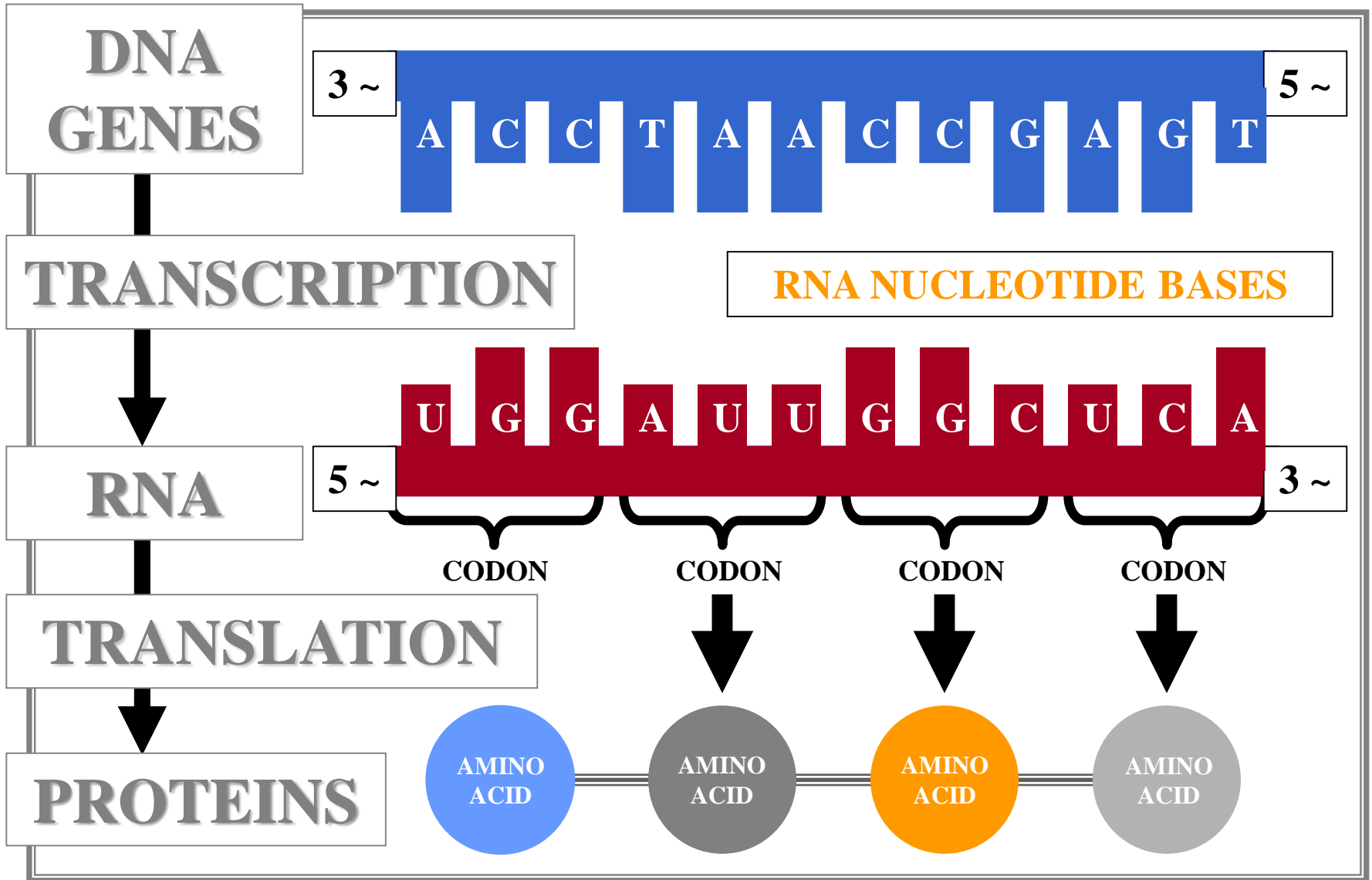
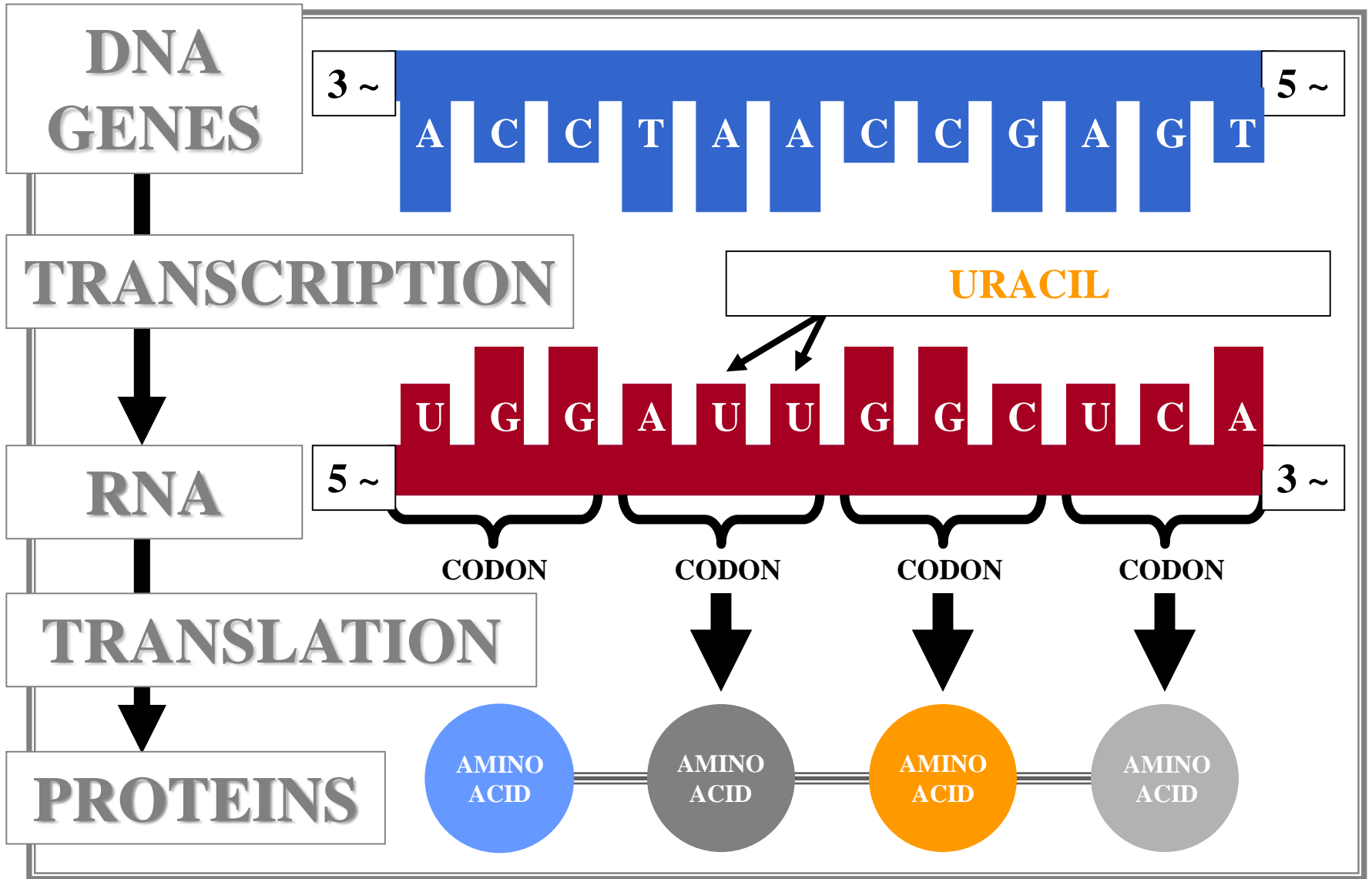


