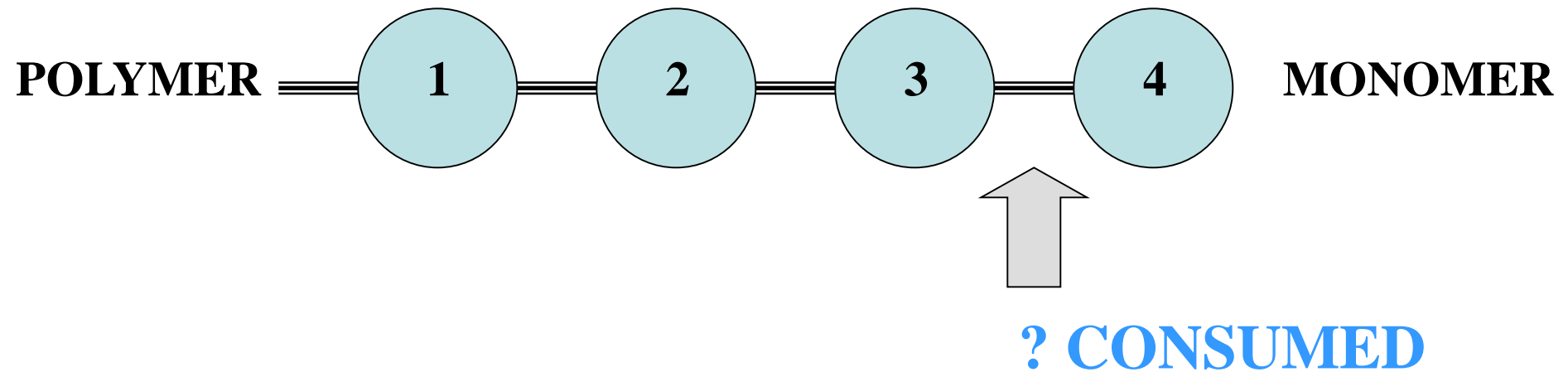




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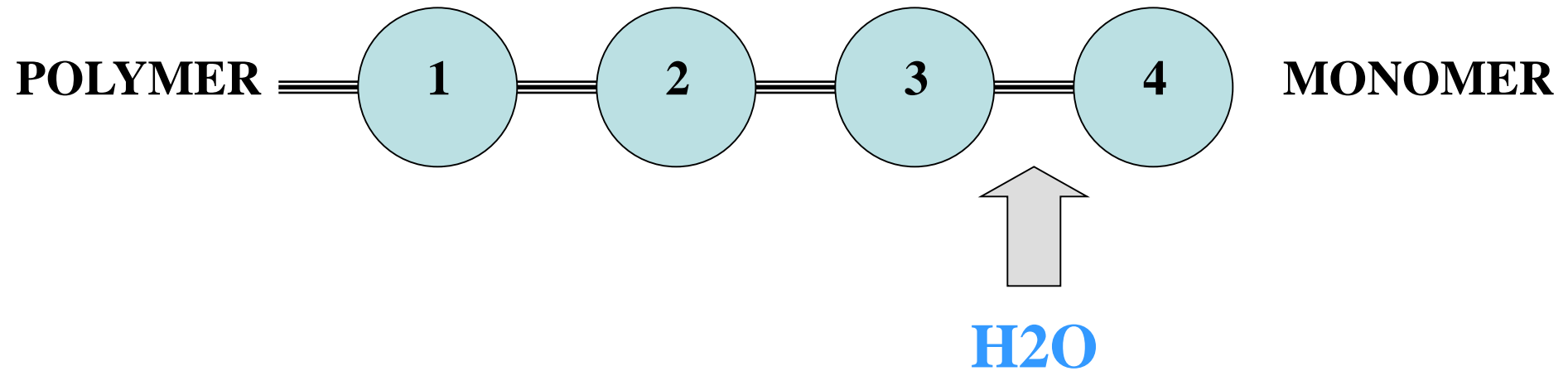


