



دانشگاه اصفهان

دانشکده علوم، گروه زیست شناسی، آزمایشگاه میکروبیولوژی



آزمایشگاه میکروبیولوژی پایه

تست های بیوشیمیایی (۲)

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Rapid Enzyme Tests in Bacteriology Lab



Catalase test

Oxidase test

Coagulase test



Catalase test

- ▶ Hydrogen peroxide forms as one of the oxidative end products of aerobic carbohydrate metabolism. Catalase converts hydrogen peroxide into water and oxygen.
- ▶ The catalase test is commonly used to differentiate streptococci (negative) for staphylococci (positive).

Specimen Requirements

Well -isolated colonies of an 18-24 hour culture.

► Reagents and Equipment

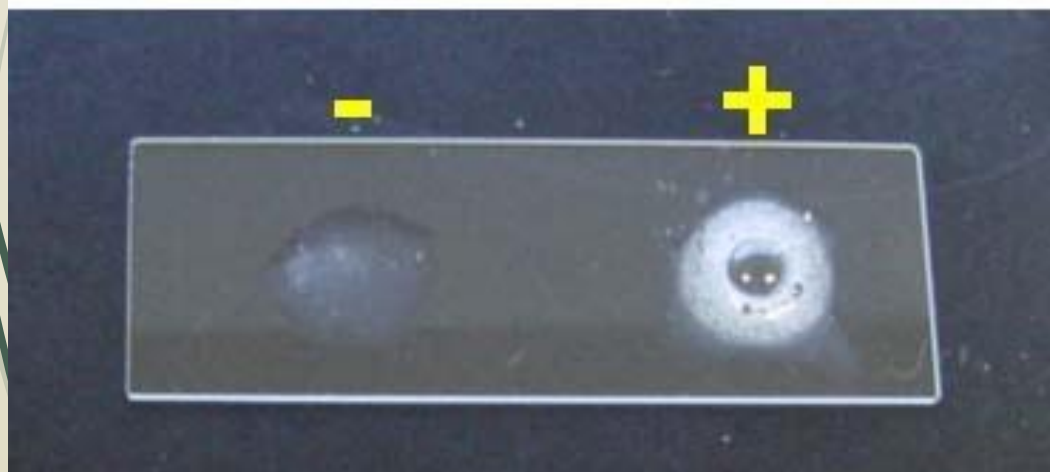
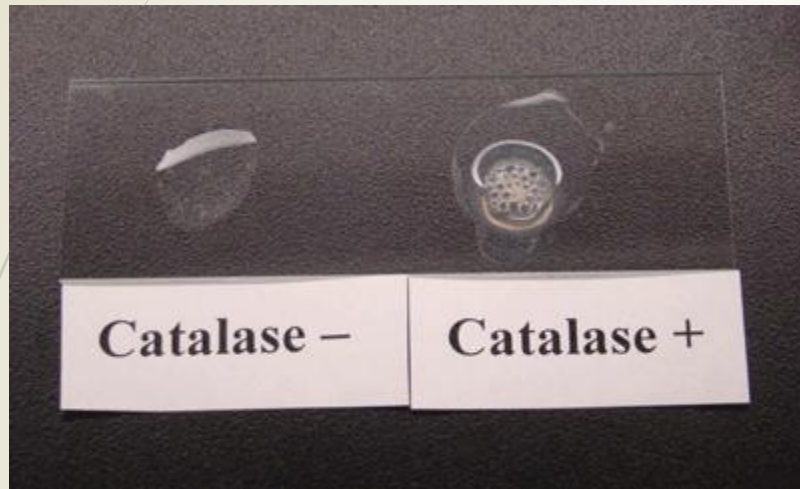
- 3% Hydrogen peroxide, Clean glass slide, Dropper, Bacteriological Loop

► Controls

Positive: *Staphylococcus aureus*

Negative: *Streptococcus sp.*

Catalase test





Oxidase test

- The **oxidase test** is a test used in microbiology to determine if a bacterium produces certain cytochrome c oxidases.

