







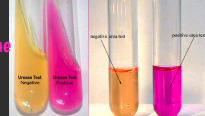
the test	The purpose of the test	The media	The indicator + the reaction	The result
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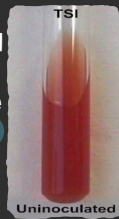
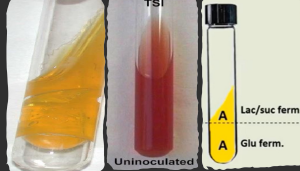

1) Indole test	Test the ability of the  to break (Tryptophan) = having the enzyme (Tryptophanase)	Peptone (liquid) + nutrient Source Tryptophan	[ Kovac's R. ] If the media turn pink = +indole = The tryptophan metabolized and produce Indole that react with the reagent Yellow = - Indole	
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

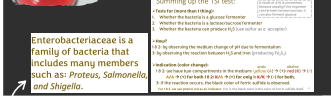

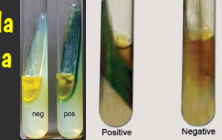

2) methyl red test	Test the ability of the  to perform mixed acid fermentation from ( Glucose )	Peptone + Glucose [Incubate at 37 for 48h]	[ MR ] if the media turn red = +MR = large amounts of mixed acid Acetic, Lactic, Succinic acid = low ph < 4.5	Low Ph < 4 Red Acidic Methyl Red +ve Methyl Red -ve High Ph > 6 Yellow Alkaline
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3) Voges - proskauer test ( V.P )	Test the ability of the  to perform Acetyl methyl carbonil ( Acetone ) from the fermentation of ( Glucose )	Peptone + Glucose [Incubate at 37 for 48h]	[ a-naphthol + 40% KOH ] if the media turn dark red = +VP = the Acetone react with the indecator & gets oxidized to Diacetyl	
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4) Citrate utilization test	Test if the  have the enzyme citrase that metabolized & utilize citrate and liberated ( produce ) CO2 [ using citrate as carbon source ]	Citrate [Incubate at 37 for 48h]	bromothymol blue = if the medium turn from green to blue = +citrate = CO2 interact with sodium Na and from sodium carbonate NaCO3 (Alkaline)	
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5) urea's test	Test the ability of the  to break ( Urea ) = having the enzyme ( Urea's )	Urea	Phenol red = if the media turn pink = +urea = the Urea break and give ( Ammonia \ Alkaline ) that interact with the indicator \ yellow = -Urea acidic	
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<p>6) TSI Triple sugar iron</p> <p>The differentiation is based on:</p> <ul style="list-style-type: none"> <li>Sugar fermentation</li> <li>Gas formation</li> <li>Hydrogen sulfide production</li> </ul> 	<p>Test if the  can ferment these 3 sugars which give acid :</p> <p>0.1% glucose + 1% lactose + 1% sucrose</p> <p># Detection of gas production by break up the medium or pushed up the tube (slightly elevation)</p>	<p>Semi sold with a gel-like gelatinous consistency media = Ferrous sulfate</p> <p>The test tube should be placed at an angle obliquely to have a slant on top.</p> 	<p>PH indicator : phenol red</p> <pre> graph TD     Inoculation --&gt; ferment_glucose[ferment glucose]     ferment_glucose --&gt; Acid1[Acid]     Acid1 --&gt; Phenol_red1[Phenol red]     Phenol_red1 --&gt; A_A[A/A]          Inoculation --&gt; start_lactose[Then start to lactose or sucrose]     start_lactose --&gt; Yellow_color[Yellow color]     Yellow_color --&gt; Phenol_red2[Phenol red]     Phenol_red2 --&gt; A_A          Inoculation --&gt; ferment_glucose     ferment_glucose --&gt; Acid1     Acid1 --&gt; Phenol_red1     Phenol_red1 --&gt; A_A          Inoculation --&gt; No_lactose[No lactose fermenter]     No_lactose --&gt; Utilize_protein[Utilize protein]     Utilize_protein --&gt; Phenol_red3[Phenol red]     Phenol_red3 --&gt; Revert_to_red[Revert to red]          Inoculation --&gt; ferment_glucose     ferment_glucose --&gt; Acid1     Acid1 --&gt; Phenol_red1     Phenol_red1 --&gt; Revert_to_red     </pre>	<p>( Acid \ Acid ( A \ A )</p>  <p>( Acid \ Alkaline ( A \ K )</p> 
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the test	The purpose of the test	The media	The indicator + the reaction	The result
	If the bacteria cannot ferment lactose, they will instead utilize the proteins present in the alkaline media. As a result, the media will remain alkaline, and the red color will persist, indicating no change. In contrast, the presence of a yellow color indicates successful fermentation of glucose.		If the organism can not use the glucose in the medium. The color of the medium remains red. <b>No sugar fermenter</b>	(Alkaline \ Alkaline (k\k)) 
H2S production	Test the ability for the  to reduce sulfur = (H2S) use sulfur as electron acceptor		<b>Iron</b> = if the media turn <b>black</b> = + H2S = hydrogen sulfide react with the intermediate and give ferric sulfide (Black)	 Summing up the TSI test: 1. No color change 2. No H2S production 3. No gas production 4. No slant change 5. No butt change 6. No color change 7. No color change 8. No color change 9. No color change 10. No color change 11. No color change 12. No color change 13. No color change 14. No color change 15. No color change 16. No color change 17. No color change 18. No color change 19. No color change 20. No color change 21. No color change 22. No color change 23. No color change 24. No color change 25. No color change 26. No color change 27. No color change 28. No color change 29. No color change 30. No color change 31. No color change 32. No color change 33. No color change 34. No color change 35. No color change 36. No color change 37. No color change 38. No color change 39. No color change 40. No color change 41. No color change 42. No color change 43. No color change 44. No color change 45. No color change 46. No color change 47. No color change 48. No color change 49. No color change 50. No color change 51. No color change 52. No color change 53. No color change 54. No color change 55. No color change 56. No color change 57. No color change 58. No color change 59. No color change 60. No color change 61. No color change 62. No color change 63. No color change 64. No color change 65. No color change 66. No color change 67. No color change 68. No color change 69. No color change 70. No color change 71. No color change 72. No color change 73. No color change 74. No color change 75. No color change 76. No color change 77. No color change 78. No color change 79. No color change 80. No color change 81. No color change 82. No color change 83. No color change 84. No color change 85. No color change 86. No color change 87. No color change 88. No color change 89. No color change 90. No color change 91. No color change 92. No color change 93. No color change 94. No color change 95. No color change 96. No color change 97. No color change 98. No color change 99. No color change 100. No color change
7) Phenylalanine deaminase	Distinguishes Proteus from Salmonella & Shigella as they 2 have the don't have contain phenylalanine deaminase	<b>Phenylalanine</b>	<b>Ferric acid</b> = if the media turn <b>green</b> = + phenylalanine = the  have phenylalanine deaminase enzyme = produce Phenyl pyruvic acid + NH3 so it's <b>PROTEUS</b>	<b>Salmonella + shigella</b> <b>Proteus</b> 
8) Ornithine decarboxylase	Distinguish between Providencia rettgeri & Morganella morgani by the present of Ornithine decarboxylase	Ornithine Source of carbon (energy for growth) + glucose	<b>Bromocresol purple</b> = if the media turn <b>purple</b> = + ornithine decarboxylase = <b>Morganella morgani (+ve) Fermentation of glucose Yellow = P.rettgeri(-ve)</b>	