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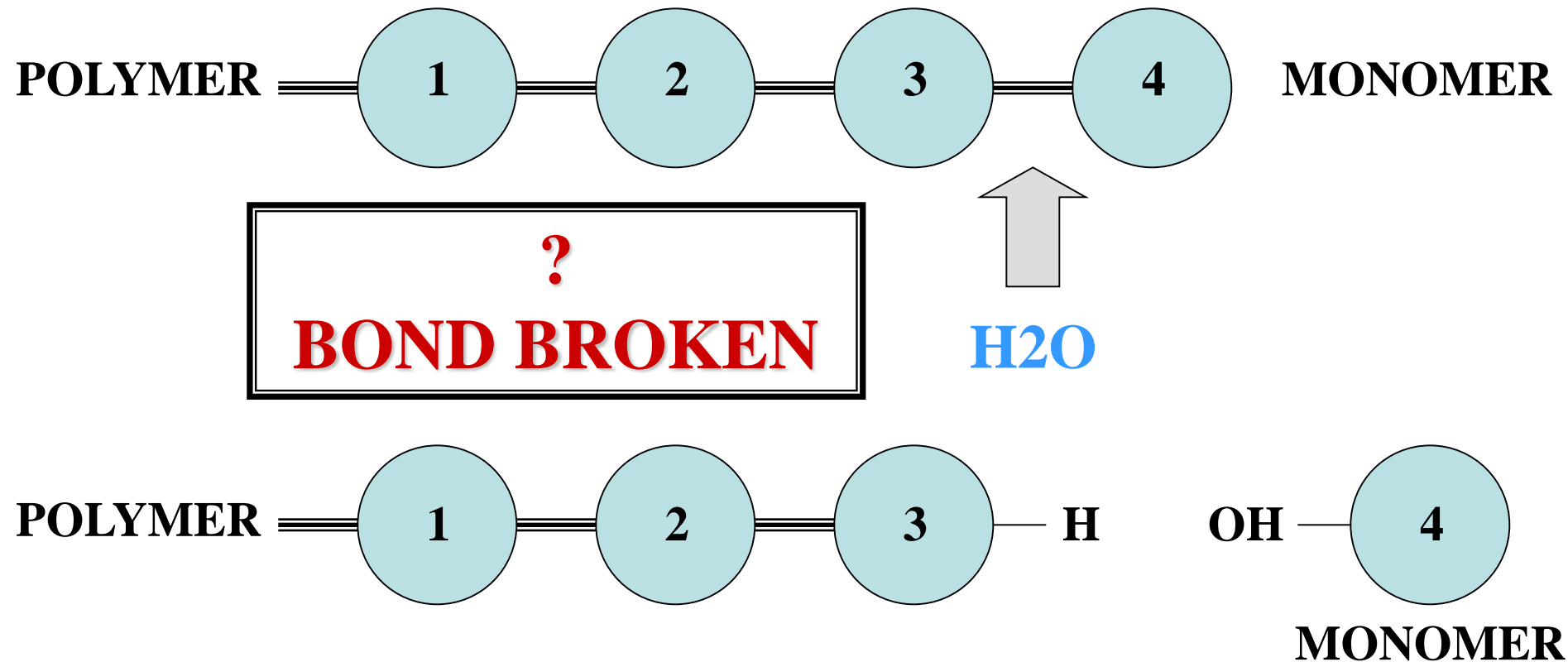




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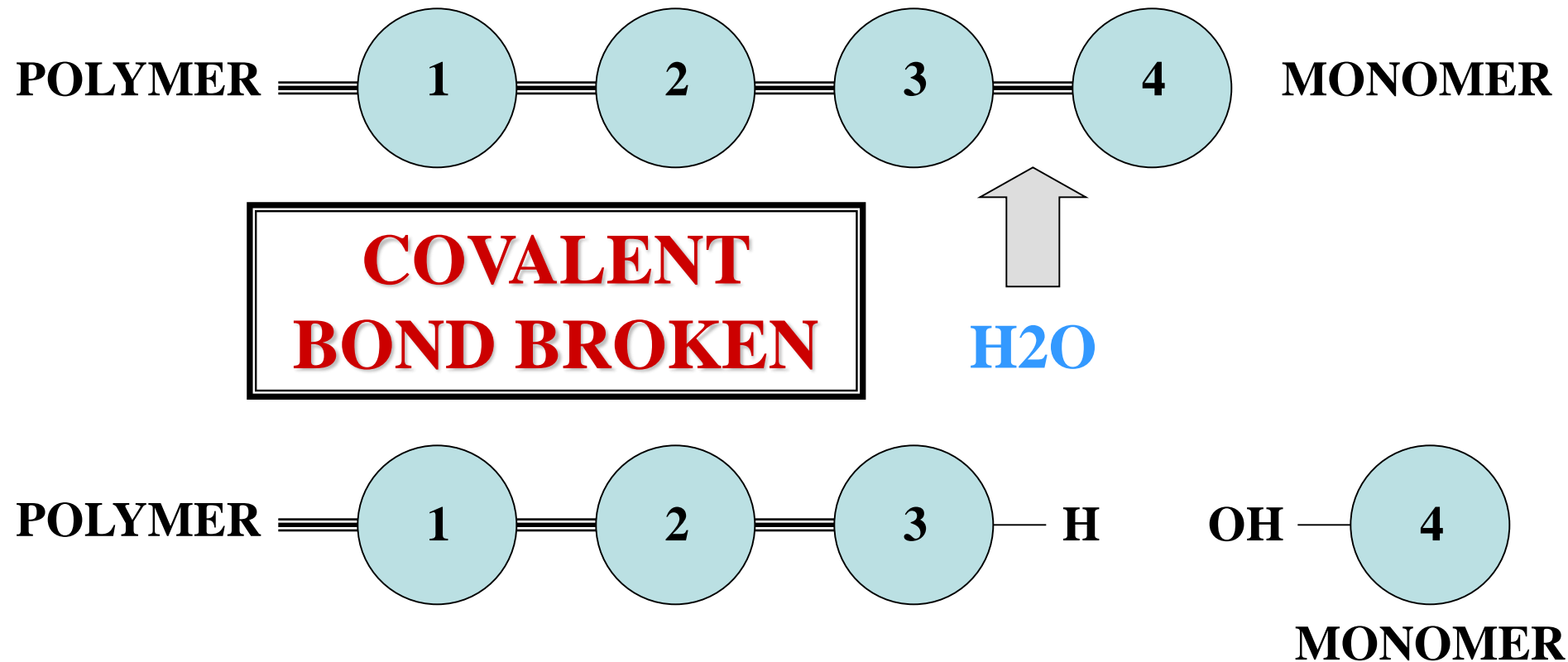


