

Lab -6-

Biochemical tests

6- IMViC Tests

Each of the letters in “IMViC” stands for one of these tests. “I” is for indole; “M” is for methyl red; “V” is for Voges-Proskauer, and “C” is for citrate, lowercase “i” is added for ease of pronunciation. IMViC is an acronym that stands for four different tests:

- a- Indole test
- b- Methyl red test
- c- Voges-Proskauer test
- d- Citrate utilization test

To obtain the results of these four tests, three test tubes are inoculated: tryptone broth (indole test), methyl red – Voges Proskauer broth (MR-VP broth), and citrate. IMViC tests are employed in the identification / differentiation of members of family **enterobacteriaceae**.

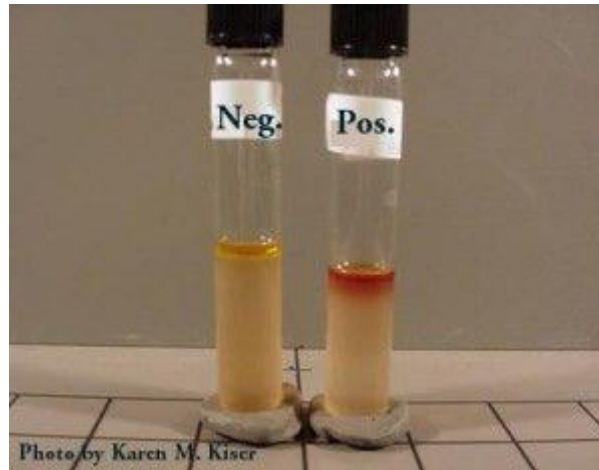
****procedure**

Cultures of any members of enterobacteriaceae have to grow for 24 to 48 hours at 37°C and the respective tests can be performed:

a- Indole test

It is performed on **sulfide-indole-motility (SIM)** medium or in **tryptophan broth**. Result is read after adding Kovac’s reagent.

1. The positive result is indicated by the **red layer at the top of the tube** after the addition of Kovács reagent.
2. A negative result is indicated by the lack of color change at the top of the tube after the addition of Kovács reagent.



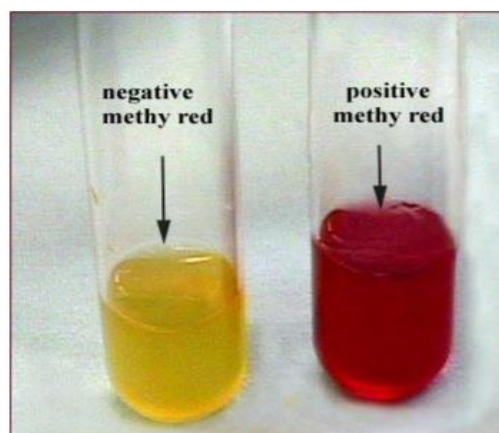
Indole Test Results: Positive-development of Red-ring

b- Methyl red test and Voges-Proskauer test

both are done in **methyl red–Voges-Proskauer (MR-VP) broth**, but the reagents that we add differs

***Methyl Red (MR)Test:**

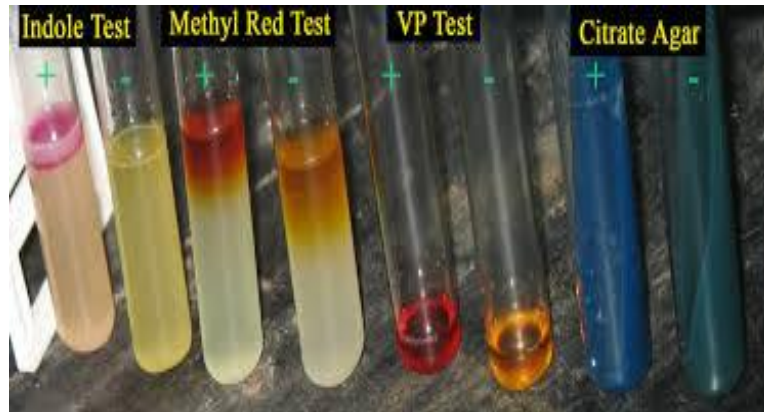
- Positive methyl red test are indicated by the development of red color after the addition of **methyl red reagent**.
- A negative methyl red test is indicated by no color change after the addition of **methyl red reagent**



لون الأحمر في الأنبوبة على جهة اليمين (التفاعل موجب)
لون أصفر في الأنبوبة على جهة اليسار (التفاعل سالب)

***Voges-Proskauer (VP) test:**

1. Negative test is indicated by lack of color change after the addition of **Barritt's A** and **Barritt's B** reagents.
2. A positive Voges-Proskauer test is indicated by the development of red-brown color after the addition of **Barritt's A** and **Barritt's B** reagents.



c- Citrate utilization test

The test is performed on **Simmons citrate agar**:

1. Negative citrate utilization test is indicated by the lack of growth and color change in the tube
2. A positive citrate result as indicated by growth and a blue color change.

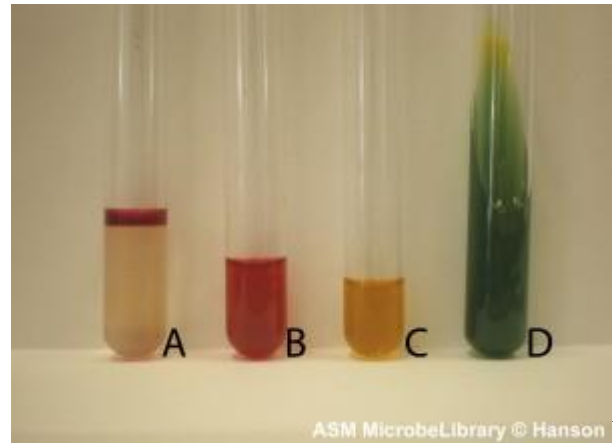


اختبار الستريت على اليمين سالب (أخضر اللون)
بينما على اليسار موجب (أزرق اللون)

****IMViC Test results of Some Genera of Enterobacteriaceae:**

1. IMViC tests of *Escherichia coli*

1. Indole: Positive
2. Methyl-Red: Positive
3. Voges-Proskauer test: Negative
4. Citrate test: Negative



IMViC Test of Ecoli: (++ --)

2. IMViC tests of *Enterobacter aerogenes*

1. Indole: Negative
2. Methyl-Red: Negative
3. Voges-Proskauer test: Positive
4. Citrate test: Positive

3. IMViC tests of *Proteus vulgaris*

1. Indole: Positive
2. Methyl-Red: Positive
3. Voges-Proskauer test: Negative
4. Citrate test: Negative

4. IMViC tests of *Citrobacter freundii*

1. Indole: Negative
2. Methyl-Red: Positive
3. Voges-Proskauer test: Negative
4. Citrate test: Positive