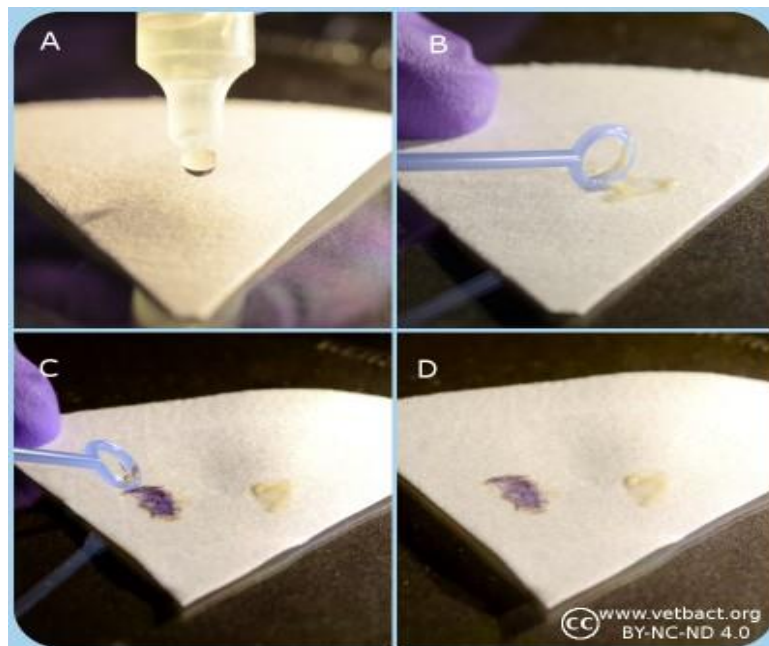


Biochemical tests

Oxidase test

This test is used to identify microorganisms containing the enzyme cytochrome oxidase (important in the electron transport chain). It is commonly used to distinguish between oxidase negative *Enterobacteriaceae* and oxidase positive *Pseudomonadaceae*.

Cytochrome oxidase transfers electrons from the electron transport chain to oxygen (the final electron acceptor) and reduces it to water. In the oxidase test, artificial electron donors and acceptors are provided. When the electron donor is oxidized by cytochrome oxidase it turns a dark purple. This is considered a positive result. In the picture below the organism on the right (*Pseudomonas aeruginosa*) is oxidase positive.



Catalase test

Many aerobic bacteria and most of those which are facultatively anaerobic produce the enzyme catalase. The function of this enzyme is to detoxify hydrogenperoxide (H_2O_2), which is formed from the superoxide radical by superoxide dismutase. Many aerotolerant anaerobic bacteria have peroxidase (which is not the same enzyme as cytochrome c oxidase) instead of catalase. Obligate anaerobic bacteria lack superoxide dismutase and catalase.

Catalase contains a heme group at the active site and it is catalyzing the following reaction with a very high turnover number:



Positive test result : Gas formation (O_2) in the form of bubbles shows that the bacterium has a catalase.

Negative test result : No gas formation.