MACROMOLECULE HYDROLYSIS REACTION

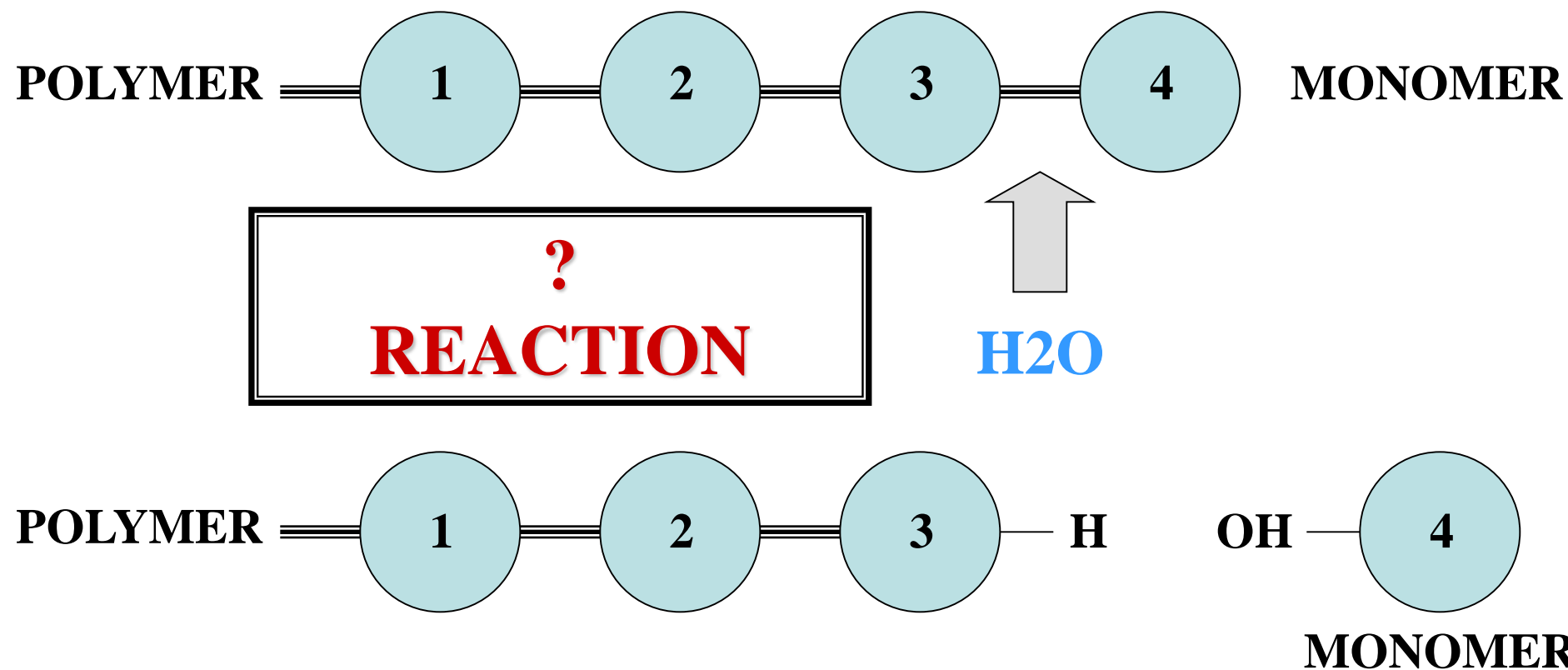




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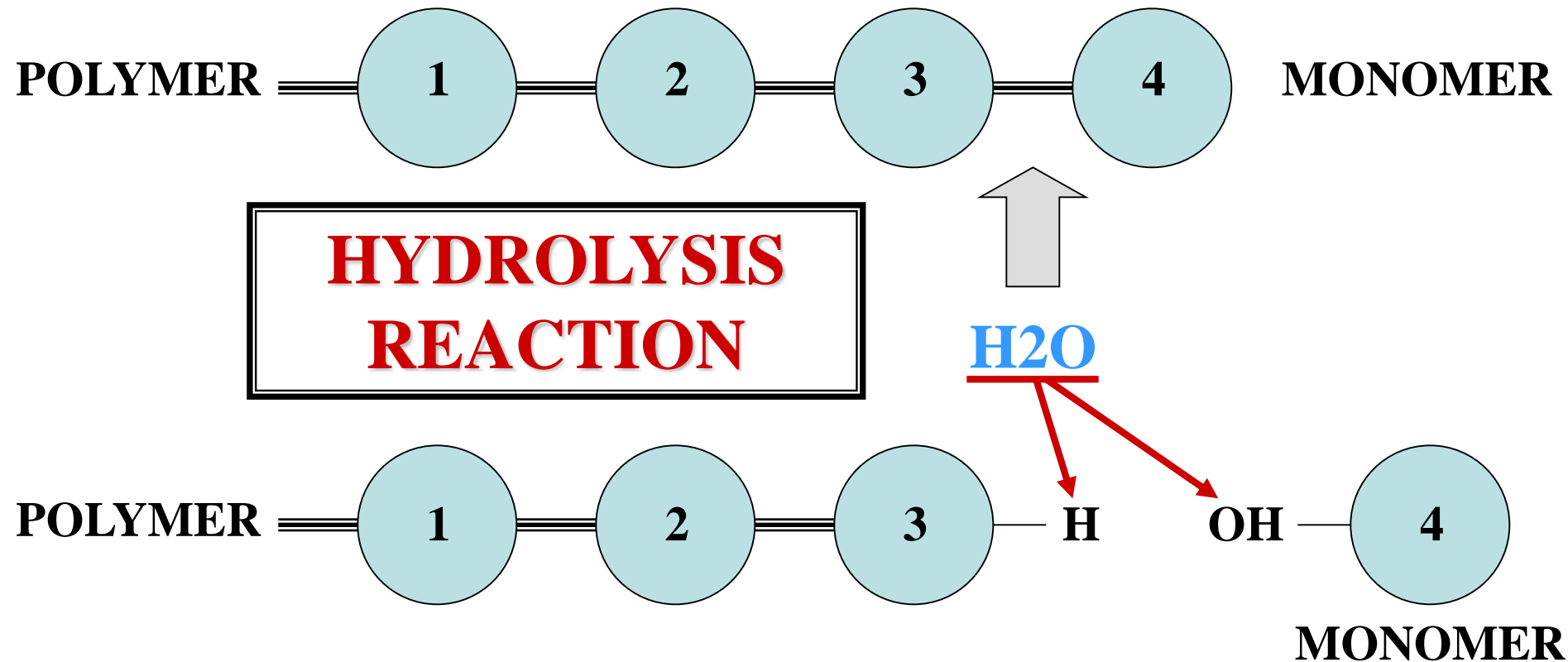


