#526146

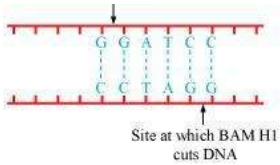
Topic: Principle of recombinant DNA technology

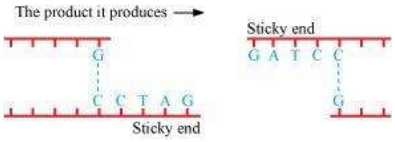
Make a chart(with diagrammatic representation) showing a restriction enzyme, the substrate DNA on which it acts, the site at which it cuts DNA and the product it produces.

Solution

The name of the restriction enzyme is Bam H1.

The substrate for BamH1 enzyme is GGATCC. BAM H1 enzyme can make cut or nick on the G nitrogen base of restriction site and produces cut with sticky ends.





#526152

Topic: Principle of recombinant DNA technology

Do eukaryotic cells have restriction endonucleases? Justify your answer.

Solution

Restriction endonucleases are naturally occurring defence mechanism of bacteria to digest any foreign DNA molecule. Restriction endonucleases recognize specific sequence mostly 4-6 bp, in the DNA and cut it into fragments by breaking the phosphodiester linkage between two successive nucleotides of DNA. As these restriction sites may be present in bacterial DNA itself, DNA methylase enzyme carry out methylation of DNA to protect own DNA in bacteria from restriction digestion. Eukaryotic DNA is highly methylated and therefore, these enzymes are not found in eukaryotes.

#526154

Topic: Microbes in industry and household

Besides better aeration and mixing properties, what other advantages do stirred tank bioreactors have over shake flasks?

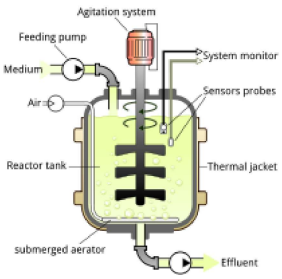
Solution

Stirred tank bioreactors are used for a large-scale production. They have several advantages over shake flasks:

(1) Easy to collect the sample for testing.

(2) There is a foam breaker that regulates the foam.

(3) It has a system that controls the temperature and pH of culture.



#526164

Topic: Principle of recombinant DNA technology

Can you think and answer how a reporter enzyme can be used to monitor transformation of host cells by foreign DNA in addition to a selectable marker?

Solution

A reporter gene can be used to monitor the transformation of host cells by foreign DNA by keeping a track of its receptor gene. It act as a selectable marker to determine whether the host cell has taken up the foreign DNA or the foreign gene gets expressed in the cell.

The reporter gene and the foreign gene are placed in the same DNA construct and then inserted in the cell. Here, the reporter gene is used as a selectable marker to find out the successful uptake of foreign genes. An example of reporter genes includes lac Z gene, which encodes a green fluorescent protein in a jelly fish.

#526170

Topic: Microbes in industry and household

Describe briefly the followings:

(a) Origin of replication

(b) Bioreactors

(c) Downstream processing

Solution

(a) Origin of replication is the DNA sequence that serves as a start site for the replication process.

(b) The large customised tanks used to carry out the biological process/reaction at commercial scale are called as bioreactors.

(c) Downstream processing includes stages in the isolation and purification of the biotechnological products.

#526172

Topic: Process of recombinant DNA technology

Explain briefy.

(a) PCR

(b) Restriction enzymes and DNA

(c) Chitinase

Solution

(a) PCR - Polymerase chain reaction technique amplify the DNA from one copy to more than one in three steps namely denaturation of target DNA (thermal cycle to separate th DNA strands), annealing of primers to the ssDNA and polymerization (extension of primer into complete DNA strand complementary to the template strand).

(b) Restriction enzymes recognize specific sequences, mostly 4-6 bp, in the DNA and cut it into fragments by breaking the phosphodiester linkage between two successive nucleotides of DNA. DNA is polymer of deoxyribonucleotides and serves as genetic material

(c) Chitinases are class of enzymes that can digest chitin; the major component of fungal cell wall.

#526211

Topic: Process of recombinant DNA technology

Can you suggest a method to remove oil (hydrocarbon) from seeds based on your understanding of rDNA technology and chemistry of oil?

Solution

Glycerols and fatty acids are main constituents of seed oils. Insertion of rDNA carrying the gene for any of glycerol synthesis inhibtors or fatty acid synthesis inhibitors would inhibit oil synthesis and the recombinants seeds won't have oils. Knocking out/removing the gene/genes responsible for the synthesis of oils is another option.