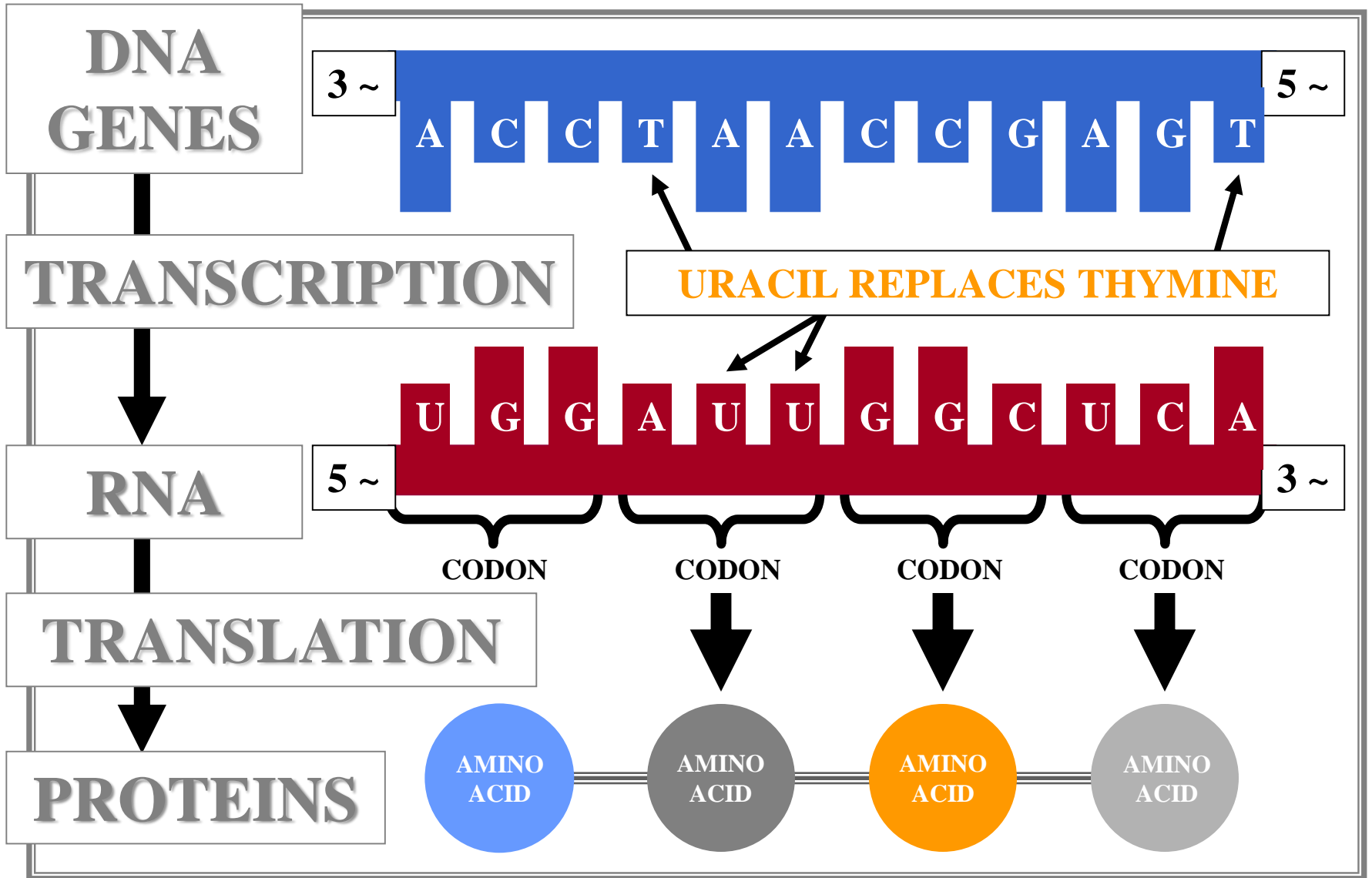
PROTEIN SYNTHESIS



PROTEIN SYNTHESIS



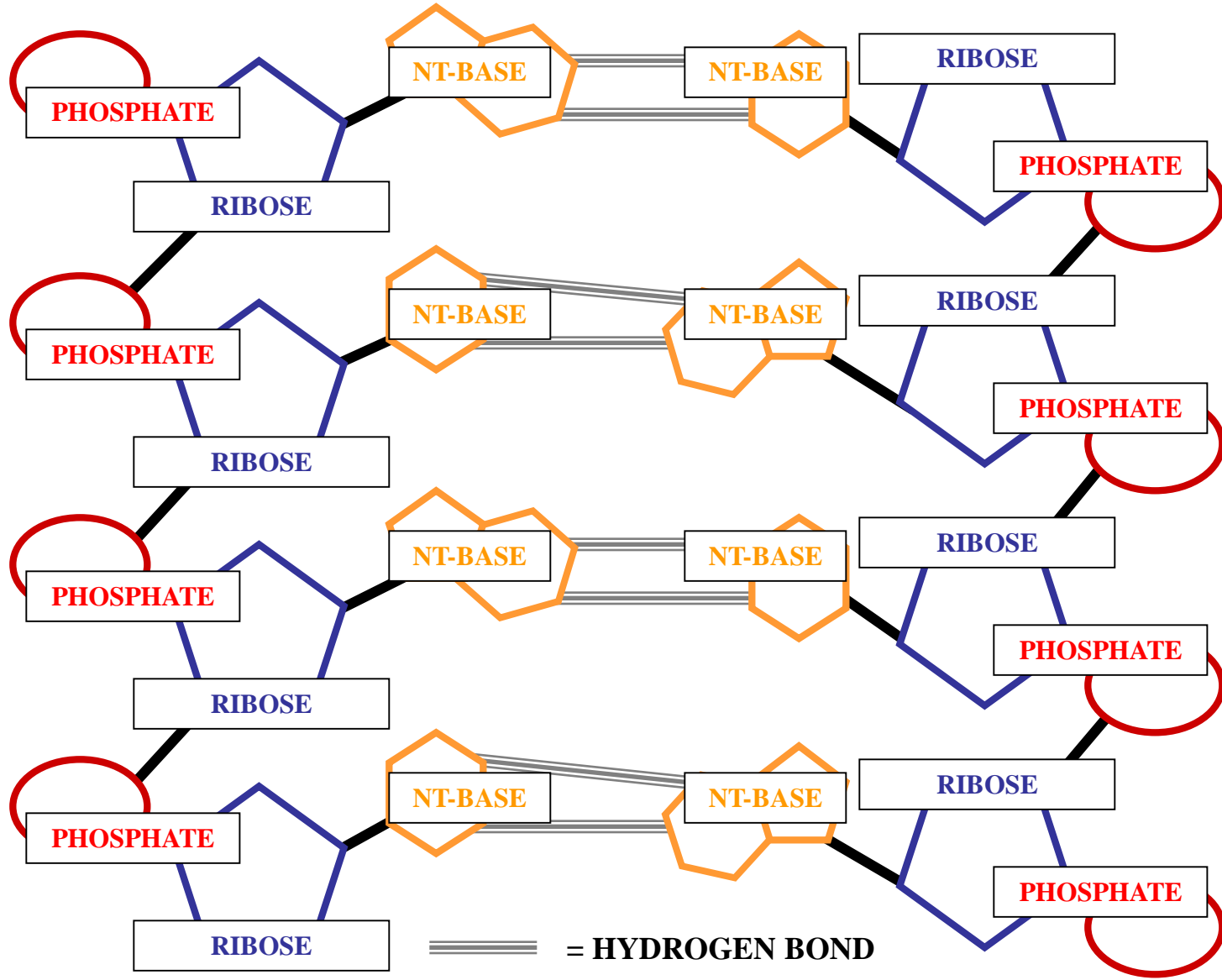
PROTEIN SYNTHESIS





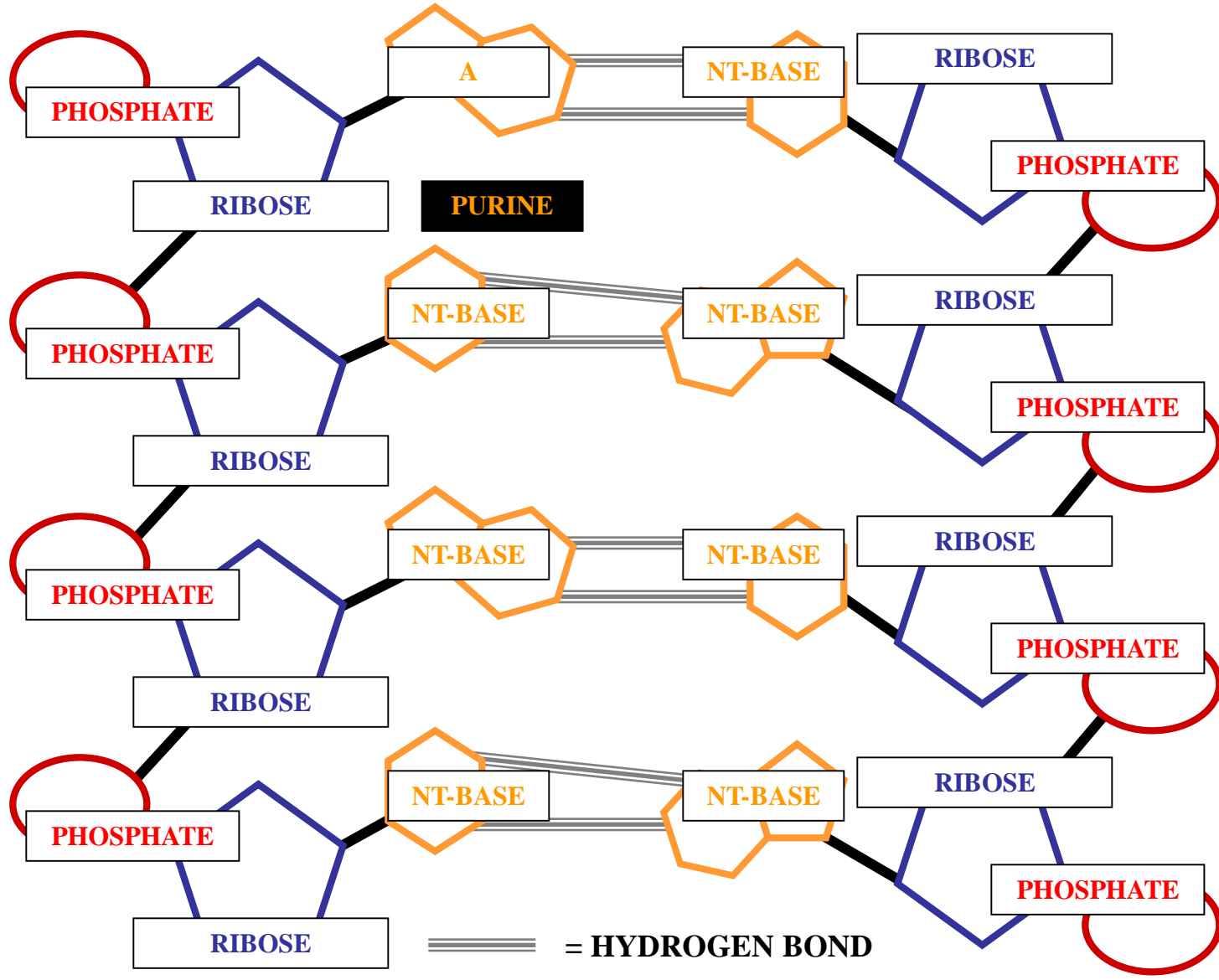
RNA NUCLEOTIDE BASE PAIRS

**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**



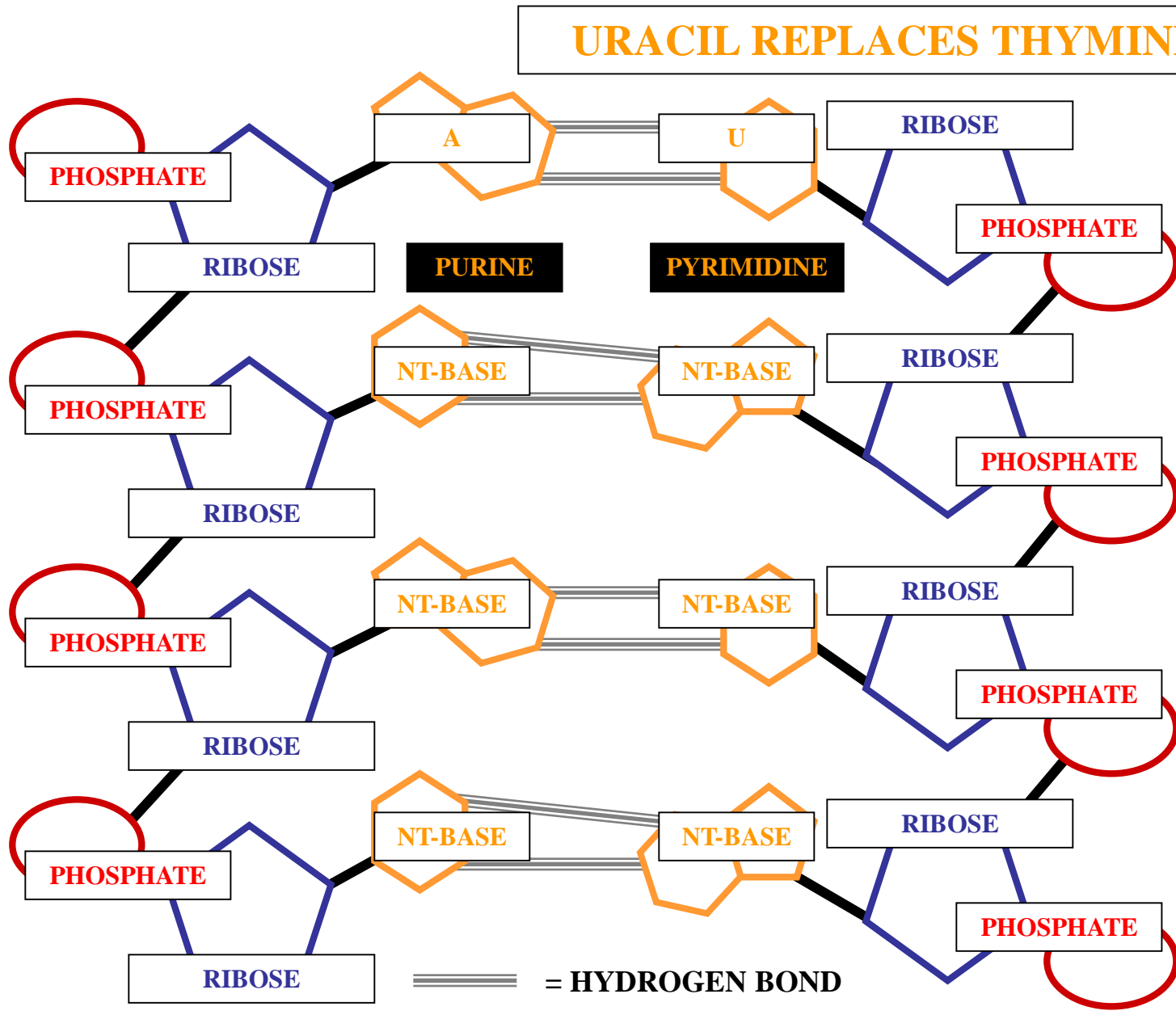
**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**

**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**



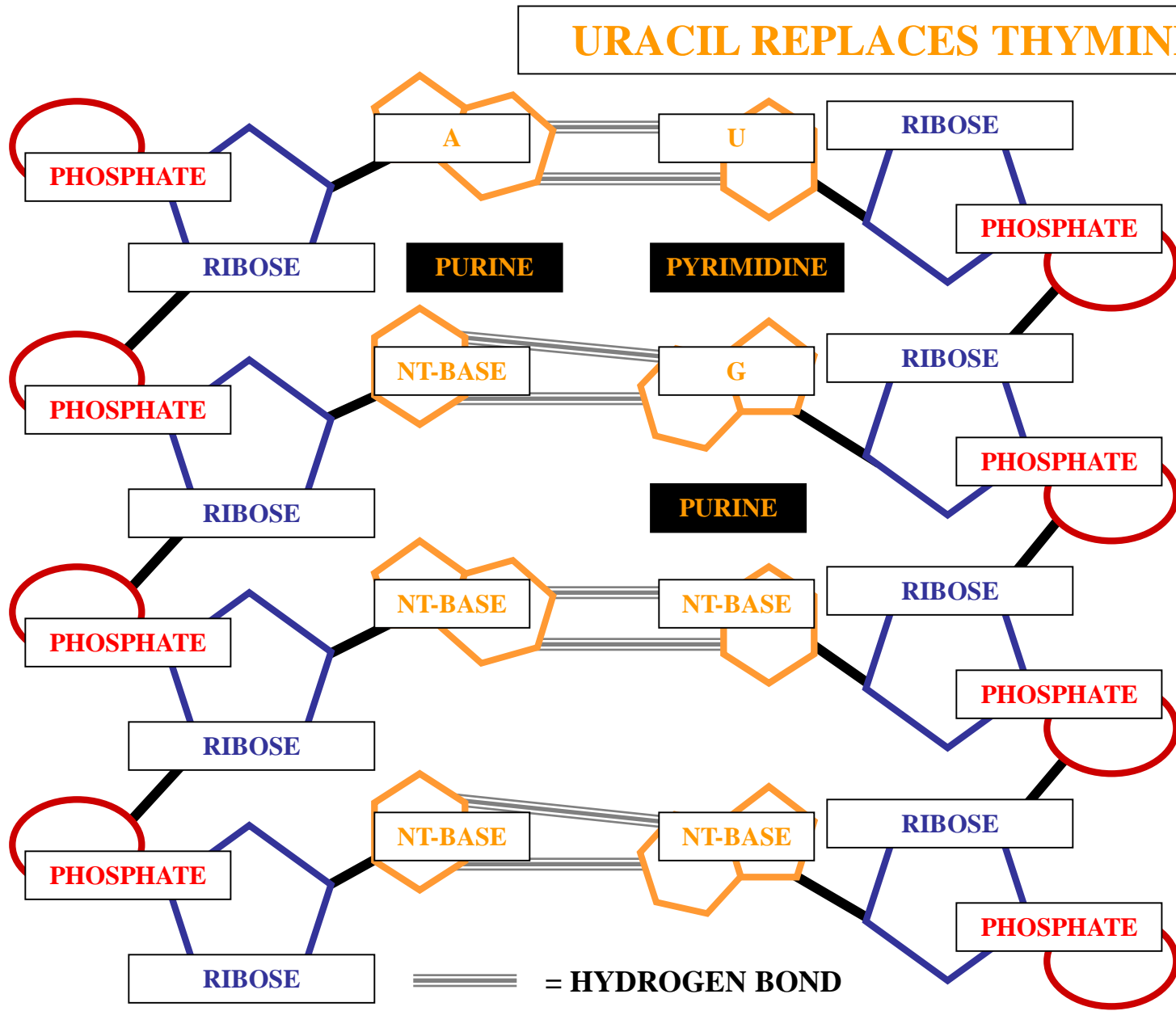
**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**

**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**



**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN** **G**

**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**



**RNA NUCLEOTIDE BASE PAIRS
PARALLEL POLYNUCLEOTIDE CHAIN**

C

RNA

RIBONUCLEIC ACID

STRUCTURE

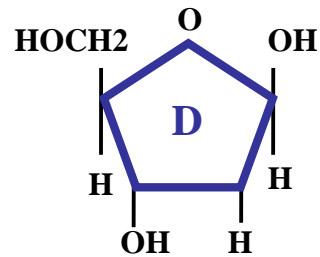
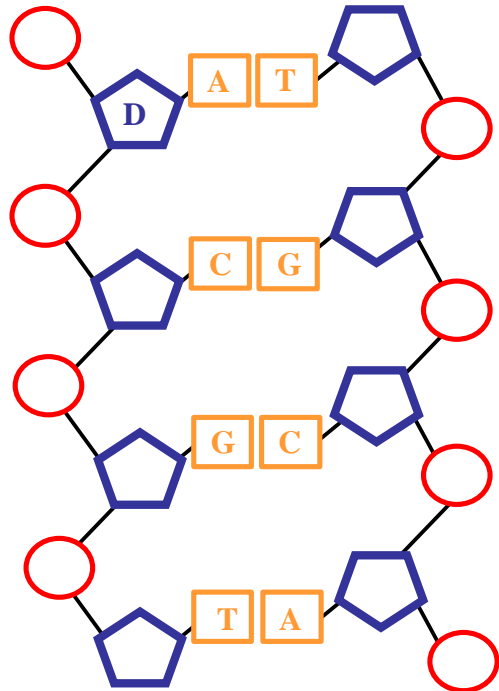