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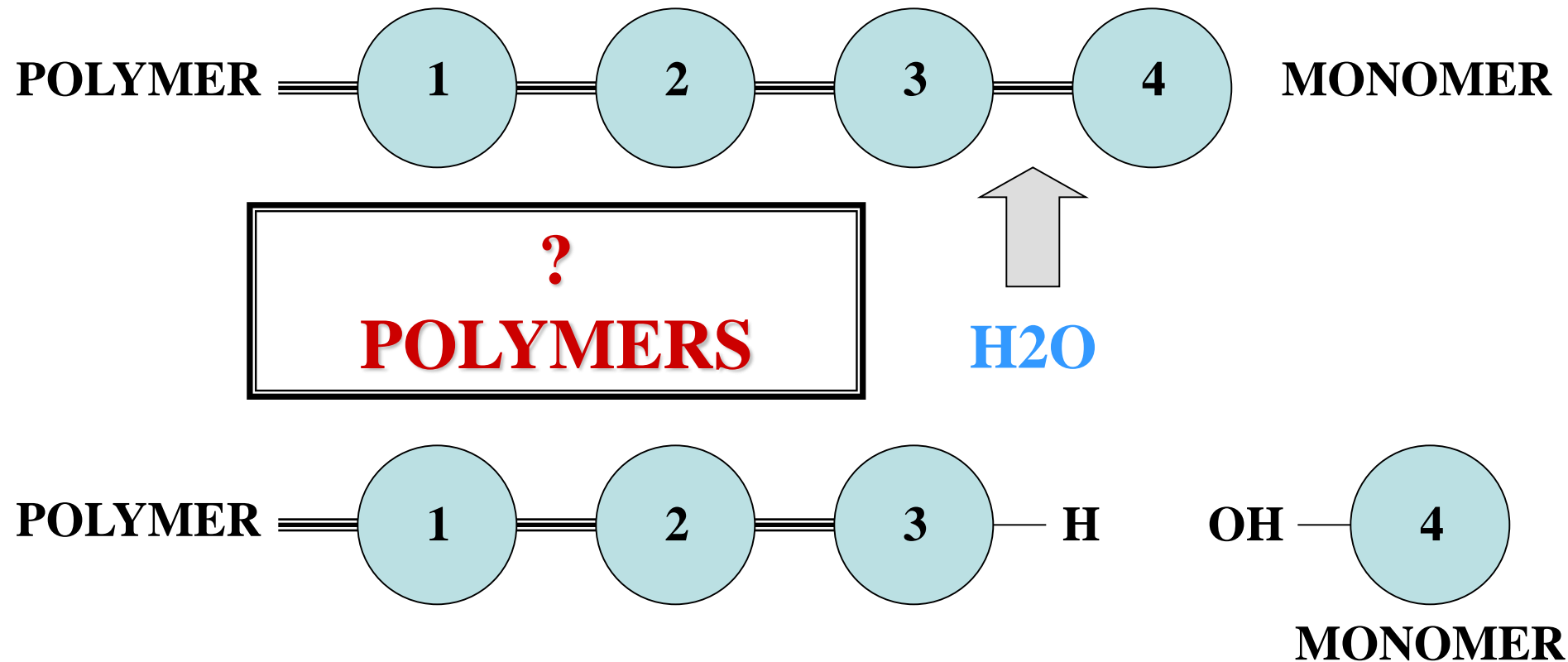




