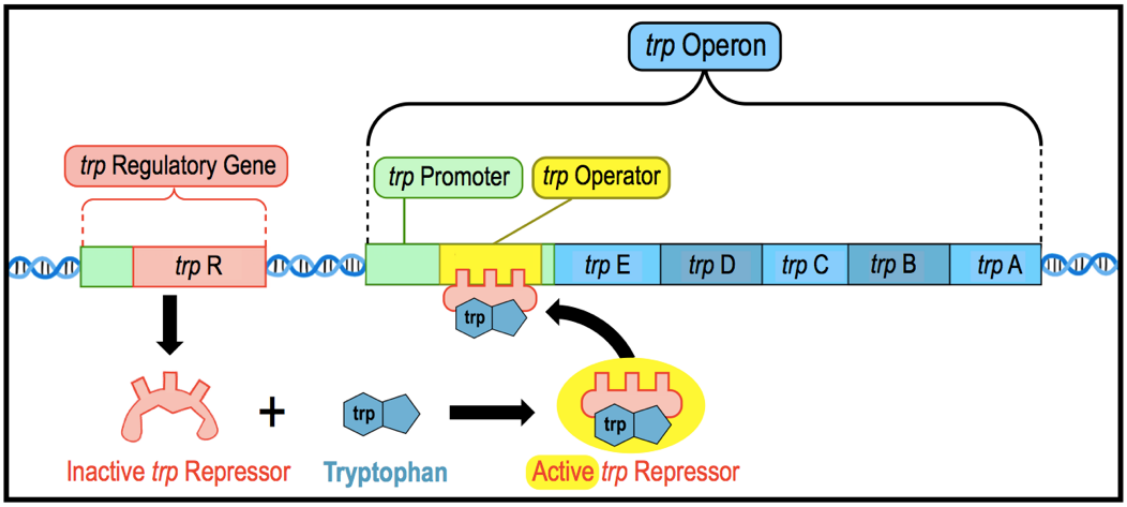
CONCEPT: THE TRP OPERON

- Tryptophan (_____) is an *amino acid* that can be *absorbed* from the environment or *synthesized* by the cell.
- _____ **Operon**: *repressible operon* with _____ genes encoding enzymes required for synthesizing **Tryp**tophan.
- ***trp*____: encodes the *trp* _____ **protein** which is expressed in the _____ form.
  - □ *Inactive TrpR* protein requires a _____ (usually Trp itself) in order to bind the operator.

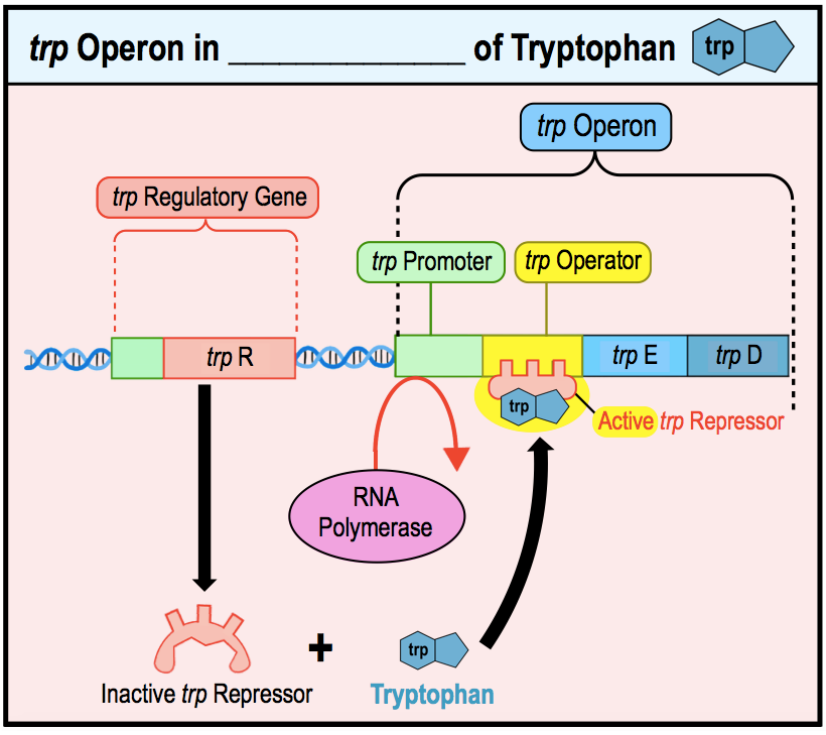
EXAMPLE: The *trp* operon contains 5 genes required for Tryptophan synthesis & is regulated by the *trp* repressor.



In the Presence of Tryptophan

- When Tryptophan is abundant, the cell does not need to synthesize its own & the *trp* operon is _____.
  - □ Tryptophan acts as a _____ that binds to & _____ the *trp* repressor protein.

EXAMPLE: Cellular Tryptophan co-represses the *trp* operon when it is readily abundant for the cell.