PURINES
PAIR WITH
PYRIMIDINES

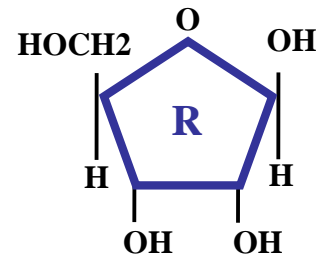
NUCLEIC ACIDS



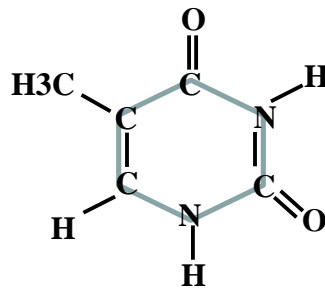
DNA



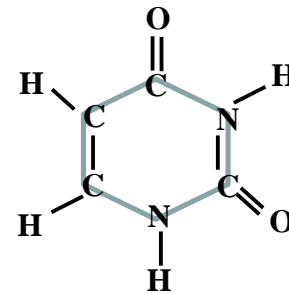
DEOXYRIBOSE



RIBOSE

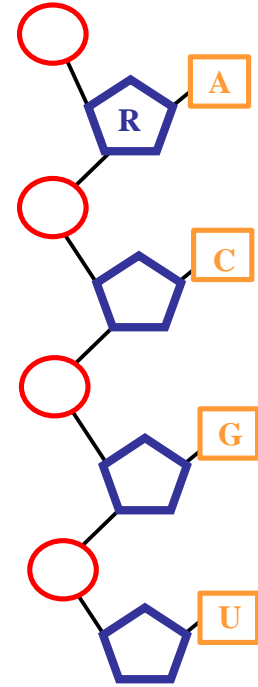


THYMINE



URACIL

RNA



MACROMOLECULE CLASSES



CARBOHYDRATES

LIPIDS

PROTEINS

NUCLEIC ACIDS

MACROMOLECULE CLASSES

CHAPTER 08

CELL

METABOLISM

CELL METABOLISM

METABOLISM

CELL METABOLISM



CELL BIOCHEMISTRY

CELL METABOLISM



CELL

METABOLISM

=

CELL

BIOCHEMISTRY



**CATABOLIC
METABOLISM
VS
ANABOLIC
METABOLISM**

CATABOLIC METABOLISM

CATABOLIC METABOLISM



CATABOLIC METABOLISM

BREAK-DOWN METABOLISM

CATABOLIC METABOLISM



CATABOLIC METABOLISM

BREAK-DOWN METABOLISM

DEGRADATIVE

CATABOLIC METABOLISM



CATABOLIC METABOLISM

BREAK-DOWN METABOLISM

DEGRADATIVE

RELEASES ENERGY

CATABOLIC METABOLISM



CATABOLIC METABOLISM

SUMMARY



***CATABOLIC
METABOLISM***





***CATABOLIC
METABOLISM
BREAK-DOWN
METABOLISM***



***CATABOLIC
METABOLISM
DEGRADATIVE
METABOLISM***

***CATABOLIC
METABOLISM
RELEASES
ENERGY***

ANABOLIC METABOLISM

ANABOLIC METABOLISM



ANABOLIC METABOLISM

BUILD-UP METABOLISM

ANABOLIC METABOLISM



ANABOLIC METABOLISM

BUILD-UP METABOLISM

BIOSYNTHESIS

ANABOLIC METABOLISM



ANABOLIC METABOLISM

BUILD-UP METABOLISM

BIOSYNTHESIS

CONSUMES ENERGY

ANABOLIC METABOLISM

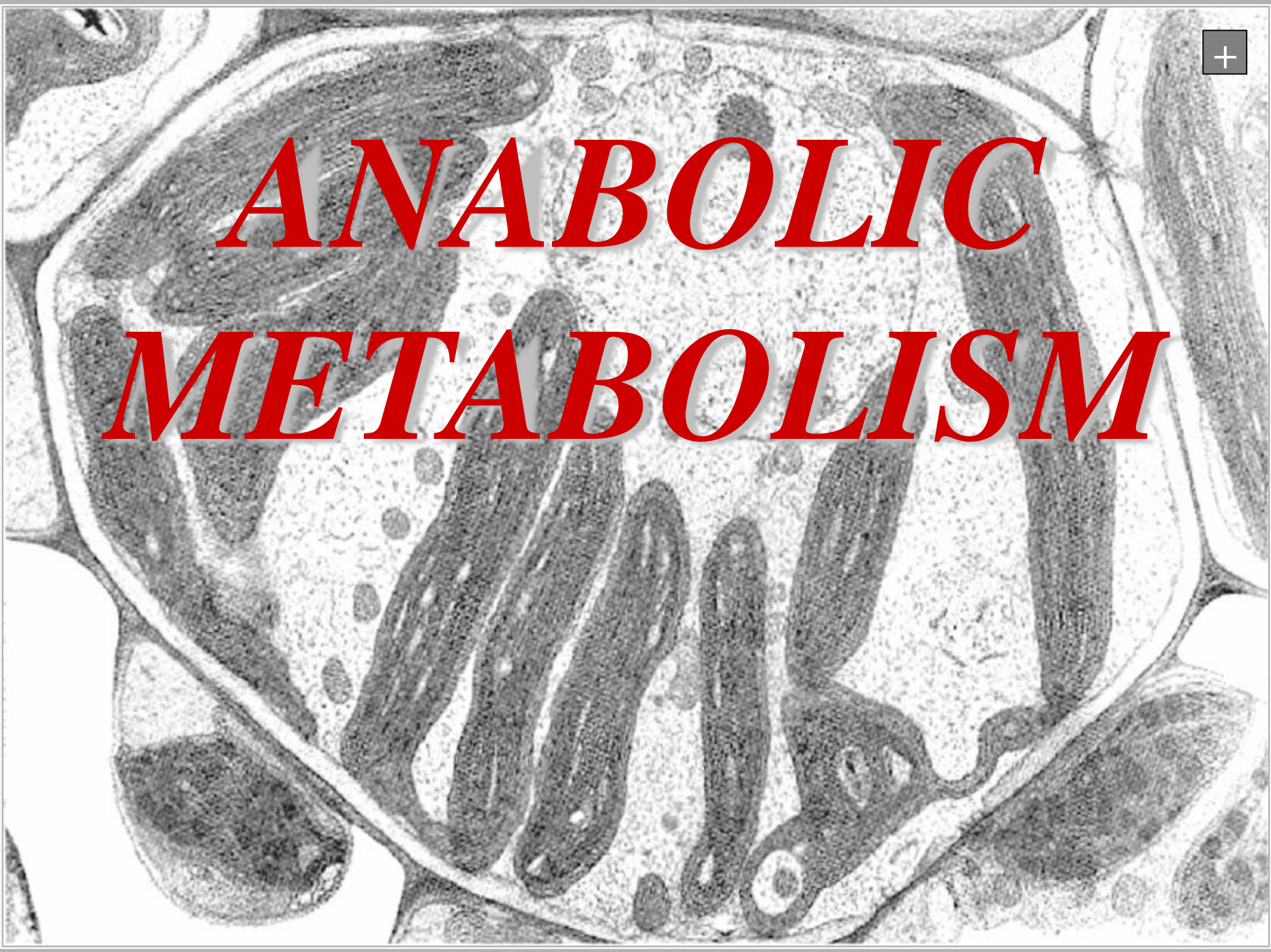


ANABOLIC METABOLISM

SUMMARY



***ANABOLIC
METABOLISM***





***ANABOLIC
METABOLISM
BUILD-UP
METABOLISM***



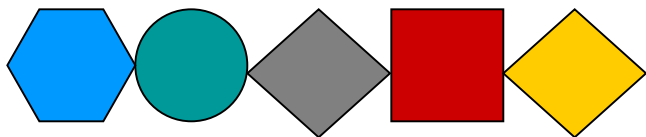
***ANABOLIC
METABOLISM
BIOSYNTHESIS
METABOLISM***

***ANABOLIC
METABOLISM
CONSUMES
ENERGY***

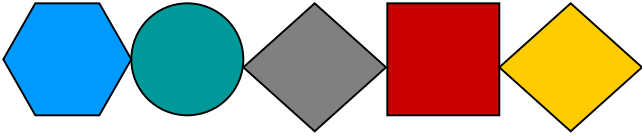
**CATABOLIC
METABOLISM
&
ANABOLIC
METABOLISM
APPLIED**



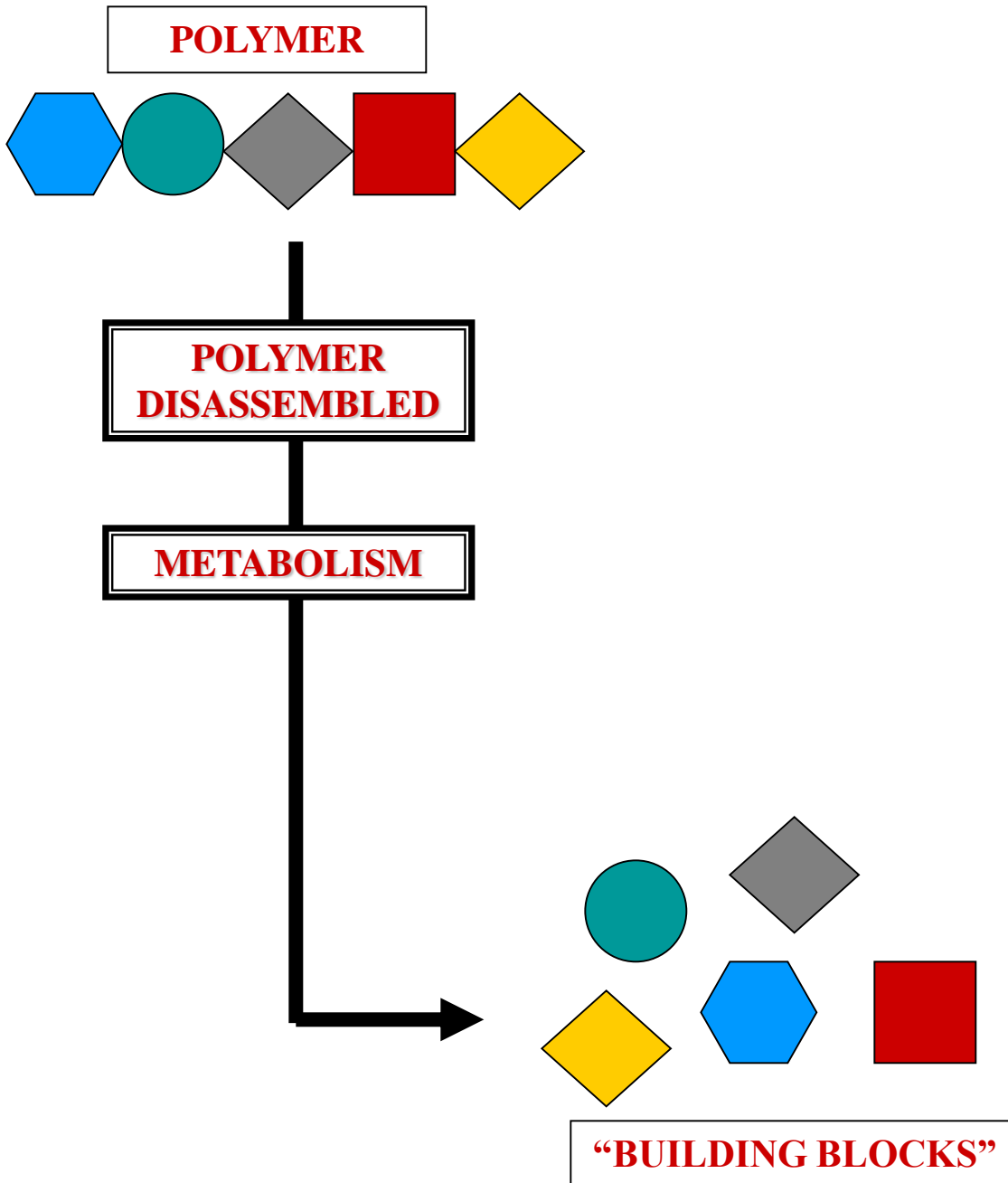
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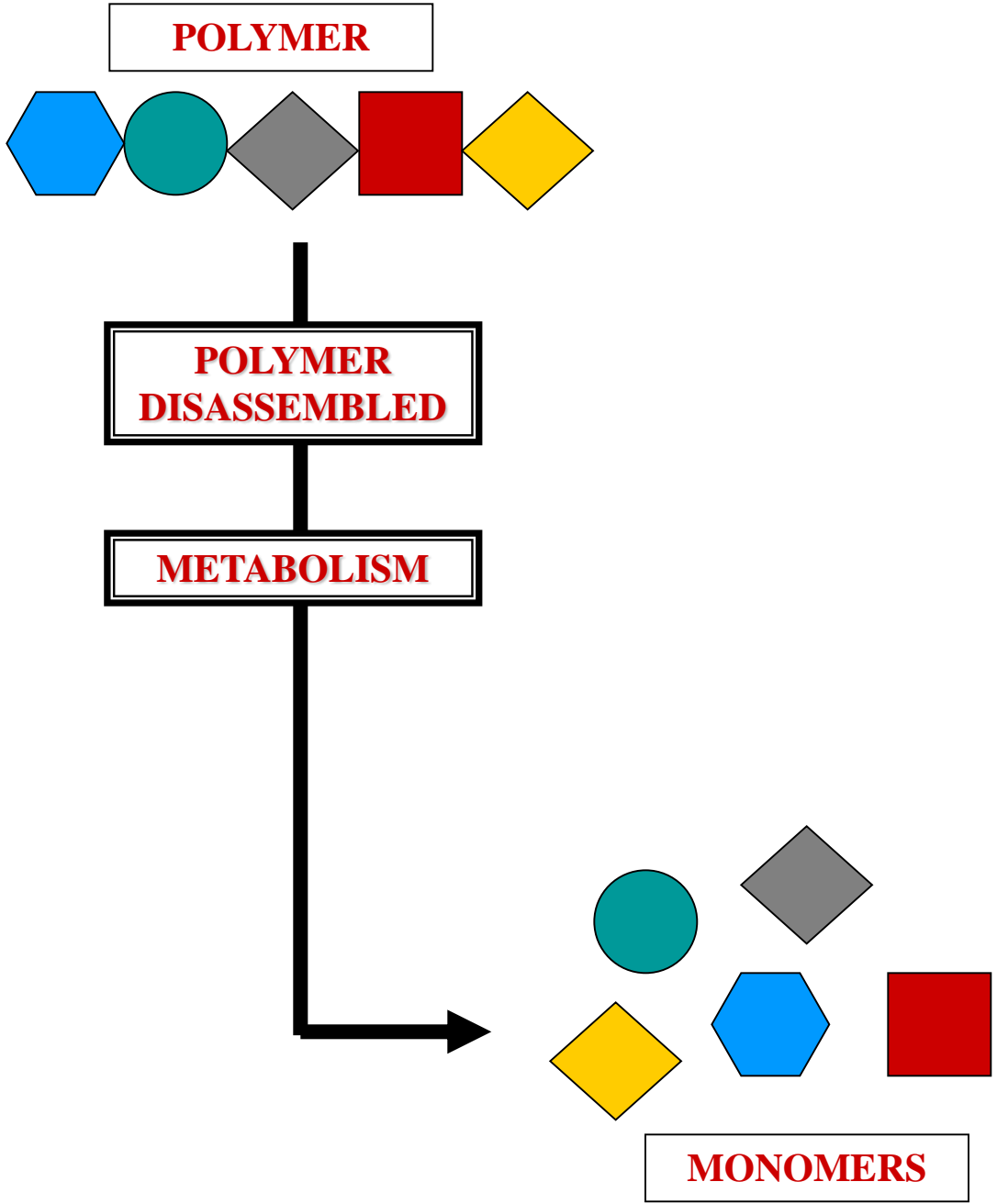


