

## Frequently-used media for bacteriological water-quality investigations

### Field Water-Quality Methods for Ground Water and Surface Water

Medium name	Target organism	Medium color	Filter pore size	Pre-incubation	Incubation	Confirmation step	Colony appearance	Ideal count
mENDO	total coliforms	red	0.45 µm	none	35 ± 0.5 °C 22-24 hours	none	Smooth, 1-4 mm diameter, red with golden green-metallic sheen	20-80
mFC	fecal coliforms	red	0.45 µm or 0.65 µm	none	44.5 ± 0.2 °C 22-24 hours	none	Smooth, 1-6 mm diameter, light to dark blue. May have brown or cream-colored center	20-60
mTEC	<i>E. coli</i>	purple	0.45 µm	35 ± 0.5 °C 2 hours	44.5 ± 0.2 °C 22-24 hours	15 minutes, urea/phenol red	Smooth, 1-4 mm diameter, yellow to yellow-brown. May have darker center.	20-80
modified mTEC	<i>E. coli</i>	clear/tan	0.45 µm	35 ± 0.5 °C 2 hours	44.5 ± 0.2 °C 22-24 hours	none	Smooth, 1-4 mm, red to magenta colonies.	20-80
NA-MUG	<i>E. coli</i>	clear/tan	0.45 µm	mENDO plate	35 ± 0.5 °C 4 hours	none	Blue/white fluorescent margin, dark center under long-wave UV (size and shape as mENDO)	NI
MI	total coliforms	clear/tan	0.45 µm	none	35 ± 0.5 °C 22-24 hours	none	Pale creamy under visible light, blue/white fluorescence under long-wave UV	20-80
	<i>E. coli</i>						Entire colony is bright blue under visible light	20-80
mE	Enterococci	clear/tan	0.45 µm	none	41.0 ± 0.5 °C 48-50 hours	go to EIA	NA	NA
EIA	Enterococci	clear/tan	0.45 µm	mE plate	41.0 ± 0.5 °C 20 minutes	none	Smooth, 1-6 mm diameter, pink to red with black or reddish-brown precipitate under colony	20-60
mEI	Enterococci	clear/tan	0.45 µm	none	41.0 ± 0.5 °C 24 hours	none	Any color colony with a blue halo	20-60
mCP	<i>Clostridium perfringens</i>	pink	0.45 µm	none	24 hours anaerobic	1 minute in ammonium hydroxide fumes	Pink colonies	NI

UV – ultraviolet irradiation (366 nm, 6 watts or greater power)

NA – not applicable; column does not apply to the test

NI – no information available; may be updated in revisions

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### Field Water-Quality Methods for Ground Water and Surface Water (cont.)

Medium name	Target organism	Active agents		Typical uses	References
		Selective	Differential		
mENDO	total coliforms	Sodium lauryl sulfate, sodium desoxycholate	Basic fuchsin, sodium sulfite	Ground water, drinking water	Britton and Greeson, 1987; APHA, 1998
mFC	fecal coliforms	Rosolic acid, bile salts	Aniline blue	Recreational-use monitoring	APHA, 1998
mTEC	<i>Escherichia coli</i>	Sodium lauryl sulfate, sodium desoxycholate	Brom-cresol purple, brom-phenol red	Recreational-use monitoring, ambient waters, ground water, drinking water	US EPA, 2000
modified mTEC	<i>Escherichia coli</i>	Sodium lauryl sulfate, sodium desoxycholate	BCIG	Recreational-use monitoring	US EPA, 2000 and 2006a
NA-MUG	<i>Escherichia coli</i>	mENDO	MUG		APHA, 1998
MI	total coliforms, <i>Escherichia coli</i>	Sodium lauryl sulfate, sodium desoxycholate, cefsulodin	MUGal, IBDG	Ground water, drinking water	US EPA, 2002
mE	enterococci	Cyclohexamide, nalidixic acid	TTC	Recreational-use monitoring	US EPA, 2000
EIA		NA	esculin		
mEI	enterococci	Cyclohexamide, nalidixic acid	TTC, IBDGluc	Recreational-use monitoring	US EPA, 2000 and 2006b
mCP	<i>Clostridium perfringens</i>	Polymyxin-B sulfate	phenolphthalein diphosphate	Surface water, to indicate point-source pollution	Bisson and Cabelli, 1980

**KEY TO ACTIVE AGENTS:**

**Sodium lauryl sulfate**, also known as sodium dodecyl sulfate (SDS) is a detergent that inhibits gram-positive cocci and endospore-forming bacteria.

**Sodium desoxycholate** is an antibiotic that inhibits growth of all gram-positive bacteria.

**Cyclohexamide** is an antibiotic that inhibits fungal growth.

**Nalidixic acid** is an antibiotic that inhibits reproduction of gram-negative bacteria.

**Cefsulodin** is an antibiotic that inhibits growth of non-coliform gram-negative bacteria.

**Rosolic acid** inhibits the growth of non-fecal bacteria.

**Bile salts** inhibit the growth of non-enteric bacteria.

**Basic fuchsin** and **sodium sulfite** work together to form a green-metallic sheen on colonies able to ferment sugars to acetaldehyde.

**Aniline blue** is a pH indicator that changes from red to blue when sugars are fermented, creating acidic by-products.

**Brom-cresol purple** is a pH indicator that changes from purple to yellow when sugars are fermented, creating acidic by-products.

**Brom-phenol red** is a pH indicator that changes from yellow to red when urea is cleaved, creating basic ammonium as a product.

**MUG** (methylumbelliferyl  $\beta$ -D-glucuronide) is a fluorogenic substrate for the enzyme  $\beta$ -D-glucuronidase. *E. coli* makes the enzyme.

**MUGal** (methylumbelliferyl  $\beta$ -D-galactoside) is a fluorogenic substrate for the enzyme  $\beta$ -D-galactosidase. All coliforms makes the enzyme.

**IBDG** (indoxyl  $\beta$ -D glucuronide) is a chromogenic substrate for the enzyme  $\beta$ -D-glucuronidase. *E. coli* makes the enzyme.

**IBDGluc** (indoxyl  $\beta$ -D glucoside) is a chromogenic substrate for the enzyme  $\beta$ -D-glucosidase. Enterococci make the enzyme.

**Esculin** forms a black precipitate under enterococcal colonies.

**TTC** (2,3,5 triphenyl tetrazolium chloride) turns red when reduced by enterococci.

**BCIG** (5-bromo 6-chloro 1-indoyl  $\beta$ -D-glucuronide) is a chromogenic substrate for the enzyme  $\beta$ -D-glucuronidase. *E. coli* makes the enzyme.

**Phenolphthalein diphosphate** is cleaved by acid phosphatase and causes colonies to turn pink in a basic environment (ammonium hydroxide).

**REFERENCES:**

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