

Homework

[Science](#), [Biology](#)



Homework 3. What does PCR do, how does it work, and why is it useful? PCR is a polymerase chain reaction which is a low-cost procedure used to amplify or make copies of a single strand or chosen segments of DNA. We know that DNA is composed of two strings of pair bases. If we have one string, we can use it to build the other one. This is called mapping. During PCR, the sought-after DNA is given a thermal shock which leads to opening of the strings. The strings are then provided the amino acids that they require to build another string. This is how PCR works. Using this procedure, millions and trillions of copies of DNA can be produced. The procedure of PCR is useful because sometimes, during DNA tests and sampling procedures, more DNA than what is available is required. Biochemists find it very useful when they have large number of replicas of the DNA or nucleotides they are working at. Hence, they do not find it difficult finding the DNA, recognizing it during their experiments, and working with it.

4. How do you separate the desired DNA from all others?

Restriction enzymes are used to separate the desired DNS from all others in case PCR is not applicable or recommended. These enzymes cut down segments of genomic DNA at particular nucleotide sites. To separate these DNA fragments, electrophoresis procedures are used. Small diameter capillary array gel electrophoresis provides quicker separation of fragments by the application of electric fields. This technique, which in this case is called pulse field gel electrophoresis (PFGE), involves many ways, one of which is electro elusion which involves the use of multiple electrodes located orthogonally from the agarose gel containing DNA which is sealed in a dialysis tubing containing buffer. Small pulses of alternate current are

passed all the way through this gel, which results in gene separation from the gel piece. The DNA is still in the dialysis tubing, so it is easily discoverable. Another way of recovering the DNA from the gel is by using agarase to digest the agarose, which leaves behind the desired DNA which we can separate easily.

5. Why is it possible to use a DNA sequence to identify bacteria?

16s rRNA gene sequencing is used for the identification of bacteria and studying of bacterial phylogeny and taxonomy. The reasons why DNA sequencing can be used for this purpose are many. First of all, 16s rRNA gene is present in nearly all bacteria. DNA sequences are not found in other organisms. Second, since the functionality of 16s rRNA has not altered with time, this means that we can use its sequence changes as an accurate measure of time or evolution. In other words, when we have to identify a lot of diverse types of organisms, we require two main properties from the DNA. One is that the DNA should be similar among a particular group of organisms, for example bacteria, and second is that some parts of this DNA must have changed with evolution so that we are able to differentiate different species of organisms. During PCR, we pick DNA anchors that have variable parts of DNA in between them. If DNA cloning is possible in this case, then this means that we have identified the bacteria.