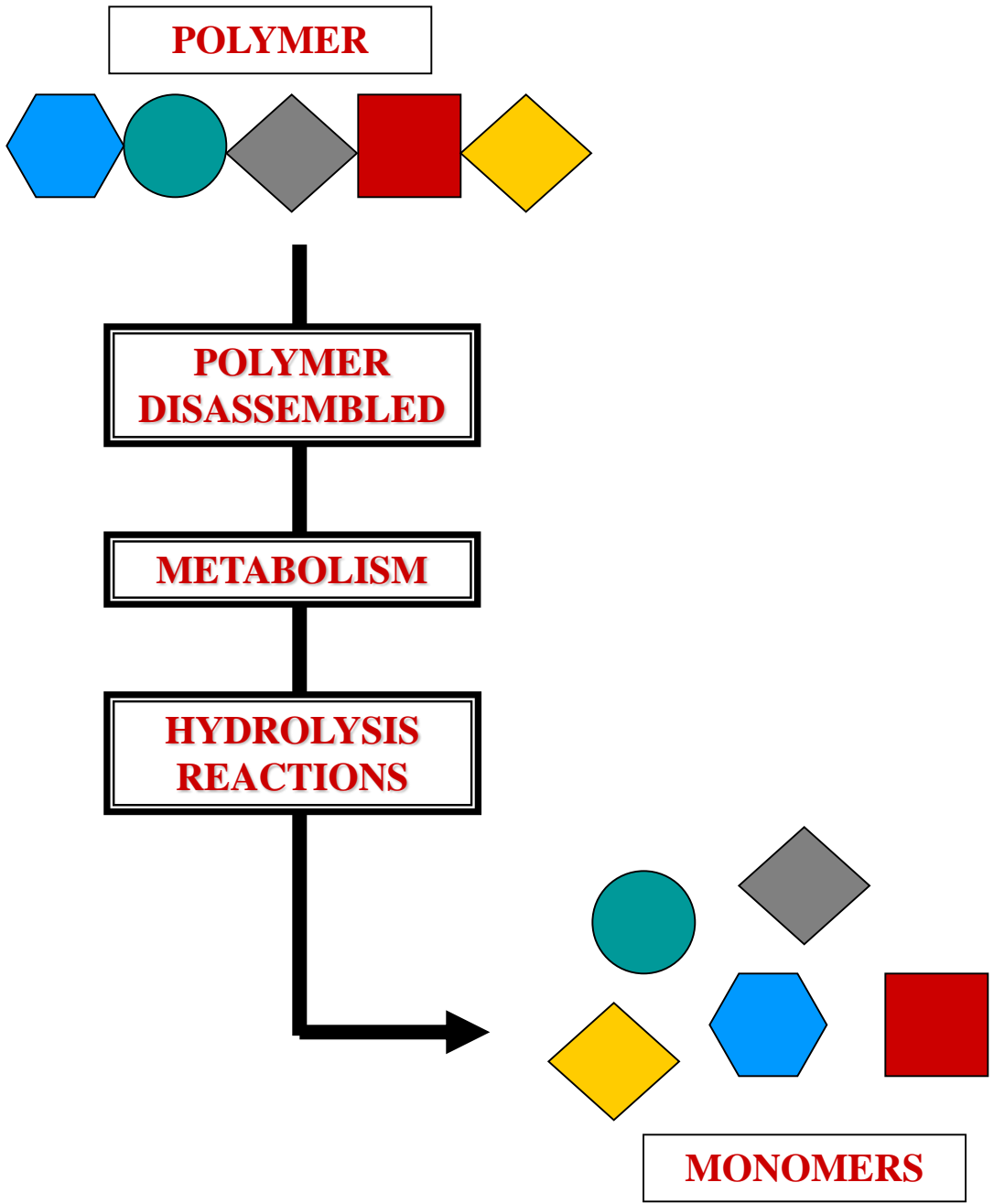
POLYMER

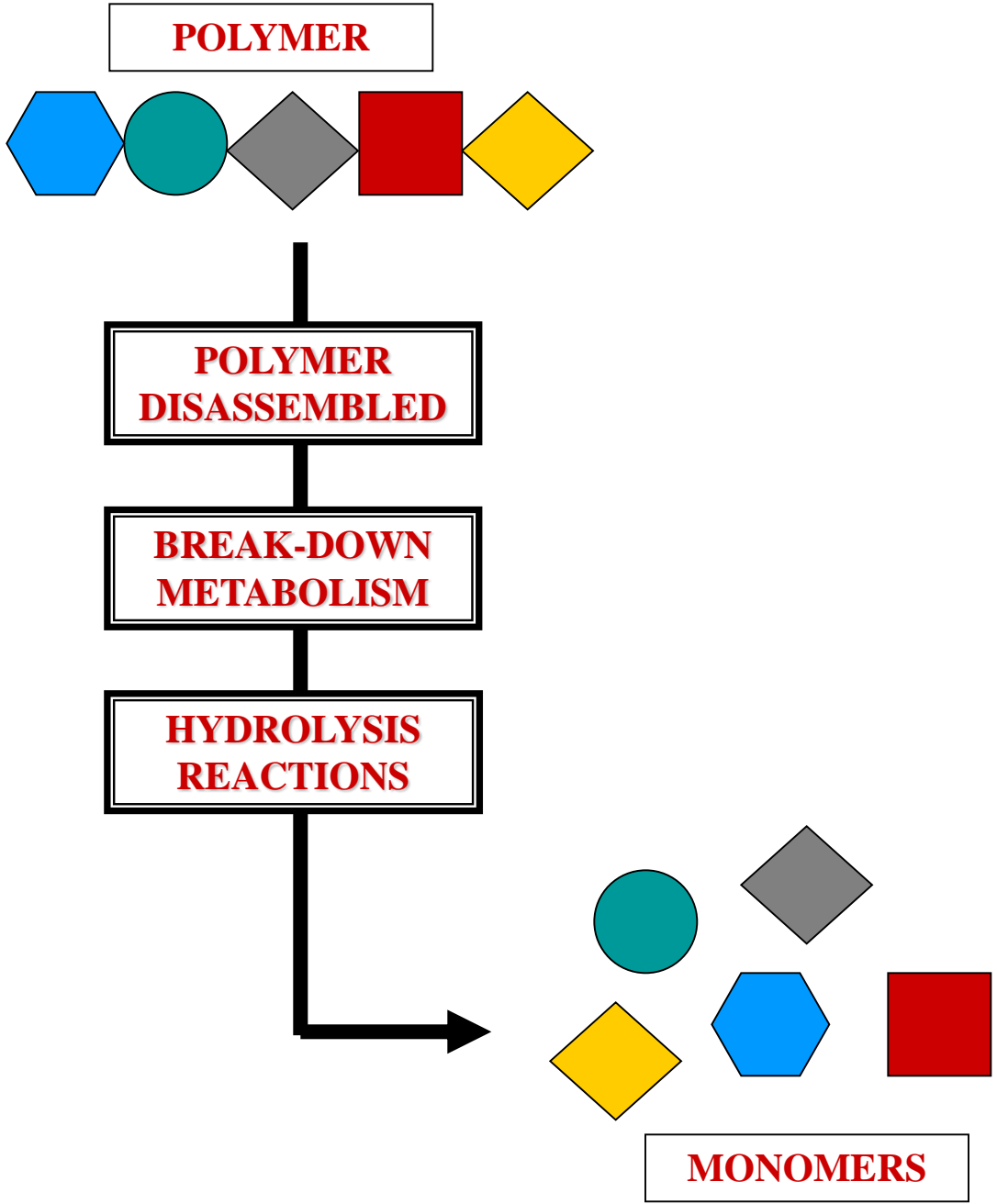


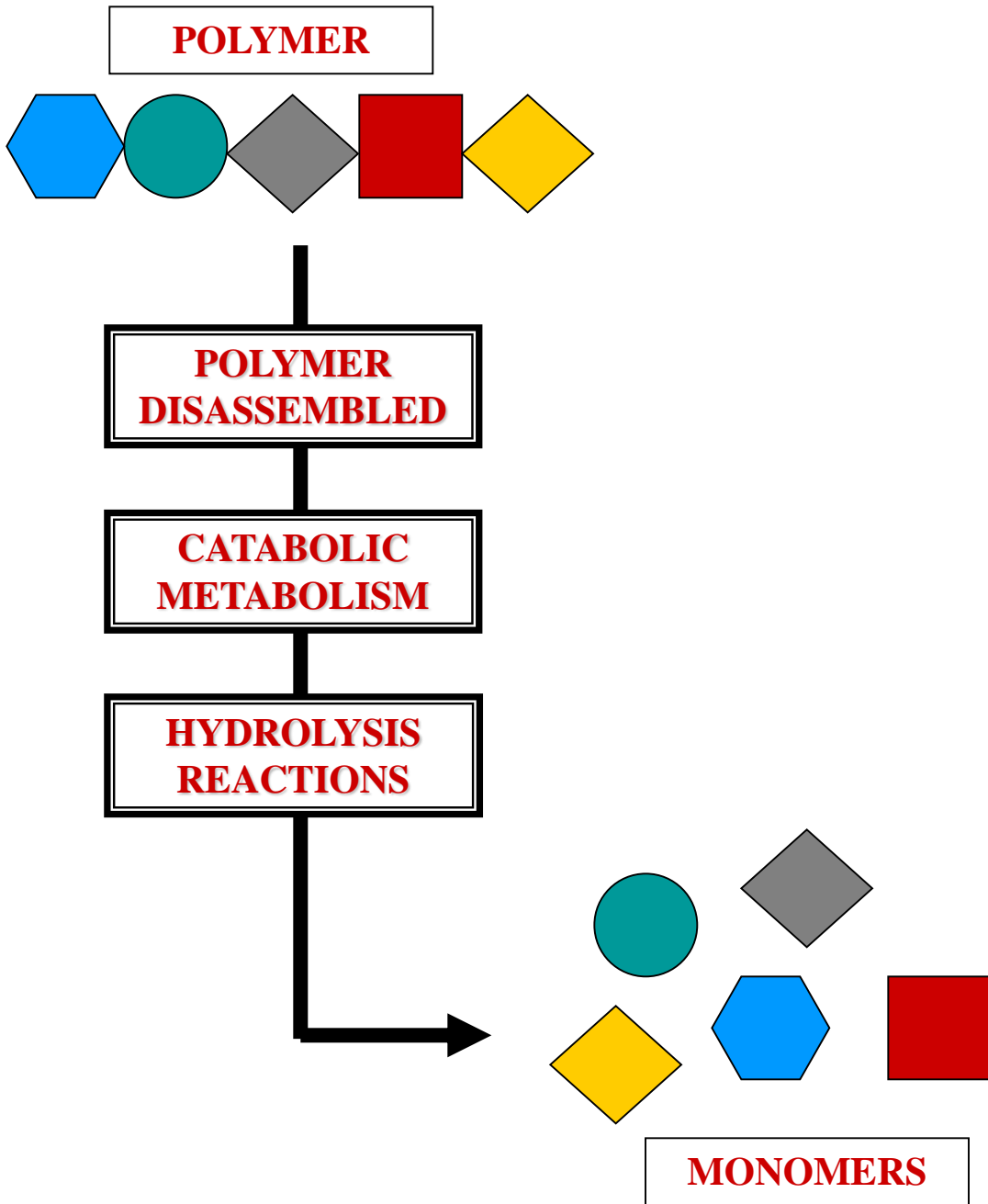
METABOLISM

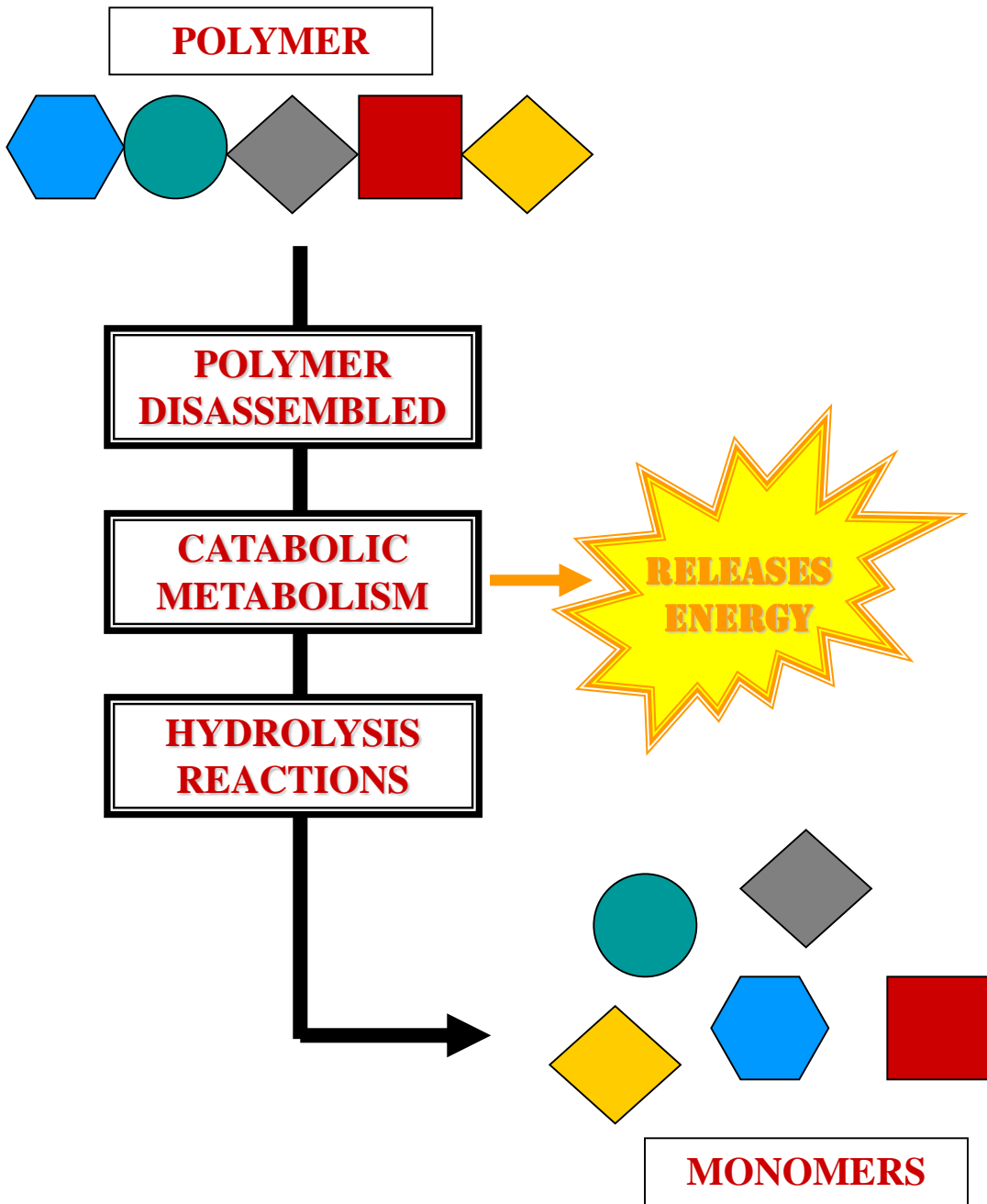


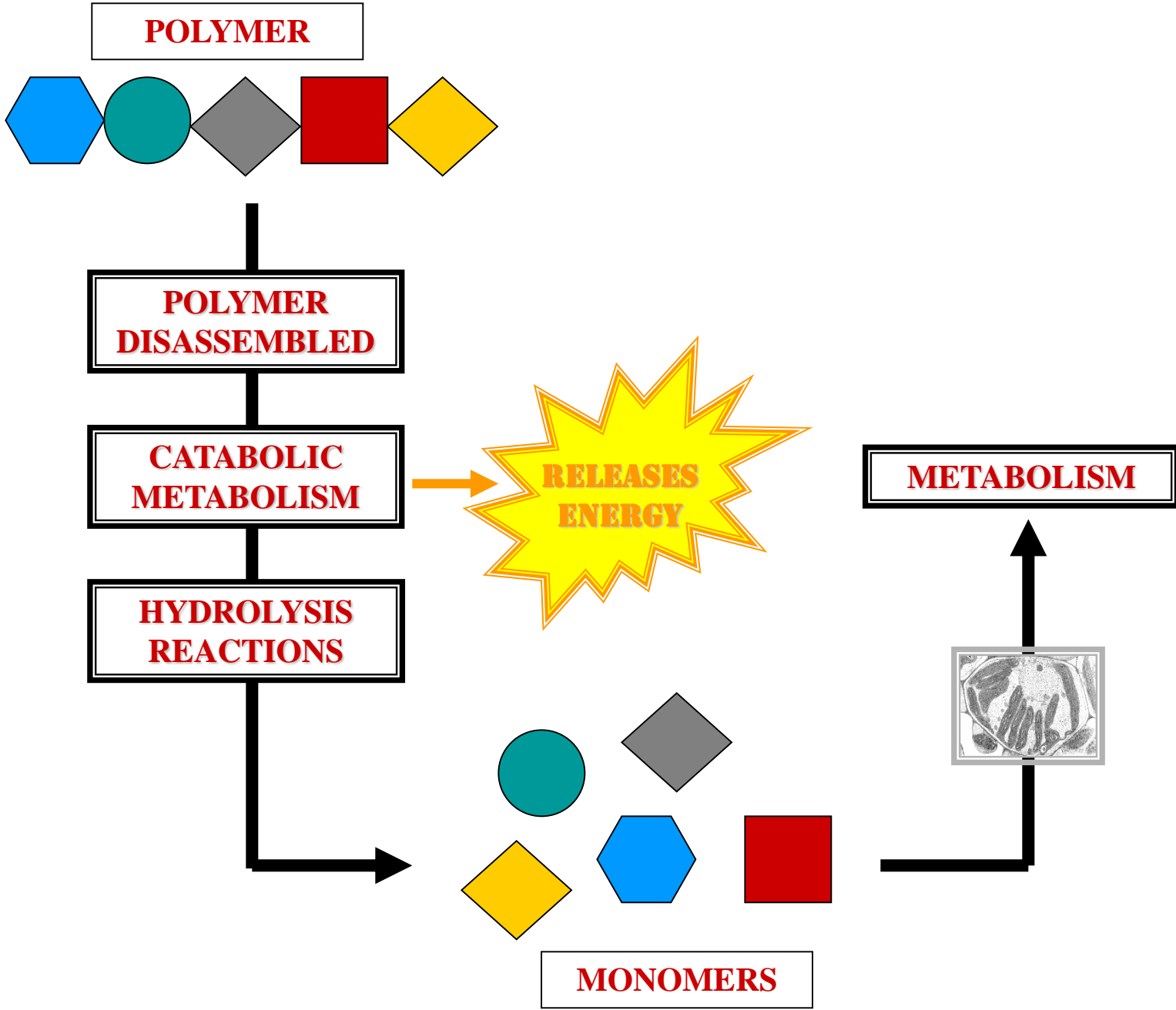


