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IMViC Tests

IMViC tests are the part of biochemical tests which are used for identification of biological isolates. [1]

Indole production test:

Those bacteria which can convert tryptophan amino acid into indole can be identified by using this test.

Steps:

i. Bacterial sample is inoculated into agar medium deep tubes and are incubated for 1-2 days at 37^{o}

ii. Few drops of Kovac's reagent is added to the test tube.

iii. Presence of red color indicates the positive results.

Indole-positive bacteria include *Aeromonas hydrophila, Aeromonas punctata, E. coli, Haemophilus influenza.*

Methyl red test [MR-Test]

Bacteria which produces acid through fermentation of glucose can be identified using this test. Methyl red indicator prodices red coloration in acidic pH while it produces orange coloration in non-acidic pH.

Steps:

i. Bacterial sample is asceptically inoculated into MR-VP-medium.

ii. The culture is incubated for 1-2 days

iii. Methyl-red indicator is added to the test tubes.

iv. Red coloration indicates the positive results.

E.coli and *Proteus vulgaris* are positive for MR-test.

Voges-Proskeuer test [VP-test]

Some microorganisms have the capability to produce neutral end products, such as acetyl methyl carbinol from pyruvic acid. Such organisms can be identified by using this test.

Steps:

i. Bacterial sample is inoculated into MR-VP media.

ii. It is then incubated for 1-2 days.

iii. Barrit's reagent is added to the culture

iv. Deep rose color indicates the presence of VP-positive organisms.

Enterobacter, Klebsiella, Serrata marescen, Hafnia alvei, Vibrio cholera and Vibrio algiolyticus shos positive results for VP test.

Citrate utilization test

Some microbes have the presence of citrate permease enzyme which allows tehm to obtain energy from citrate when no other carbon sources are present. Citrase converts citrate into oxaloacetic acid and acetate which are further converted into pyruvic acid and carbon dioxide. Carbon dioxide so produces reacts with sodium and water to form sodium carbonate which is an alkaline product. This changes the color of bromothymol blue indicator from green to deep Prussian blue.

Steps:

i. Bacterial sample is carefully inoculated into Koser's citrate medium which is also having presence of bromothymol blue.

ii. A slant is prepared and incubated for 1-2 days.

iii. Presence of deep blue coloration indicates the positive results, while, green color indicates negative results.

Bacteria which give positive citrate utilization test are *Klebsiella pneumonia, Enterobacter, Citrobacter freundii, Serratia marcescens, Proteus mirabilis, Providencia.*

MCQs

1. IMViC tests are used for?

a. Identification of biological isolates

b. Studying the cell culture techniques

c. Identification and isolation of the active ingredients from a plant part

d. For testing the efficiency of the sterilization technique in laboratory

2. Some bacteria have the property to generate indole from which amino acid?

a. Isolucin

b. Cystien

c. Tryptophan

d. Ascorbic acid

3. Reagent used for indole production test is?

a. Barrit's reagent

b. Kovac's reagent

c. Bromothymol reagent

d. Koser's reagent

4. Bacteria which can produce acetyl-methyl carbinol from pyruvic acid can be identified by which test?

a. MR-test

b. VP-test

c. Citrate test

d. Indole production test

5. Type of medium used in Citrate utilization test is?

a. Koser's citrate medium

b. MR-VP medium

c. Common agar medium

d. None of the above

6. Choose the correct sequence of true/false for the following statements-

- **Red coloration indicates the positive result for indole production test.**
- **Red coloration indicates the positive result of MR-test.**
- **Green color indicates the positive result of VP-test.**
- **Deep rose color indicates the positive result of citrate utilization test.**

TTFF

TTFT

TFTT

FTFF

7. Match the following bacteria with the type of test they are positive to-

I. E.coli	**A. Indole production test**
II. Vibrio cholera	**B. MR-test**
III. Proteus vulgaris	**C. VP-test**
IV.Proteus mirabilis	**D. Citrate utilization test**

a) I-C, II-A, III-D, IV-B

b) I-D, II-C, III-A, IV-B

c) I-D, II-B, III-C, IV-A

d) I-A, II-C, III-B, IV-D