### 9) The analytical profile index (API) (Biochemical tests for identification)

Several API systems for different groups of organism - streptococcus B

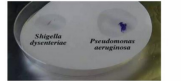



We inoculate each tube, place them in an incubator, and after 24 hours, we record the color changes according to the catalog. This allows us to identify the type of bacteria.

### Oxidase Test

Some bacteria produce Oxidase enzyme Detection by adding few drops of colorless Oxidase reagent Colonies turn deep purple in color (positive)

- All Enterobacteriaceae are oxidase-negative.
- This test is used to differentiate enterobacteriaceae from Pseudomonas which is oxidase positive.



-indication (color change): after adding colorless oxidase reagent **purple color** → indicates the presence of **Pseudomonas** bacteria.  
**no color is present** → the bacteria is from the **Enterobacteriaceae**.


### Catalase test:

is used to differentiate between staphylococci (catalase +ve) and streptococci (catalase -ve).

Principle: Catalase enzyme  
 $2H_2O_2 \rightarrow 2H_2O + O_2$

Procedure:

- Smear a colony of the organism to a slide
- Drop H<sub>2</sub>O<sub>2</sub> onto smear
- Observe



### Coagulase test:

Some bacteria produce coagulase enzyme Coagulase enzyme converts fibrinogen to fibrin (plasma clot)

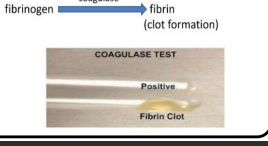
Detected by slide or test tube method

### Coagulase test

is used to differentiate Staphylococcus aureus from coagulase-negative staphylococci. we concentrate that staphylococcus aureus to give positive.

1. coagulase test
2. coagulase test
3. coagulase test

fibrinogen → coagulase → fibrin (clot formation)





Cell-Fie

Characteristic	Staphylococci	Streptococci
Catalase Test	Catalase positive	Catalase negative
Morphology	Forms clusters <b>The Shape is not enough</b>	Forms chains
Gram Staining	Gram-positive	Gram-positive
Shape	Cocci (spherical bacteria)	Cocci (spherical bacteria)

**Staphylococcus aureus is the only member of the Staphylococcus family that is coagulase-positive.**

-Indication: forming of fiber clot, indicate **Coagulase-positive bacteria**



Potri-fied

The End.