MACROMOLECULE HYDROLYSIS REACTION

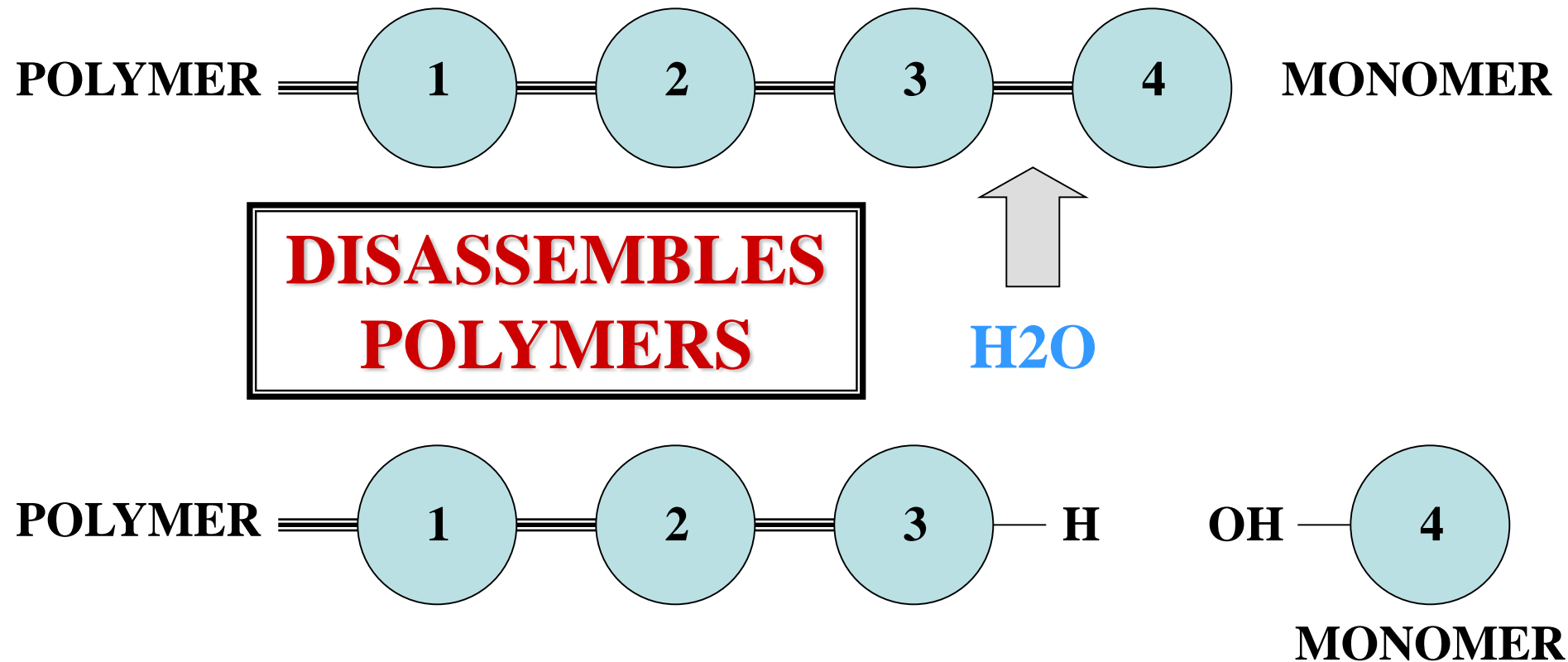


MACROMOLECULE HYDROLYSIS REACTION





MACROMOLECULE HYDROLYSIS REACTION



CONDENSATION

REACTION

...

HYDROLYSIS

REACTION

...

SUMMARY



CONDENSATION



REACTION

VS

HYDROLYSIS

REACTION

?

CONDENSATION



REACTION

VS

HYDROLYSIS

REACTION

!!!INVERSE RXTS!!!

CONDENSATION

ASSEMBLES

VS

HYDROLYSIS

DISASSEMBLES

!!!INVERSE RXTS!!!

