

A. The resulting data is analyzed by the VITEK II software, which compares the growth patterns of the microorganisms in each well to a database of known microbial species and their corresponding antimicrobial susceptibility patterns. It is widely used in clinical microbiology laboratories to identify microorganisms and determine their susceptibility to various antibiotics. Principle of work: The VITEK II system uses a combination of technologies including fluorescence, spectrophotometry, and turbidimetry to identify microorganisms and determine their susceptibility to antimicrobial agents. This involves heating and cooling the sample to specific temperatures to denature the DNA, anneal the primers, and extend the DNA strands.

C. VITEK II system: The VITEK II system is an automated microbial identification and antimicrobial susceptibility testing system developed by bioMérieux. This method allows researchers to obtain multiple copies of a DNA sequence from a small sample, which can be used for various applications such as genetic testing, forensics, and research. Regularly clean and maintain the thermal cycler to ensure proper function and prevent contamination.

B. Thermal cycler: A thermal cycler, also known as a PCR machine, is a laboratory instrument used to amplify DNA samples through the polymerase chain reaction (PCR). It uses a precise temperature control system to carry out the temperature cycles required for PCR. Principle of work: The thermal cycler works by cycling through a series of temperature changes to facilitate the different stages of the PCR reaction. Principle: PCR works by using a special enzyme called Taq polymerase, which can extend and replicate DNA strands. The most commonly used temperature cycles in PCR include:

- 1) Denaturation: This is typically done at a temperature of 94–98°C, where the double-stranded DNA template is separated into two single strands. This is necessary to allow the primers to bind to the target DNA.
- 2) Annealing: This is typically done at a temperature of 50–65°C, where the primers anneal or bind to their complementary sequences on the template DNA.

Run the thermal cycler program, which typically includes cycles of denaturation, annealing, and extension. Properly dispose of biohazardous waste and contaminated materials.

4.2.3.