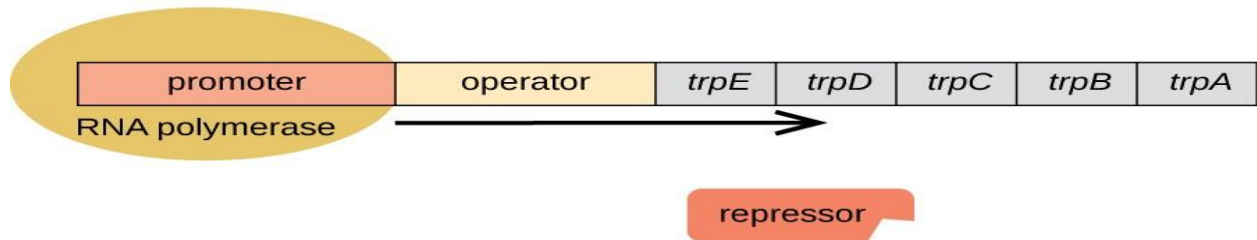


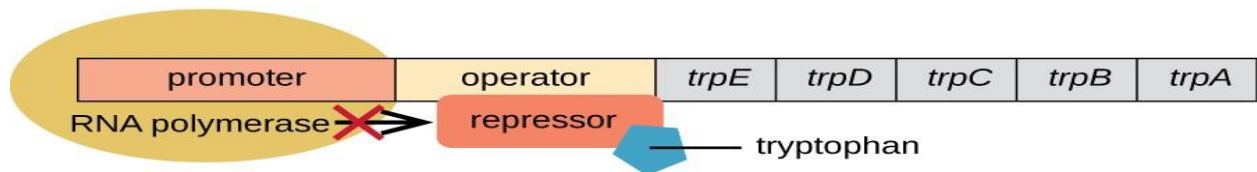
The *trp* Operon - a repressible system

This operon contains five structural genes for the production of five proteins. As with all operons, the *trp* operon consists of the repressor, promoter, operator and the structural genes. When environmental tryptophan is low, the operon is turned on. This means that transcription is initiated, the genes are expressed, and tryptophan is synthesized. However, if tryptophan is present in the environment, the *trp* operon is attenuated (turned off). Transcription does not occur and tryptophan is not synthesized.

In the absence of tryptophan, the *trp* repressor dissociates from the operator, and RNA synthesis proceeds.



When tryptophan is present, the *trp* repressor binds the operator, and RNA synthesis is blocked.



Difference between inducible Vs repressible operon: The *trp* operon is a **repressible system**. The primary difference between repressible and inducible systems is the result that occurs when the effector molecule binds to the repressor. With inducible systems, the binding of the effector molecule to the repressor greatly reduces the affinity of the repressor for the operator, the repressor is released and transcription proceeds. The *lac* operon is an example of an inducible system. With repressible systems, the binding of the effector molecule to the repressor greatly increases the affinity of repressor for the operator and the repressor binds and stops transcription. Thus, for the *trp* operon, the addition of tryptophan (the effector molecule) to the *E. coli* environment shuts off the system because the repressors binds at the operator. In this system, though, unlike the *lac* operon, the gene for the repressor is not adjacent to the promoter, but rather is located in another part of the *E. coli* genome. Another difference is that the operator resides entirely within the promoter.

Inducible system - the effector molecule (lactose inducer) interacts with the repressor protein such that it can not bind to the operator

Repressible system - the effector molecule (tryptophan) interacts with the repressor protein such that it can bind to the operator