CARBOHYDRATES

CARBOHYDRATE



CARBOHYDRATE

SINGLE SUGAR MONOMER

CARBOHYDRATE

CARBOHYDRATE

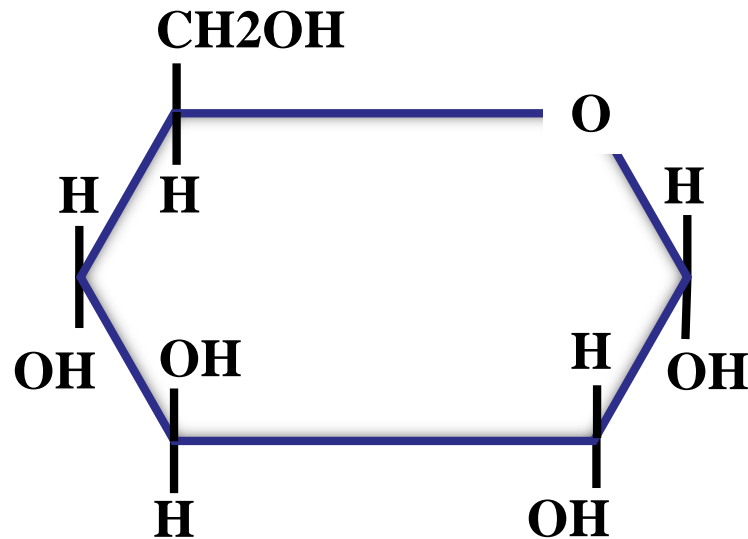
SINGLE SUGAR MONOMER
OR

POLYMER SUGAR MONOMERS

CARBOHYDRATE

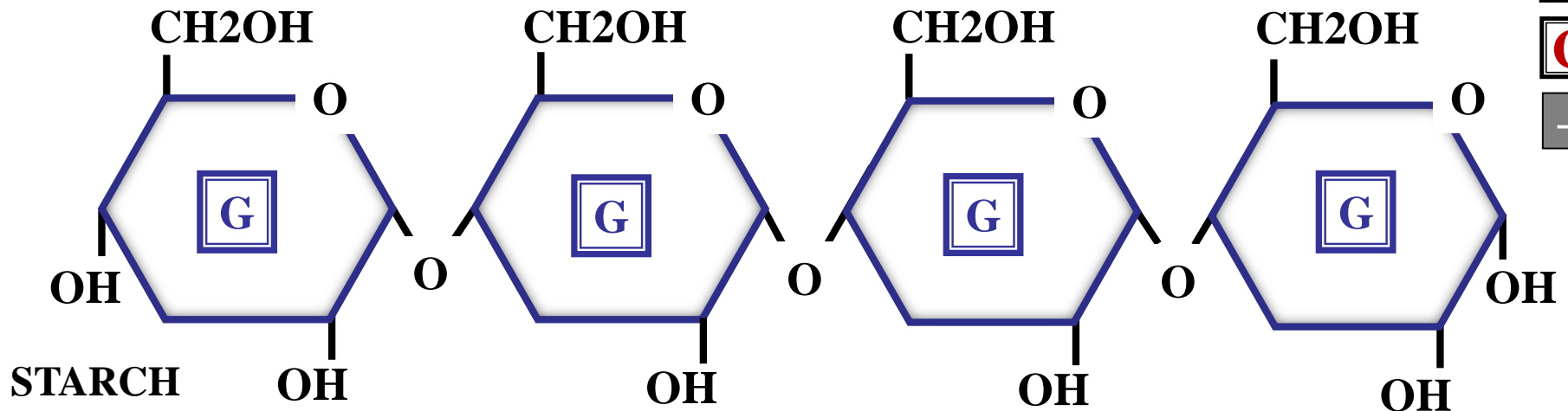
CARBOHYDRATE EXAMPLES

CARBOHYDRATE - MONOMER



GLUCOSE

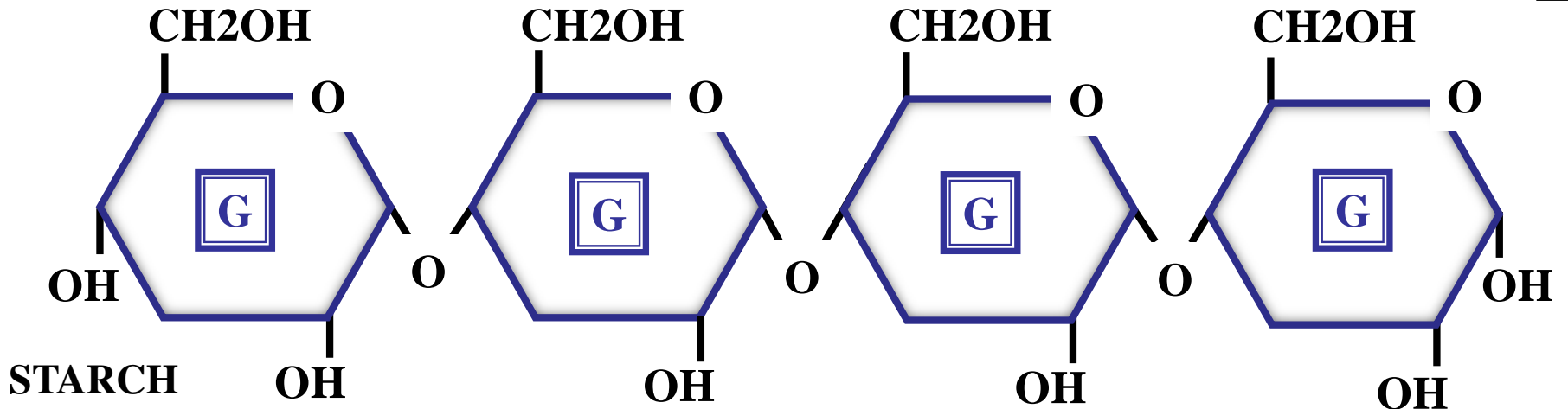
CARBOHYDRATE - MONOMER



STARCH

CARBOHYDRATE - POLYMER

 = GLUCOSE MONOMER

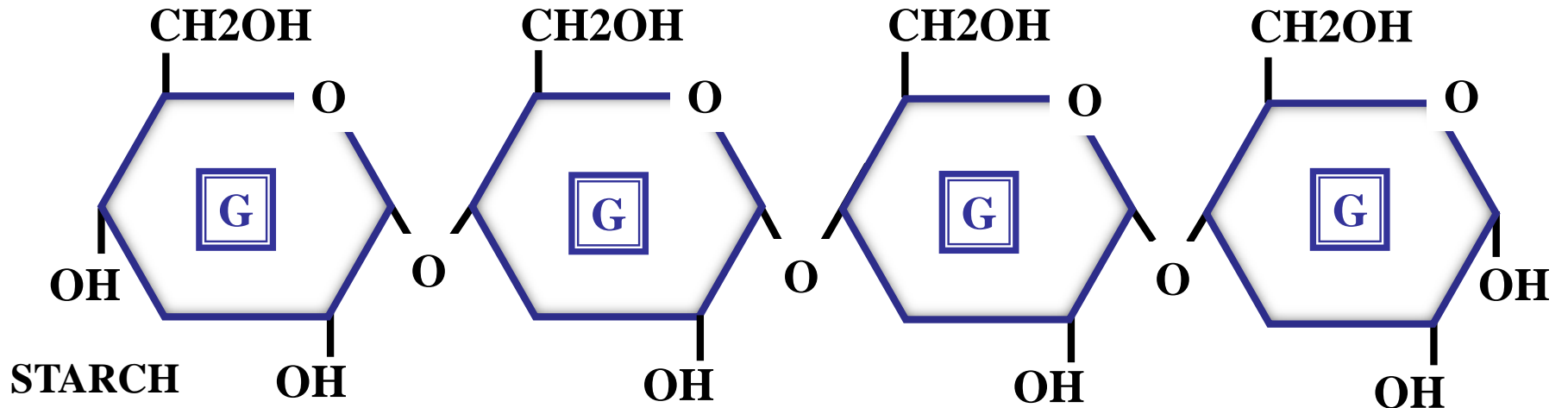


STARCH

CARBOHYDRATE - POLYMER

G = GLUCOSE MONOMER

?
REACTIONS



STARCH

CARBOHYDRATE - POLYMER

