

Methyl-red VOGES-PROSKAUER broth, MR-VP (i23249)

For the differentiation of bacteria based on acid production (Methyl Red test) and acetoin production (Voges-Proskauer reaction).

Industry: Clinical

Principles & Uses

The Methyl Red (MR) and Voges-Proskauer (VP) tests play a vital role in the biochemical identification of bacterial species, particularly within the *Enterobacteriaceae* family. Initially introduced by Clark and Lubs, the MR test identifies glucose fermentation by producing mixed acids, turning the medium red under a pH of 4.4. Voges and Proskauer, in 1898, developed the VP test to detect acetoin and 2,3-butanediol produced during glucose fermentation by certain bacteria, turning the medium pink or violet. Both tests are critical for differentiating between the *Escherichia-Enterobacter* group.

The MR-VP Medium, containing peptones as nitrogen and carbon source, glucose as fermentable carbohydrate, and potassium dihydrogen phosphate as buffering agent, differentiates enteric Gram-negative bacilli based on these reactions. In the MR test, bacteria initially produce acids, leading to a low pH, while in the VP test, acetoin is oxidized to diacetyl, creating a red color. The tests are performed after incubating cultures for specific durations, and various reagents are used for the VP test. However, it's cautioned that MR and VP tests alone may not fully distinguish *E. coli* from the *Klebsiella-Enterobacter* groups, necessitating additional measures. These tests remain integral in identifying bacterial species through specific carbohydrate metabolic pathways.

Composition (gr/L)

Pancreatic Digest of Casein 3.5 g, Peptic digest of Animal Tissue 3.5 g, Glucose 5 g, Potassium Dihydrogen Phosphate 5 g.

Final pH at 25°C 6.9 ± 0.2

Preparation from dehydrated Powder

Suspend 17 g of the powder in 1 L of distilled water. Mix thoroughly. Distribute into tubes or flasks. Autoclave at 121°C for 15 minutes.

Quality Control

Dehydrated Appearance: Fine, homogeneous, free of extraneous material.

Prepared Appearance: Pale to light, yellow to tan, clear to slightly hazy.

Reaction of 1.7% Solution at 25°C: pH 6.9 ± 0.2

Cultural Response

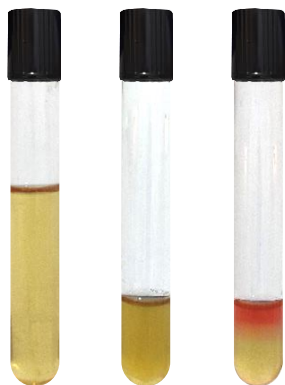
Inoculate MR-VP Broth with growth from a single colony. Incubate at 35 ± 2°C for 48 hours Proceed with Methyl Red or Voges-Proskauer test.

Methyl Red Test: Transfer 2.5 mL of the MR-VP Broth culture to a tube (13 x 100mm). Add 5 drops of Methyl Red and observe for a color change.

Voges-Proskauer Test: Transfer 2.5 mL of the MR-VP Broth culture to a tube (13 x 100mm). Add 0.3 mL (6 drops) of Voges-Proskauer Reagent A (5% α-naphthol). Add 0.1 mL (2 drops) of Voges-Proskauer Reagent B (40% KOH). Gently agitate the tube and let stand for 10 – 15 minutes. Observe for a color change.

Organism (ATCC*)	Recovery	Methyl Red	Voges-Prokauer
<i>Citrobacter freundii</i> (8454)	Good	+ (red)	- (no change)
<i>Enterobacter aerogenes</i> (13048)	Good	- (yellow)	+ (red)
<i>Escherichia coli</i> (25922)	Good	+ (red)	- (no change)
<i>Serratia marcescens</i> (14756)	Good	±	+

*ATCC is a registered trade mark of the American Type Culture Collection.



Prepared Culture Medium (left). *Citrobacter freundii*: VP negative (middle), MR positive (right).

Storage

Keep the container at 15-30 °C. Store prepared medium at 2-8 °C.