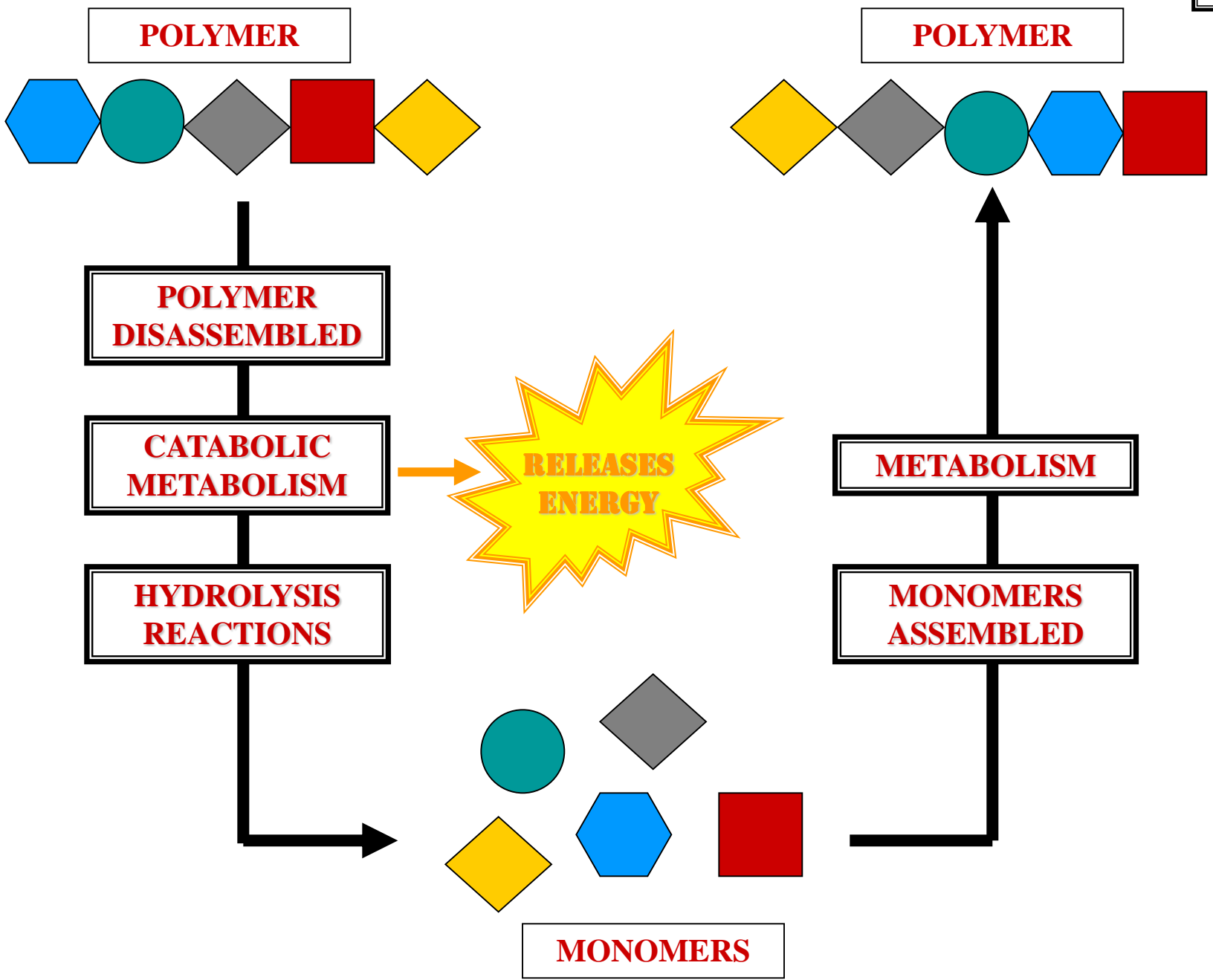


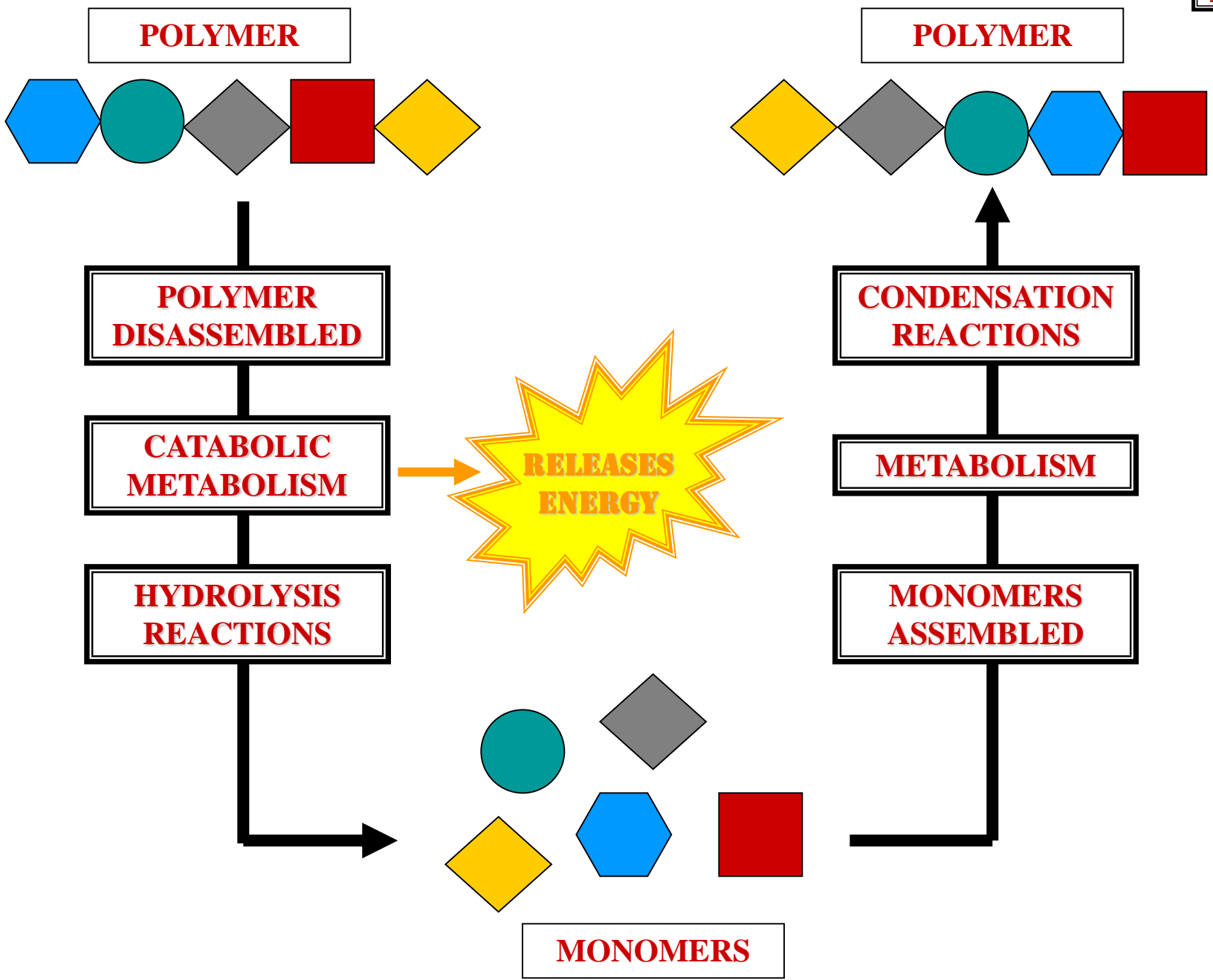


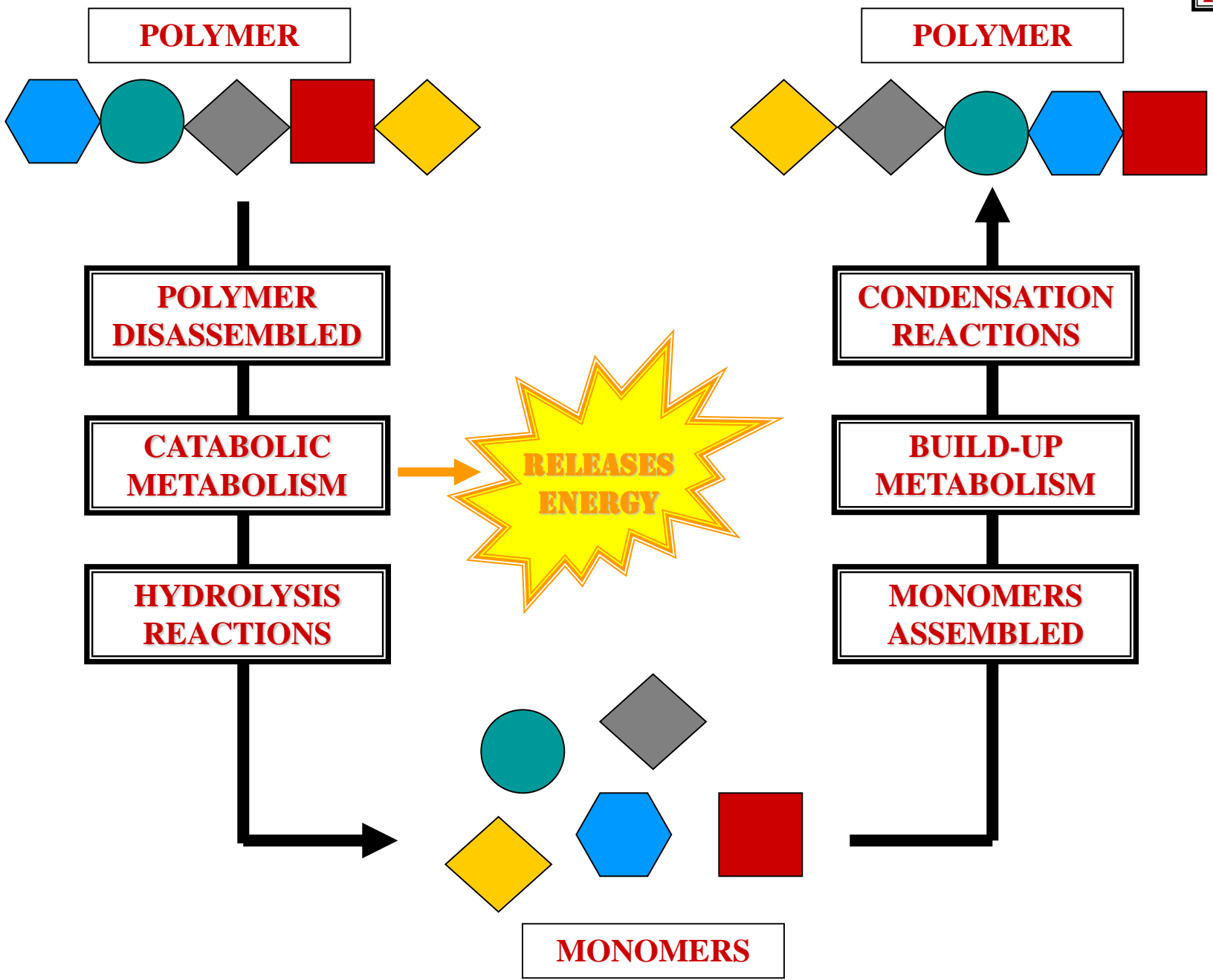


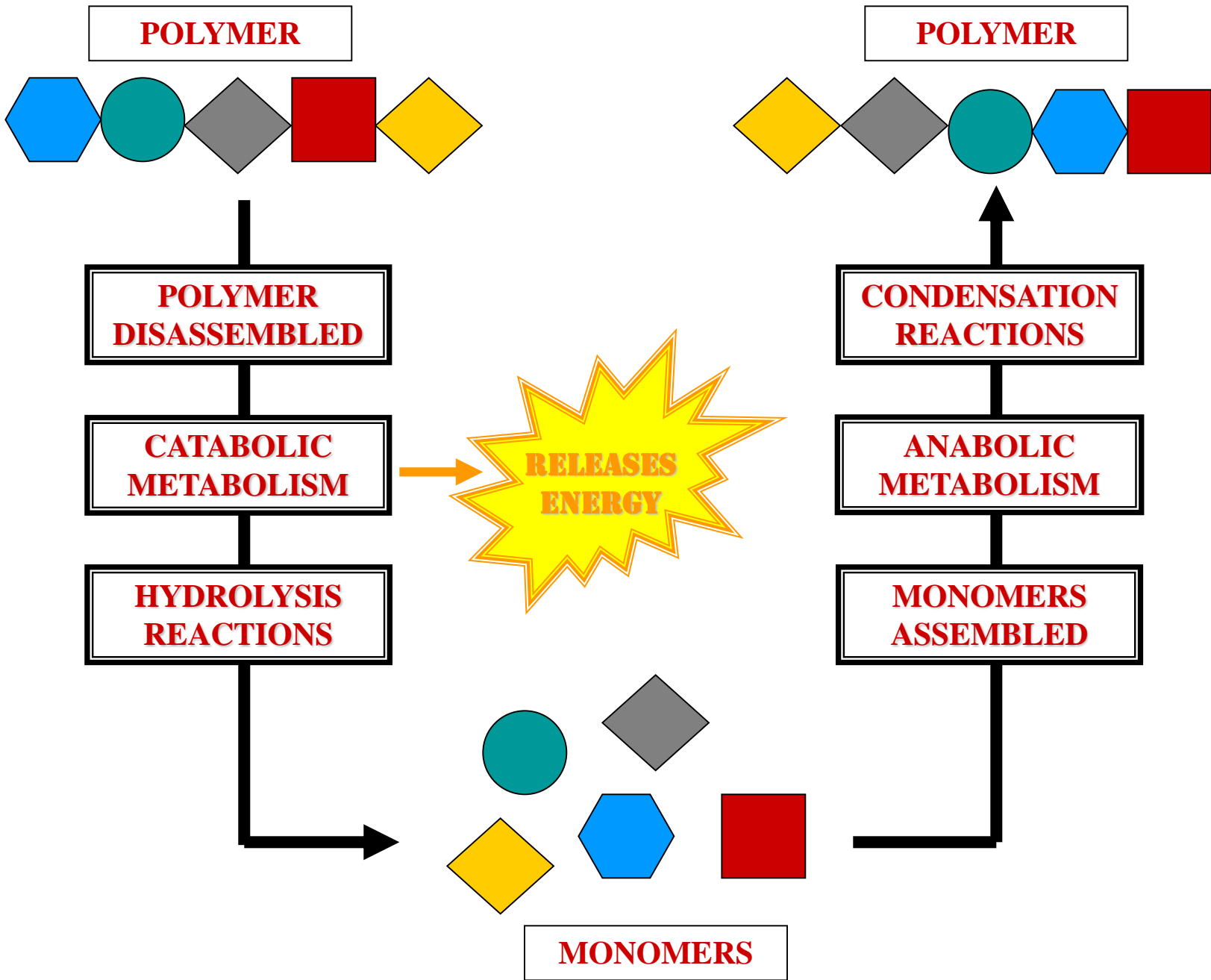


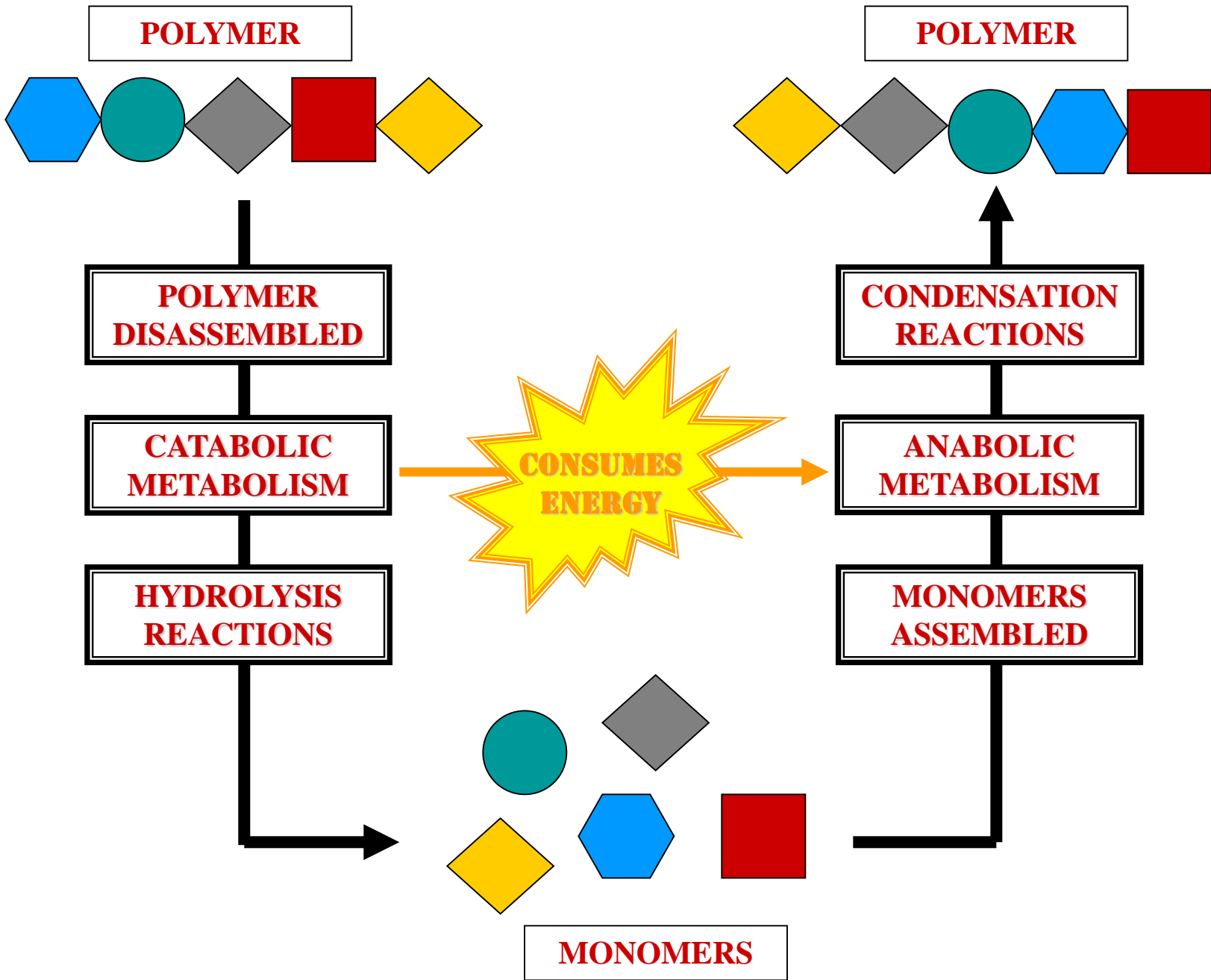












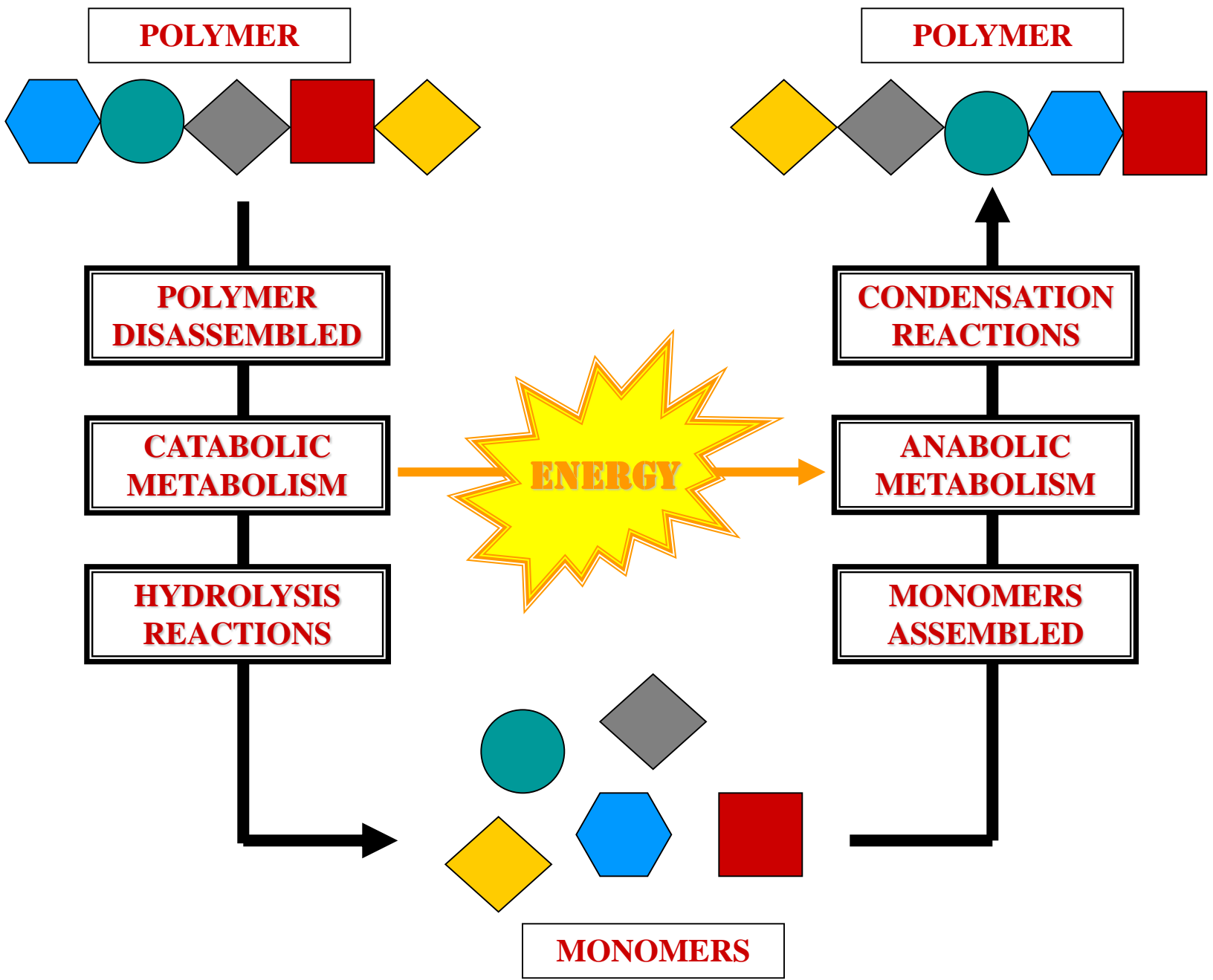