 = GLUCOSE MONOMER

**CONDENSATION
REACTIONS**

SUGARS

SUGAR

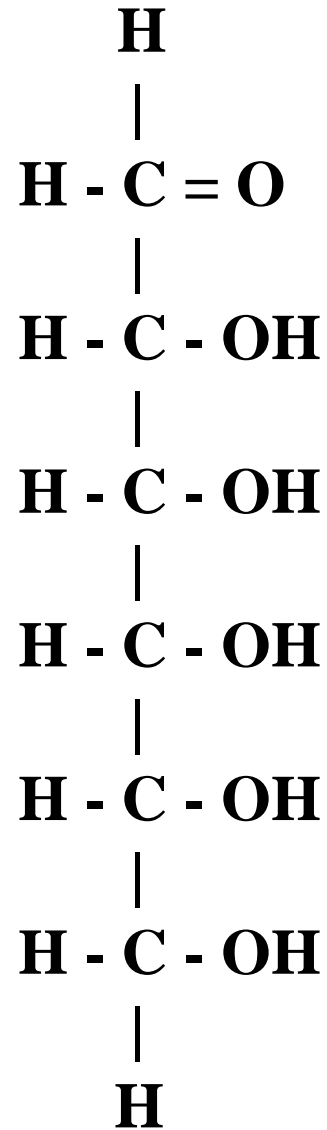
SUGAR

**HYDROCARBON
WITH A BONDED -CO GROUP
&
SEVERAL BONDED -OH GROUPS**

SUGAR

SUGAR EXAMPLE

SUGAR

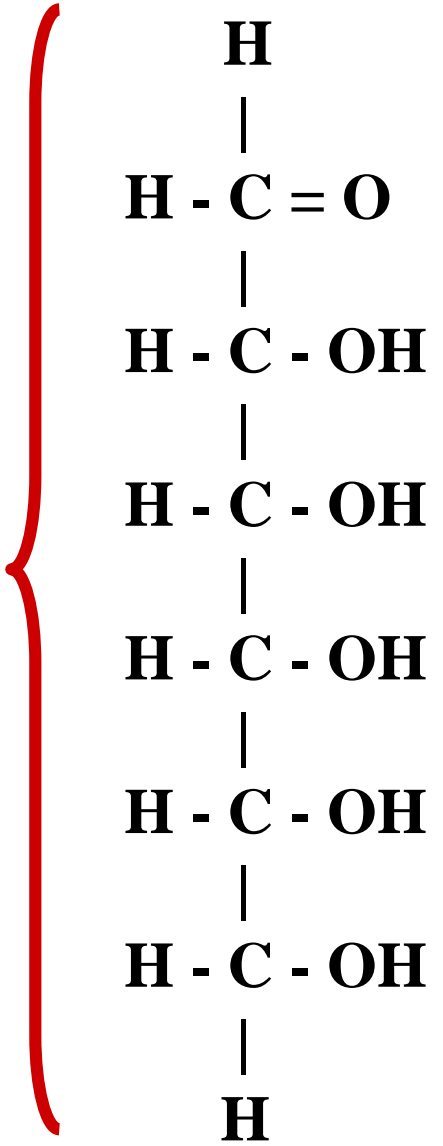


GLUCOSE



SUGAR

HYDROCARBON

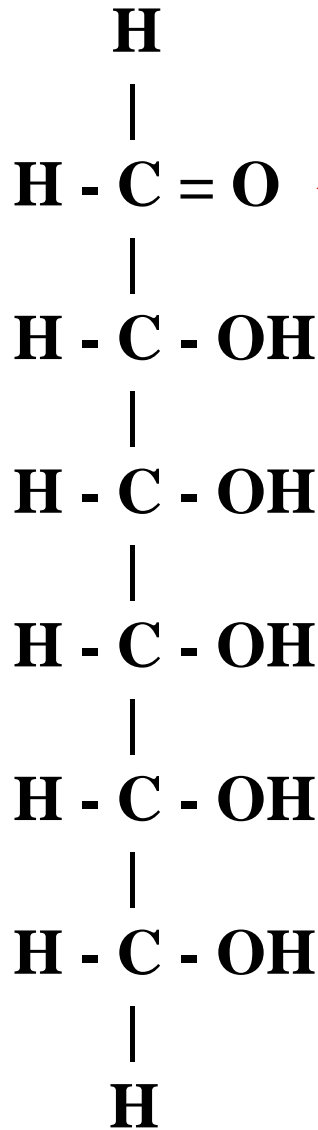


GLUCOSE

OH

SUGAR

HYDROCARBON



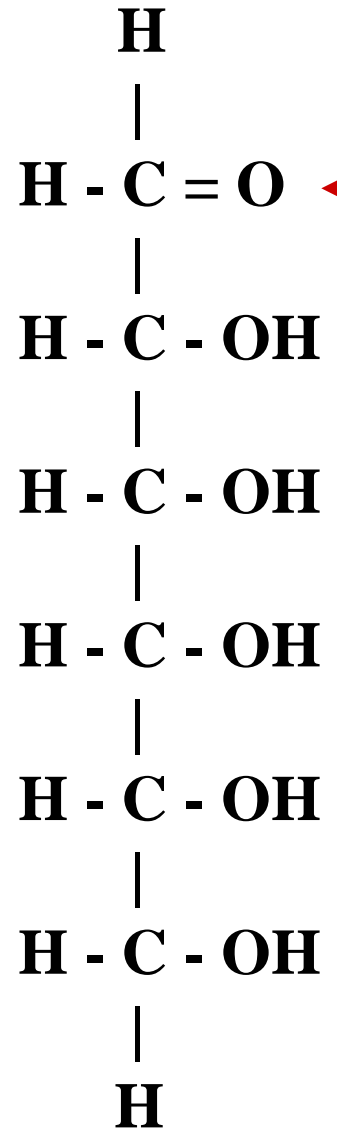
CARBONYL GROUP

GLUCOSE



SUGAR

HYDROCARBON

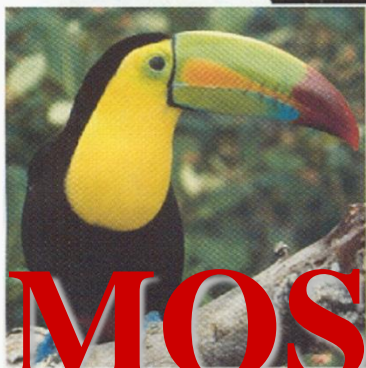


CARBONYL GROUP

HYDROXYL GROUPS

GLUCOSE

LIVING ORGANISMS



SUGARS