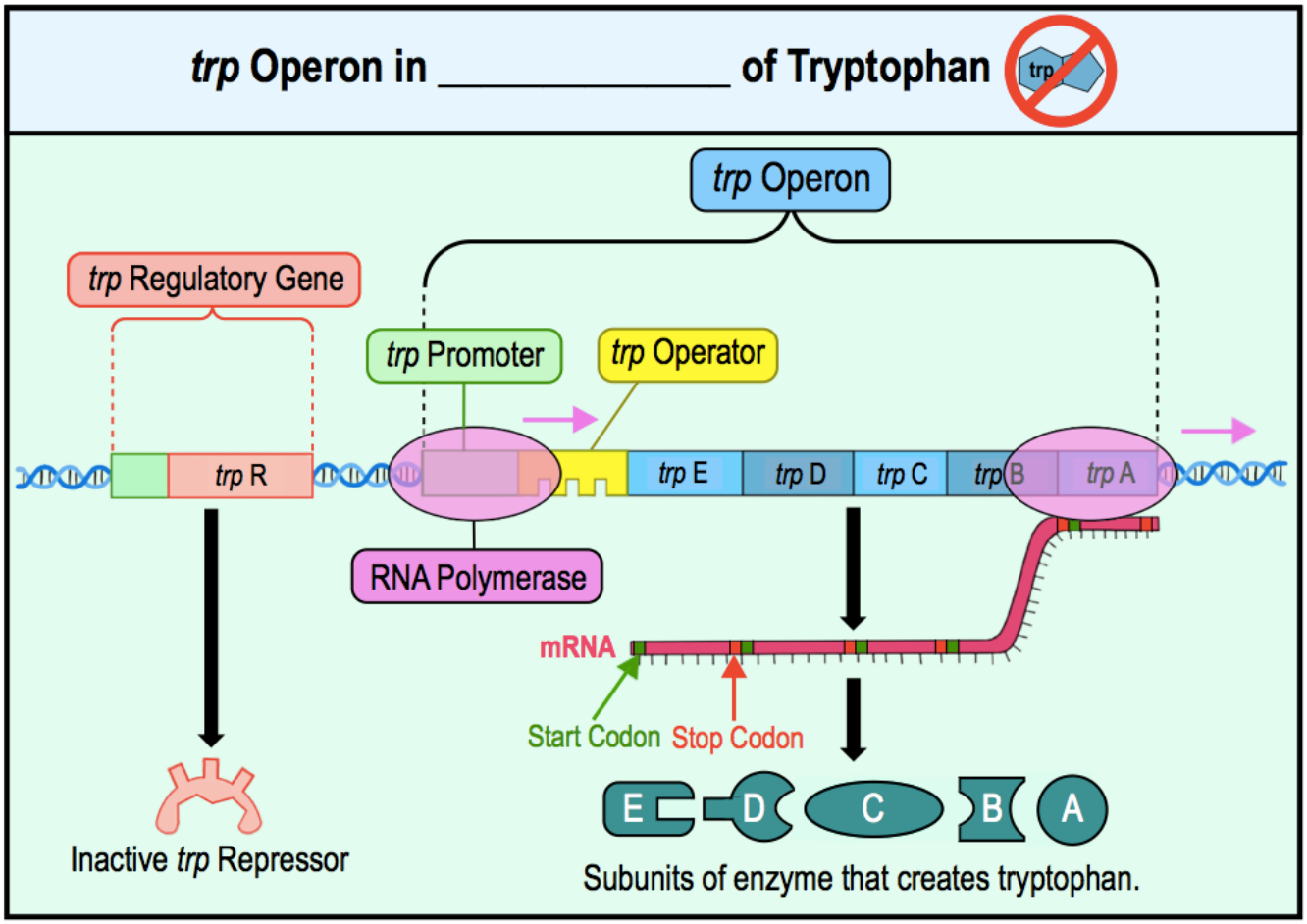
CONCEPT: THE TRP OPERON

In the Absence of Tryptophan

●When Tryptophan is *not* readily available the cell must _____ its own using enzymes from the *trp* operon.

□ When cellular Tryptophan levels are *low*, the *TrpR* remains _____, allowing for transcription.

EXAMPLE: Low cellular Tryptophan levels result in increased transcription of the *trp* operon.



PRACTICE: The trp operon consists of _____ genes that encode tryptophan biosynthesis enzymes.

a) One. b) Two. c) Three. d) Four. e) Five.

PRACTICE: Under what conditions does the trp repressor block transcription of the trp operon?

a) When the repressor binds to the inducer.

b) When the repressor binds to tryptophan.

c) When the repressor is not bound to tryptophan.

d) When the repressor is not bound to the operator.

CONCEPT: THE TRP OPERON

PRACTICE: If the *trp* regulatory gene mutates so that the repressor protein can no longer bind to tryptophan what will be the result?

a) The *trp* operon will not be expressed.
b) The *trp* operon will be continuously expressed.
c) The *trp* operon will be expressed in the presence of tryptophan only.
d) The *trp* operon will be expressed in the absence of tryptophan only.
e) There will be no effect on the *trp* operon.

PRACTICE: In the absence of tryptophan, _____:

a) The inducer cannot bind to the operator, so *trp* operon transcription occurs.
b) The active repressor cannot bind to the operator, so *trp* operon transcription is reduced.
c) The inactive repressor cannot bind to the operator, so *trp* operon transcription occurs.
d) The repressor binds to the corepressor, and *trp* operon transcription occurs.
e) The active repressor binds to the operator, so *trp* operon transcription is repressed.

PRACTICE: Based on the information you know about the *trp* operon, is the creation of tryptophan expensive to the cell?

a) Yes, this is why tryptophan is the co-repressor of the *trp* operon.
b) No, this is why tryptophan is the inducer of the *trp* operon.
c) Yes, this is why tryptophan is the repressor of the *trp* operon.