**CATABOLIC
METABOLISM
&
ANABOLIC
METABOLISM
?**

**CATABOLIC
METABOLISM
&
ANABOLIC
METABOLISM
*!!!INVERSE!!!***



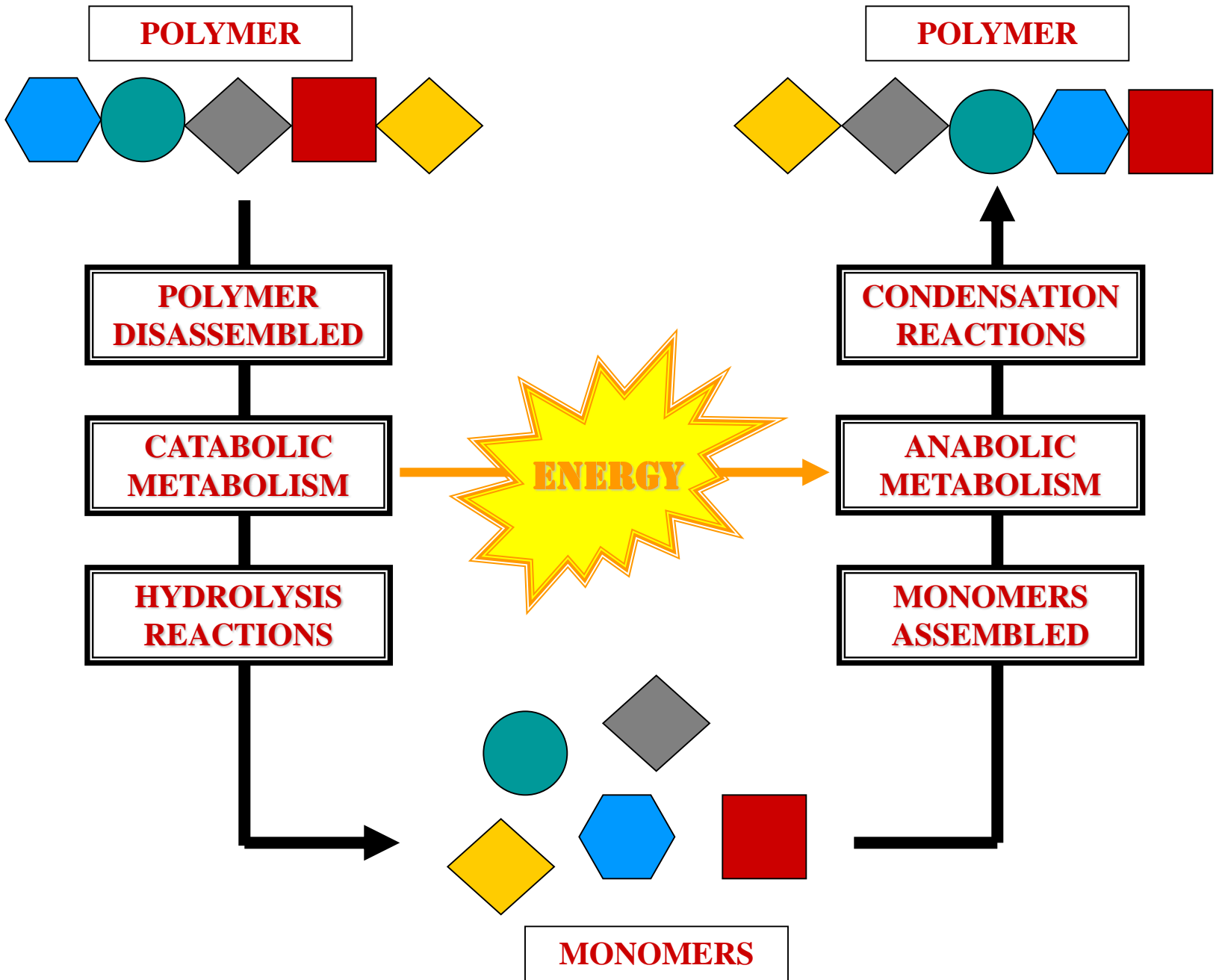
**CATABOLIC
BREAK-DOWN
&
ANABOLIC
BUILD-UP**

!!!*INVERSE*!!!