Oxidase solution

- ▶ L(+)-Ascorbicacid 0,03 g
- ▶ N,N,N',N'- Tetramethyl-p-Phenylendiamine
- ▶ Dihydrochloride ($C^{10}H^{16}N^2 \cdot 2HCl$) 0,03 g
- ▶ Sterile water 30 ml

Dissolve chemicals in water, and store the solution in a dark buttle in +5 °C for 3 weeks.

Oxidase test



ASM MicrobeLibrary © Cathcart, Kramer, Shields

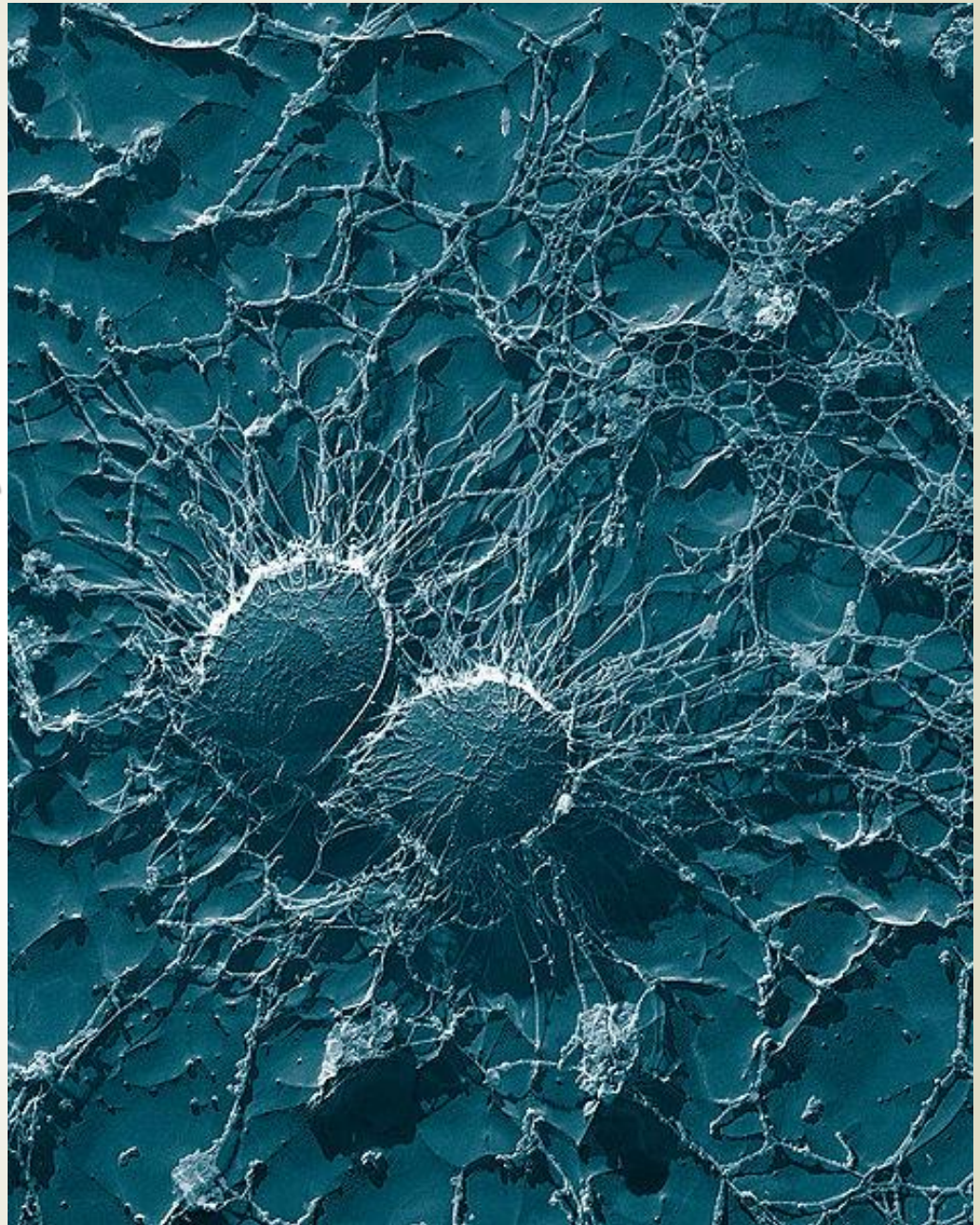




Bound coagulase

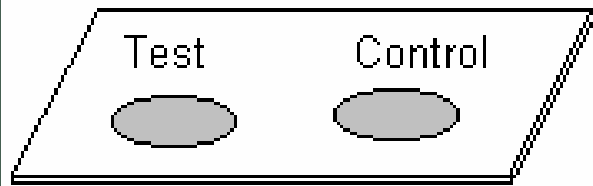
- The bound coagulase is also known as clumping factor.
- It cross-links the α and β chain of fibrinogen in
- plasma to form fibrin clot that deposits on the cell wall.
- While slide coagulase test is useful in screening, tube coagulase test is useful in confirmation of coagulase test.

➤ **Clumping by
