



## Koser Citrate Medium

M069

### Intended Use:

Recommended to differentiate *Escherichia coli* and *Enterobacter aerogenes* on the basis of citrate utilization.

### Composition\*\*

Ingredients	Gms / Litre
Sodium ammonium phosphate	1.500
Potassium dihydrogen phosphate	1.000
Magnesium sulphate	0.200
Sodium citrate	3.000
Final pH ( at 25°C)	6.7±0.2

\*\*Formula adjusted, standardized to suit performance parameters

### Directions

Suspend 5.7 grams in 1000 ml purified / distilled water. Dispense into tubes and sterilize by autoclaving at 15 lbs pressure (121°C) for 15 minutes. Cool to 45-50°C.

### Principle And Interpretation

Coliform bacteria serve as bacterial indicators of sanitary quality of food and water. These bacteria are normally found in the intestinal tract of humans and many warm-blooded animals (1). Coliforms encompasses mostly of *Enterobacteriaceae* from the genera *Enterobacter*, *Klebsiella*, *Escherichia*, and *Citrobacter*. The characteristics of the members of *Enterobacteriaceae* are that they are gram-negative rods and ferment glucose to form acid along with gas production (2). Two important members of the *Enterobacteriaceae* family are *Escherichia coli* and *Enterobacter aerogenes*. Both can be differentiated on the basis of IMViC test. *Enterobacter* species are able to utilize sodium citrate as the sole carbon source while *E.coli* fail to do so. This property is used to differentiate the coli-aerogenes group (3). Koser Citrate Medium is used as a base for studying citrate utilization tests. This medium is recommended by APHA, and others, to presumptively identify coliforms encountered in the food and dairy industry (3-7).

The various salts used serve as source of carbon and nitrogen to the organisms. Citric acid or its sodium salt is utilized as a sole source of carbon and ammonium salt as the sole source of nitrogen by *E. aerogenes* while *E. coli* does not utilize these salts and hence fail to grow. Koser Citrate Medium may be used in place of Simmon Citrate Agar (M099). Inoculating into Koser Citrate Medium further identifies coli-like colonies from Endo or EMB Agar plates. After 24-48 hours incubation, tubes showing marked turbidity may be assumed to contain organisms from aerogenes group and if the medium remains clear it may be considered as coli. Presumptive positive organisms identified on this medium should be further confirmed by performing the biochemical tests.

### Type of specimen

Clinical samples - Faeces; Food and dairy samples; Water samples

### Specimen Collection and Handling

For clinical samples follow appropriate techniques for handling specimens as per established guidelines (7,8).

For food and dairy samples, follow appropriate techniques for sample collection and processing as per guidelines (1,9,10).

For water samples, follow appropriate techniques for sample collection, processing as per guidelines and local standards.(2)

After use, contaminated materials must be sterilized by autoclaving before discarding.

### Warning and Precautions :

In Vitro diagnostic Use. Read the label before opening the container. Wear protective gloves/protective clothing/eye protection/ face protection. Follow good microbiological lab practices while handling specimens and culture. Standard precautions as per established guidelines should be followed while handling clinical specimens. Safety guidelines may be referred in individual safety data sheets.

## Limitations :

1. The pH affects the performance of the medium and must be correctly monitored.

## Performance and Evaluation

Performance of the medium is expected when used as per the direction on the label within the expiry period when stored at recommended temperature.

## Quality Control

### Appearance

White to cream homogeneous free flowing powder

### Colour and Clarity of prepared medium

Colourless, clear solution without any precipitate

### Reaction

Reaction of 0.57 w/v aqueous solution at 25°C. pH : 6.7±0.2

### pH

6.50-6.90

### Cultural Response

Cultural characteristics observed after an incubation at 35-37°C for 18-24 hours.

Organism	Inoculum (CFU)	Growth	Citrate Utilisation
# <i>Klebsiella aerogenes</i> ATCC 13048 (00175*)	50-100	luxuriant	positive reaction,turbidity
<i>Enterobacter cloacae</i> ATCC 23355	50-100	luxuriant	positive reaction,turbidity
<i>Escherichia coli</i> ATCC 25922 (00013*)	50-100	none-poor	negative reaction, no turbidity
<i>Klebsiella pneumoniae</i> ATCC 13883 (00097*)	50-100	luxuriant	positive reaction,turbidity

## Reference

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- 3.Koser S. A., 1923, J. Bacteriol., 8:493.
- 4.U. S. Food and Drug Administration, 1995, Bacteriological Analytical Manual, 8th Ed., AOAC International, Gaithersburg, Md.
- 5.Williams, (Ed.), 2005, Official Methods of Analysis of the Association of Official Analytical Chemists, 19th Ed., AOAC, Washington, D.C.
- 6.Downes F. P. and Ito K., (Eds.), 2001, Compendium of Methods for the Microbiological Examination of Foods, 4th Ed., APHA, Washington, D.C.
- 7.Wehr H. M. and Frank J. H., (Eds.), 2004, Standard Methods for the Microbiological Examination of Dairy Products, 17th Ed., APHA Inc., Washington, D.C.

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