MOST ABUNDANT
ORGANIC COMPOUNDS
WITHIN
LIVING ORGANISMS

TWELFTH EDITION

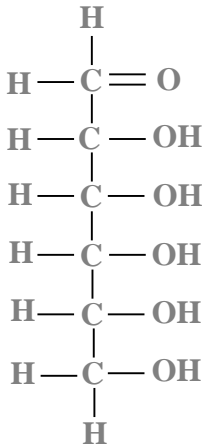
CAMPBELL
BIOLOGY

URRY • CAIN • WASSERMAN
MINORSKY • ORR

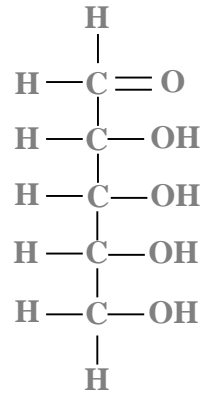


CARBOHYDRATE SUGARS

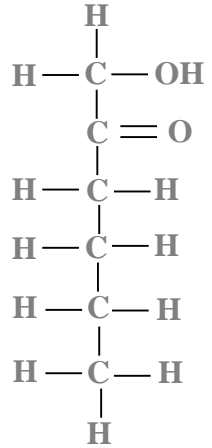
SUGAR EXAMPLES



GLUCOSE
C₆H₁₂O₆



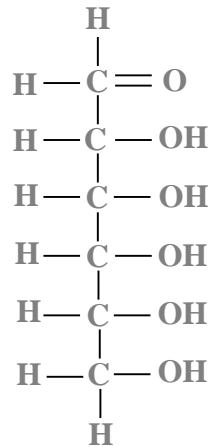
RIBOSE
C₅H₁₀O₅



FRUCTOSE
C₆H₁₂O₆

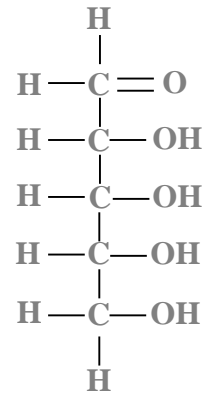
CARBOHYDRATE SUGARS

SUGAR EXAMPLES



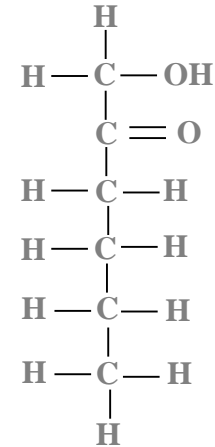
GLUCOSE

C₆H₁₂O₆



RIBOSE

C₅H₁₀O₅



FRUCTOSE

C₆H₁₂O₆