**CATABOLIC
METABOLISM
&
ANABOLIC
METABOLISM
*!!!COUPLED!!!***







ENERGY

ENERGY

BIO-ENERGETICS

BIO-ENERGETICS



STUDY BIO-ENERGY MANAGEMENT

BIO-ENERGETICS

BIO-ENERGETICS



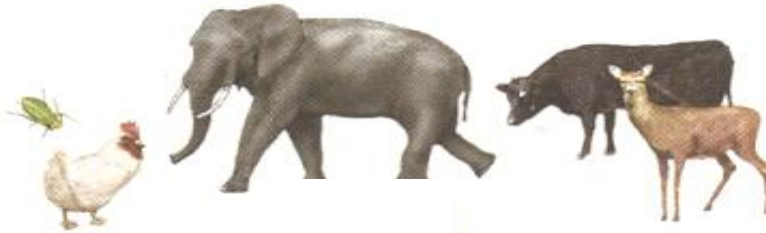
~2 CARNIVORES



~1 CARNIVORES



HERBIVORES



PRODUCERS



**FOOD
CHAIN**

BIO-ENERGETICS



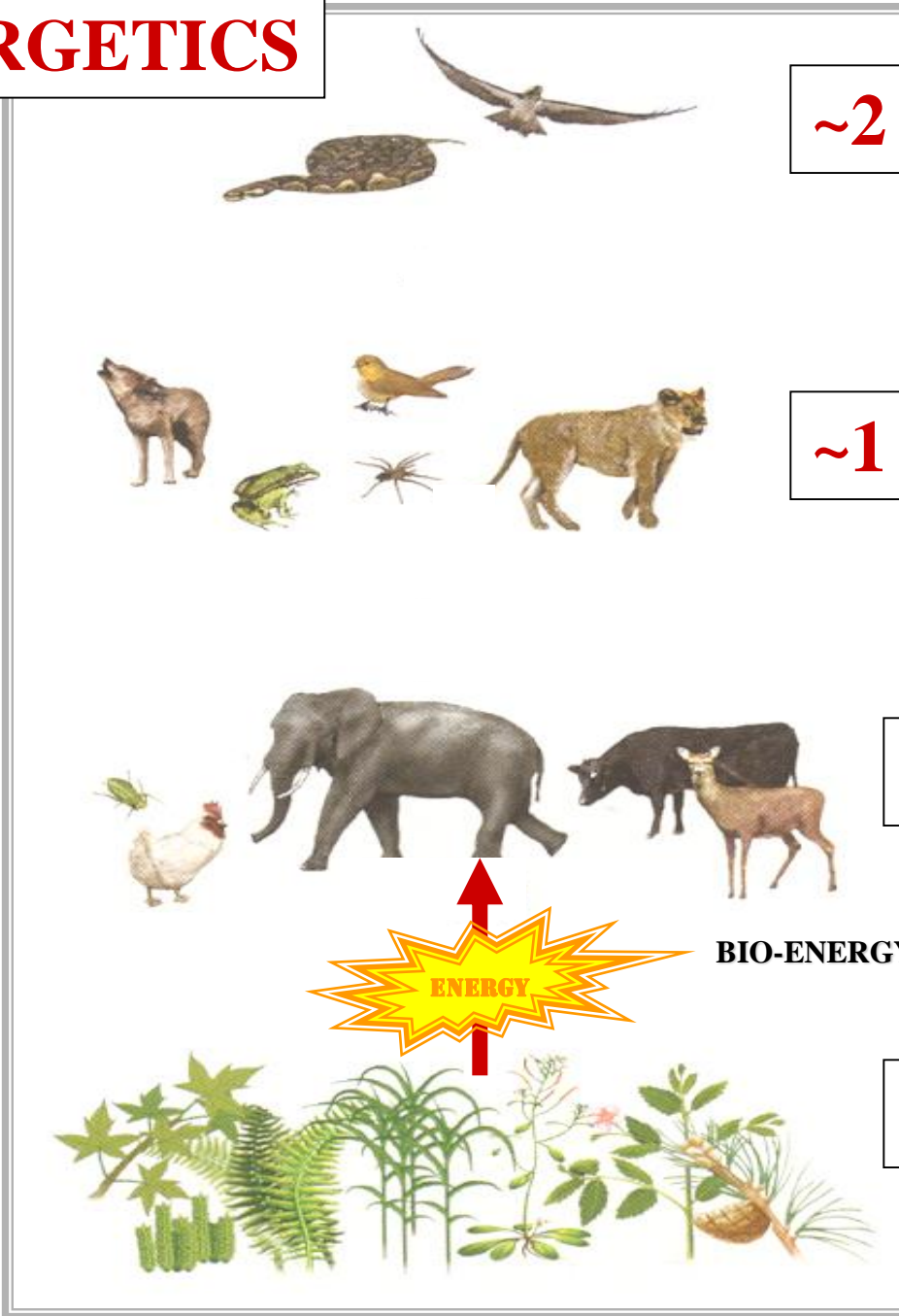
~2 CARNIVORES

~1 CARNIVORES

HERBIVORES

PRODUCERS

**FOOD
CHAIN**

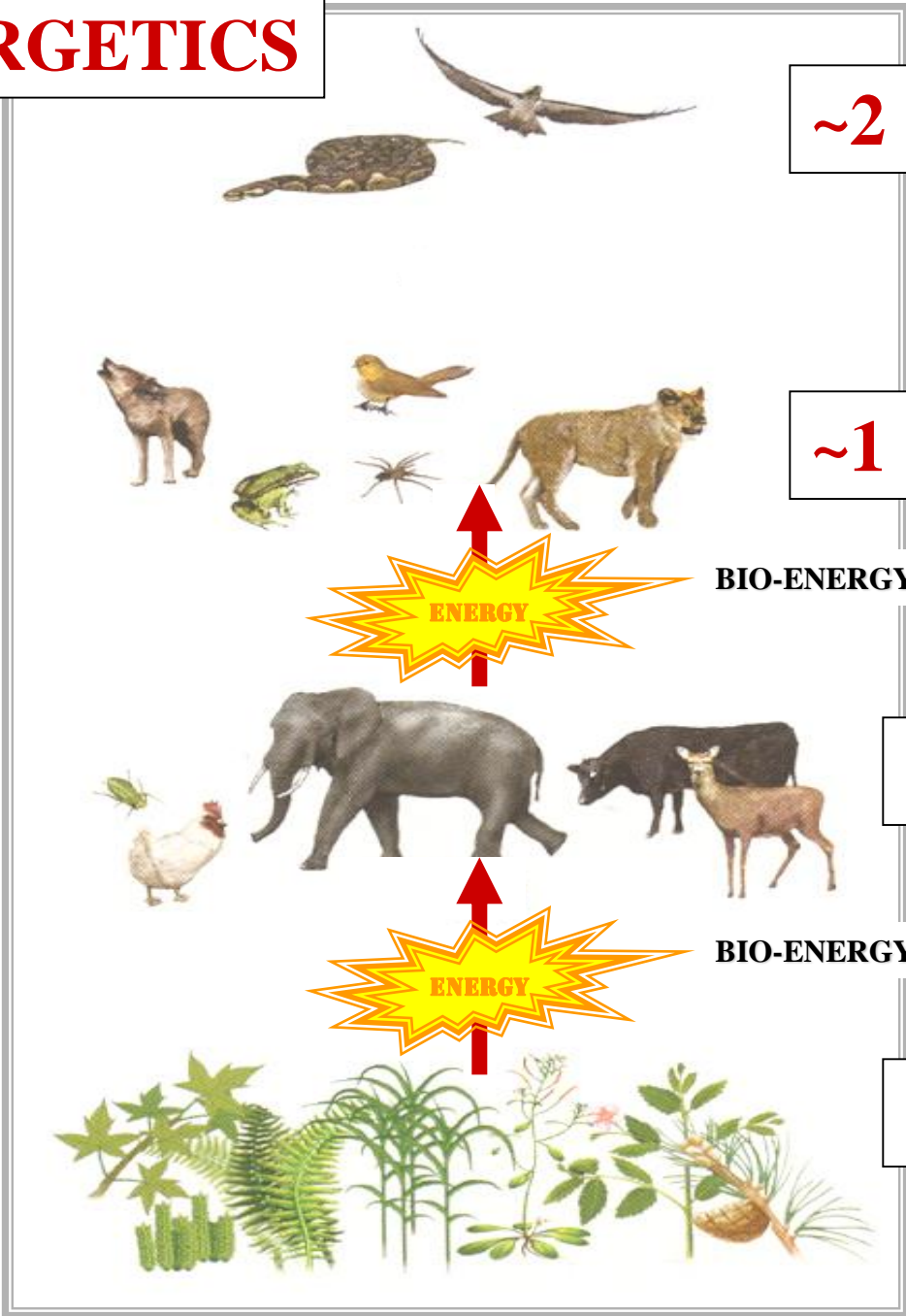


BIO-ENERGY MANAGEMENT

BIO-ENERGETICS



FOOD CHAIN



~2 CARNIVORES

~1 CARNIVORES

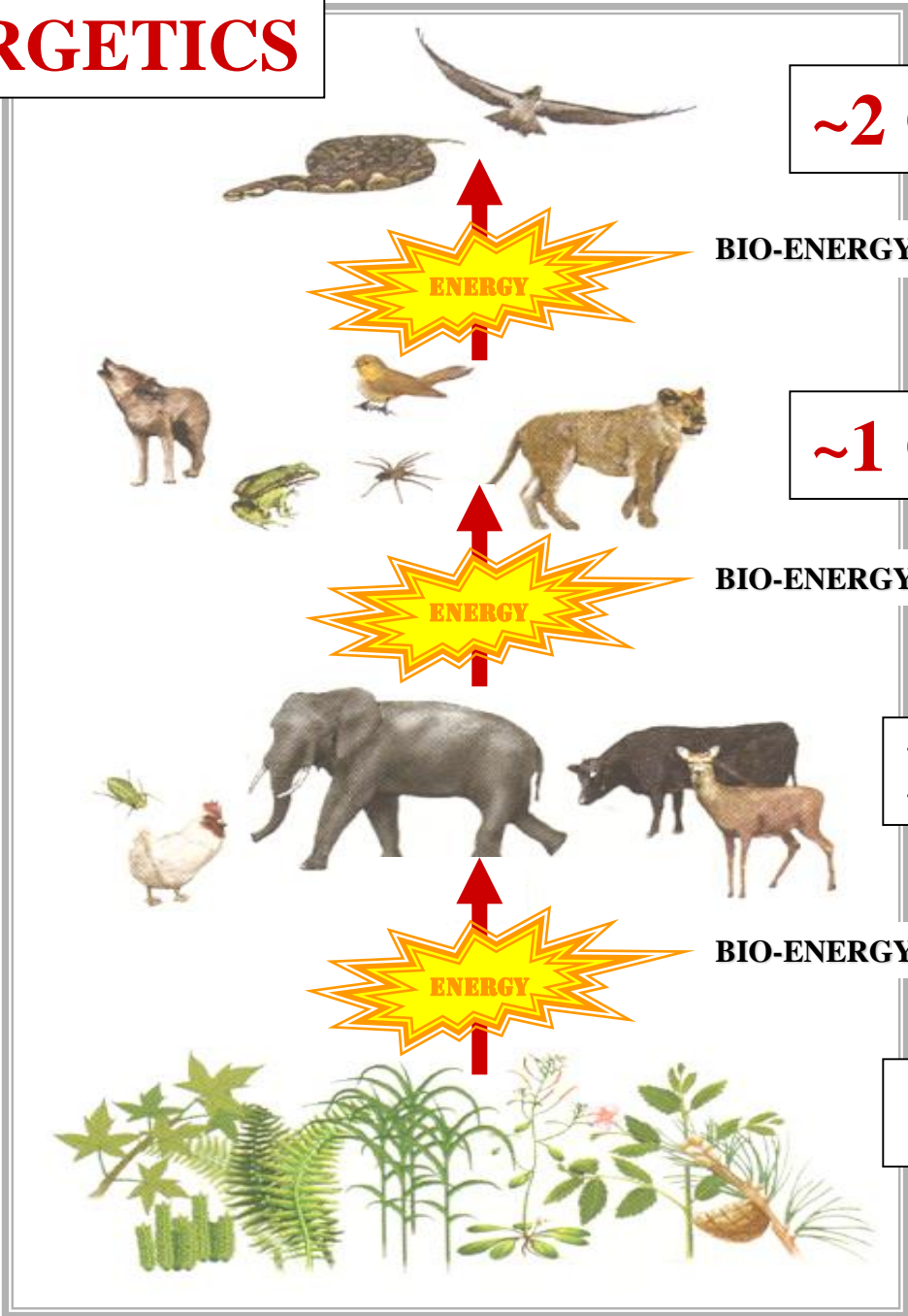
HERBIVORES

PRODUCERS

BIO-ENERGETICS

?

FOOD CHAIN



~2 CARNIVORES

BIO-ENERGY MANAGEMENT

~1 CARNIVORES

BIO-ENERGY MANAGEMENT

HERBIVORES

BIO-ENERGY MANAGEMENT

PRODUCERS

QUESTION



**WHAT IS THE
INITIAL BIO-ENERGY
SOURCE?**

QUESTION

LIVING ORGANISMS



LIVING ORGANISMS

LIVING ORGANISMS

EARTH

ANSWER



L

SUN / STAR

ANSWER



INITIAL BIO-ENERGY SOURCE

**LIGHT
ENERGY**

INITIAL BIO-ENERGY SOURCE

SUN / STAR

ENERGY: DEFINED

ENERGY



ENERGY

**ABSTRACT
DIFFICULT TO DEFINE**

ENERGY



ENERGY

ABSTRACT

ABILITY TO DO WORK

ENERGY



ENERGY

ABSTRACT

ABILITY TO DO WORK

ABILITY TO DRIVE

BIO-CHEMICAL REACTIONS

ENERGY



ENERGY: DEFINED

SUMMARY



ENERGY

ABSTRACT

DIFFICULT TO DEFINE



ENERGY

ABILITY TO DO WORK



ENERGY

**ABILITY TO DRIVE
BIO-CHEM RXTS**

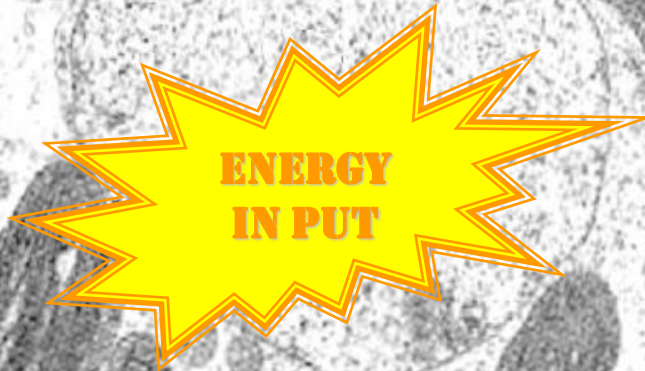


BIOCHEMICAL REACTION



BIOCHEMICAL REACTION

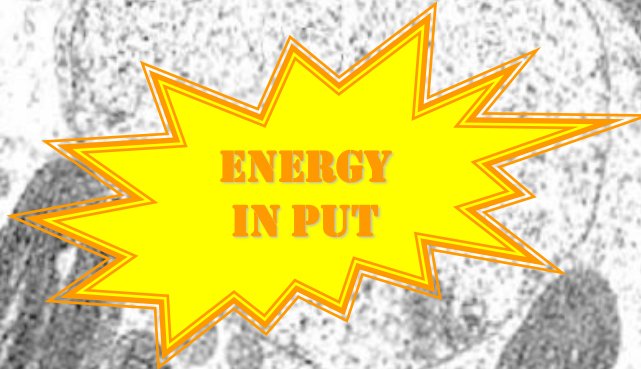
ENERGY INPUT



BIOCHEMICAL REACTION



ENERGY INPUT



**ENERGY INPUT
DRIVES**

BIOCHEMICAL REACTIONS



ENERGY INPUT
ESSENTIAL
CELL
METABOLISM



QUESTION

WHAT
ENERGY STATE IS
ESSENTIAL TO
CELL METABOLISM?

QUESTION

ENERGY STATES

ENERGY STATES

POTENTIAL ENERGY

ENERGY STATE

ENERGY STATES

POTENTIAL ENERGY

KINETIC ENERGY

ENERGY STATE

POTENTIAL ENERGY STATE

POTENTIAL ENERGY

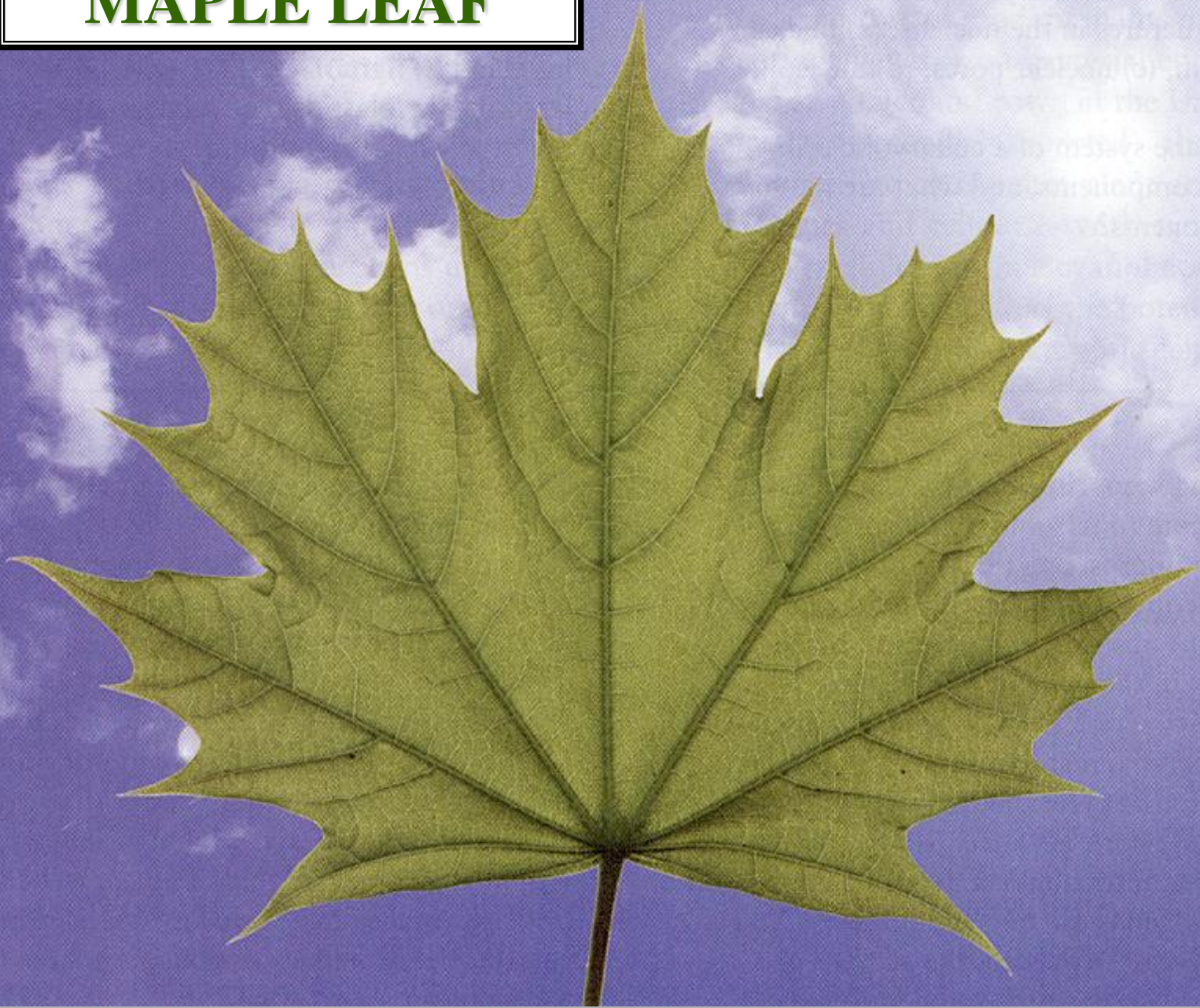


ENERGY IN STORAGE

POTENTIAL ENERGY

MAPLE LEAF

P



PHOTOSYNTHESIS

S



WATER

CO₂

LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT
THYLAKOID

CHEMICAL ENERGY

DK RXT
STROMA

CHLOROPLAST

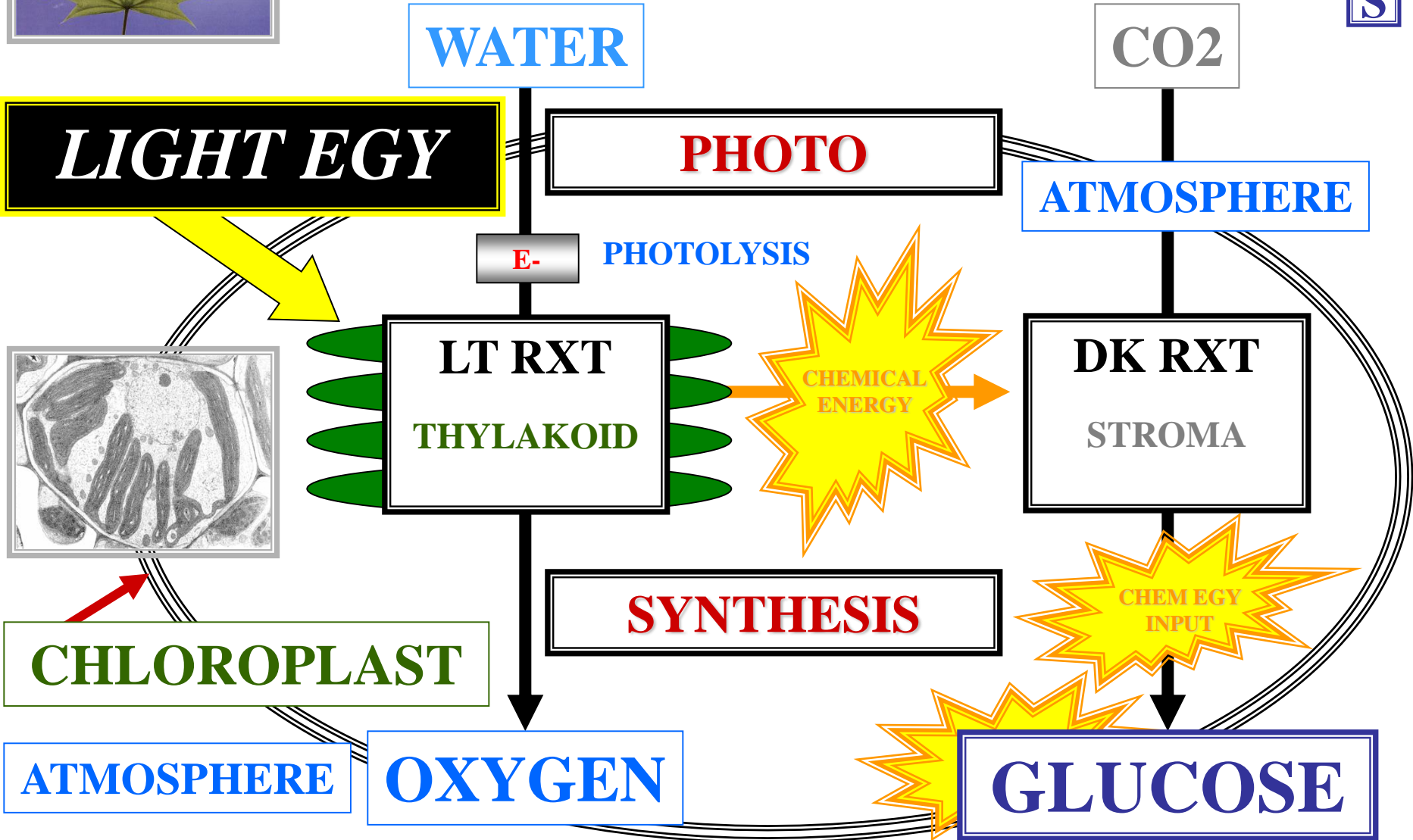
SYNTHESIS

CHEMICAL ENERGY INPUT

ATMOSPHERE

OXYGEN

GLUCOSE



PHOTOSYNTHESIS



WATER

CO₂

LIGHT ENERGY

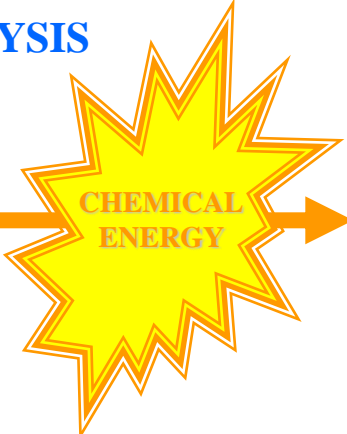
PHOTO

ATMOSPHERE

E- PHOTOLYSIS



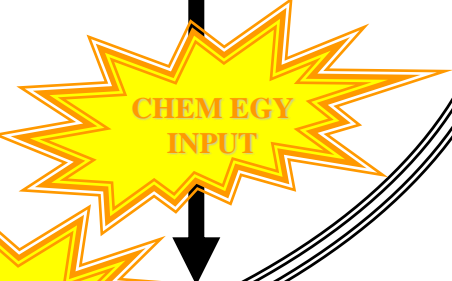
LT RXT
THYLAKOID



DK RXT
STROMA

SYNTHESIS

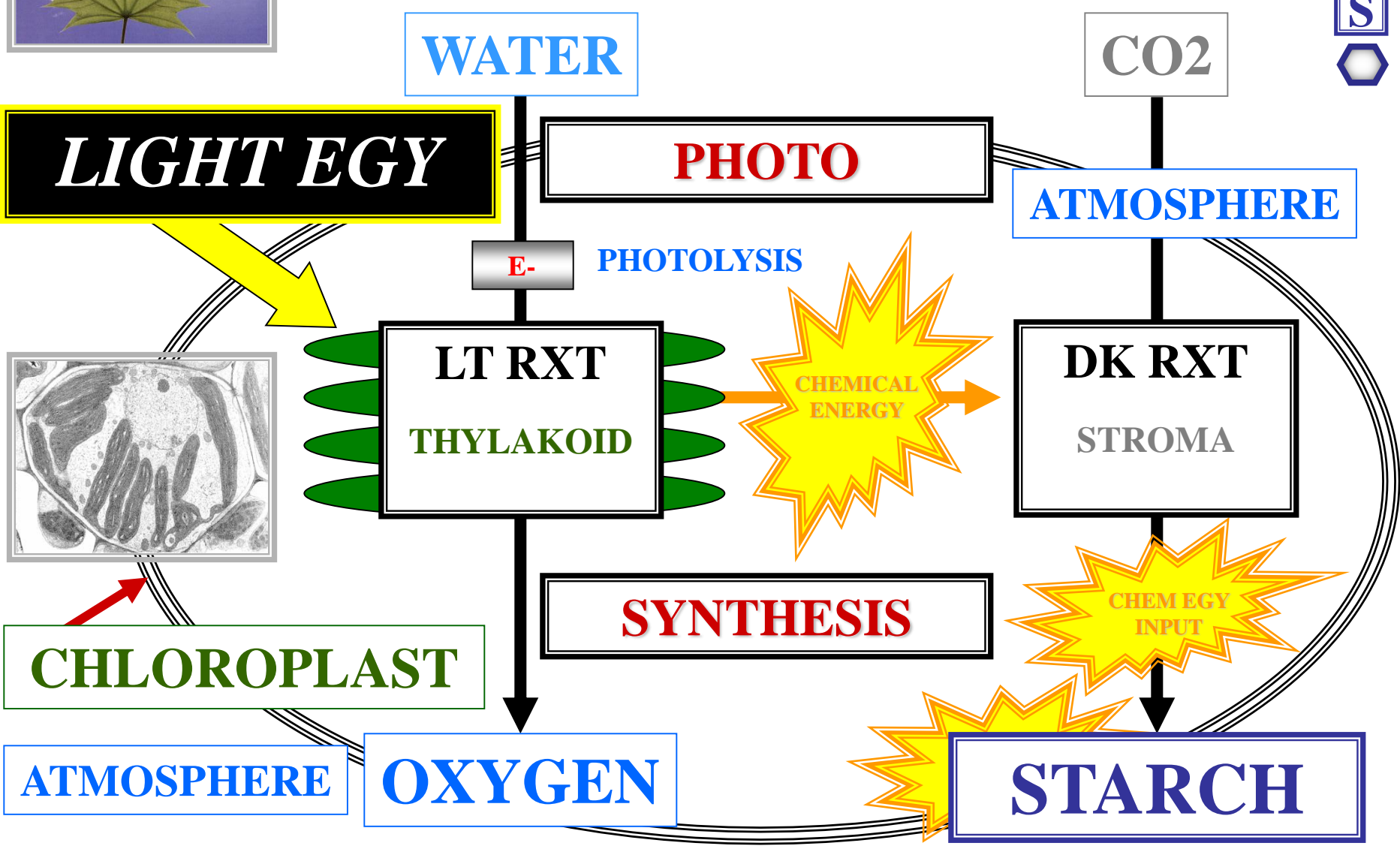
CHLOROPLAST

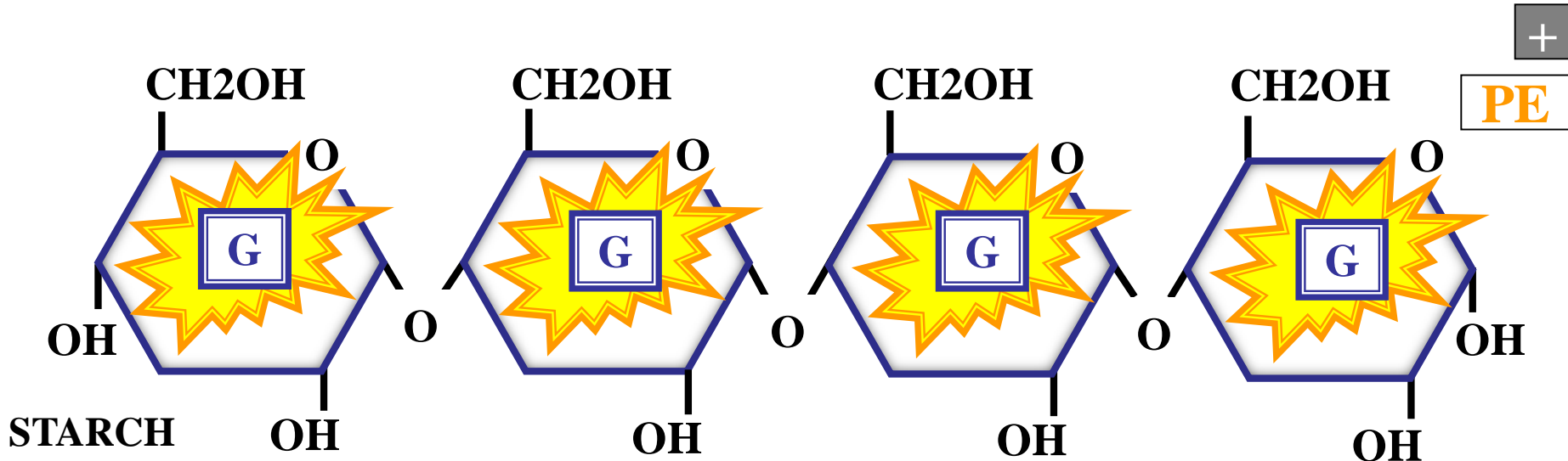


ATMOSPHERE

OXYGEN

STARCH



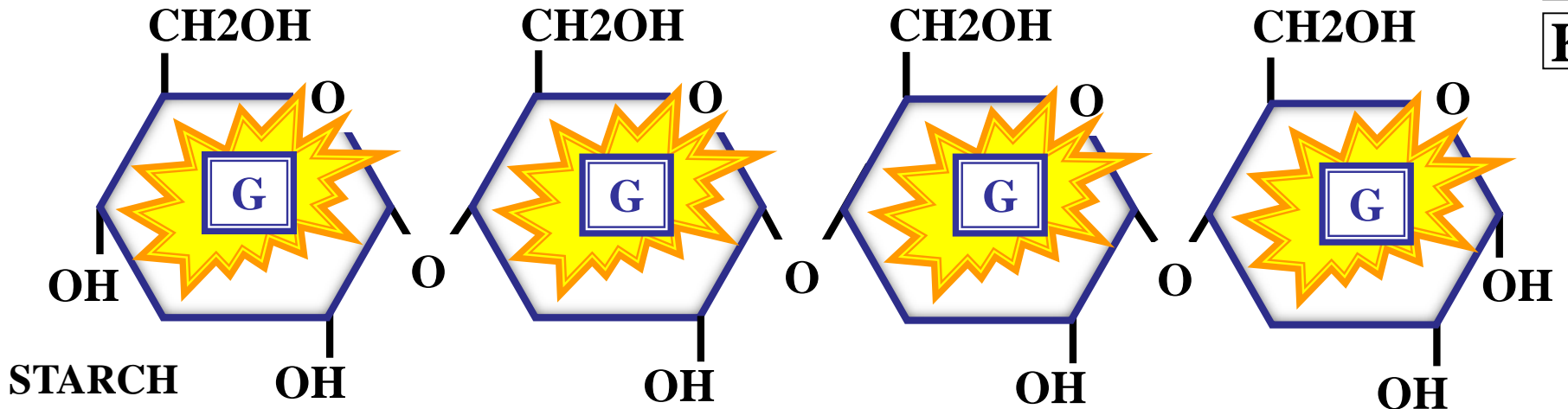


STARCH = AMYLOSE

ENERGY IN STORAGE

 = STORED ENERGY

 = GLUCOSE



STARCH = AMYLOSE

**POTENTIAL ENERGY
ENERGY IN STORAGE**

 = STORED ENERGY

 = GLUCOSE

KINETIC ENERGY STATE

KINETIC ENERGY



ENERGY IN MOTION/USE

KINETIC ENERGY



BIOCHEMICAL REACTION



BIOCHEMICAL REACTION

ENERGY INPUT

i

S

+

ENERGY
INPUT



BIOCHEMICAL REACTION

ENERGY INPUT



**ENERGY
STATE**



BIOCHEMICAL REACTION