bound coagulase**

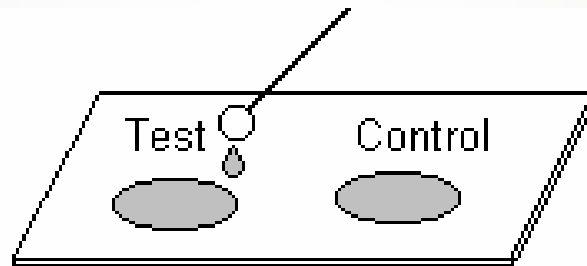


Coagulase

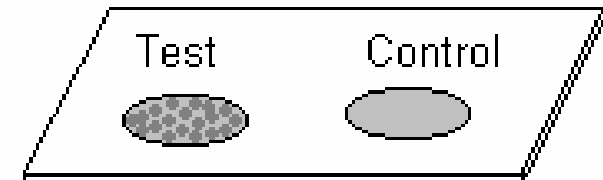
Slide coagulase test



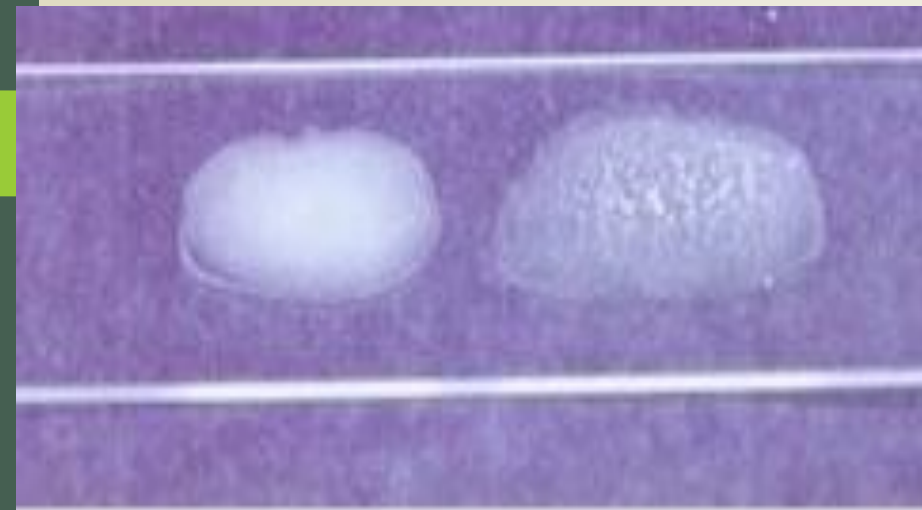
Dense suspensions of test are made on slide



One loopful of plasma is added to test and mixed



Clumping occurs in test, indicating it is *S. aureus*



Negative
(no clumps)

Positive
(clumps)



Slide Coagulase Test



Coagulase

➤ The free coagulase:

Reacts with coagulase reacting factor (CRF) in plasma to form a complex, which is thrombin. This converts fibrinogen to fibrin resulting in clotting of plasma.

While slide coagulase test is useful in screening, tube coagulase test is useful in confirmation of coagulase test.

TUBE COAGULASE TEST:

