

DNA analysis - Electrophoresis

Agarose

Technical tip

Agarose is a linear polysaccharide (average molecular mass about 12 000) made up of the basic repeat unit agarobiose, which comprises alternating units of galactose and 3,6-anhydrogalactose. Agarose is a natural colloid extracted from seaweed. It is very fragile and easily destroyed by handling. Agarose gels have very large "pore" size and are used primarily to separate very large molecules with a molecular mass greater than 200 KDa or 5.4kb. Agarose gels can be processed faster than polyacrylamide gels, but their resolution is inferior.

Agarose gel electrophoresis is employed to check the progression of a restriction enzyme digestion, to quickly determine the yield and purity of a DNA isolation or PCR reaction, and to size fractionate DNA molecules, which then could be eluted from the gel. Prior to gel casting, dried agarose is dissolved in buffer by heating and the warm gel solution is then poured into a mold, which is fitted with a well-forming comb. The percentage of agarose in the gel varies. Although 0.7% agarose gels typically are used, in cases where the accurate size fractionation of DNA molecules smaller than 1 kb is required, Agarose is usually used at concentrations between 1% and 3%. Ethidium bromide is included in the gel matrix to enable fluorescent visualization of the DNA fragments under UV light. Agarose gels are submerged in electrophoresis buffer in a horizontal electrophoresis apparatus. The DNA samples are mixed with gel tracking dye and loaded into the sample wells. Electrophoresis usually is at 150 - 200 mA for 0.5-1 hour at room temperature, depending on the desired separation. When low-melting agarose is used for preparative agarose gels, electrophoresis is at 100-120 mA for 0.5-1 hour, again depending on the desired separation, and a fan is positioned such that the heat generated is rapidly dissipated. Size markers are co-electrophoresed with DNA samples, when appropriate for fragment size determination.

Selection guide

Applications	Recommended agarose
Resolve DNA fragments (50-2000bp)	Agarose 3:1 HRB and agarose SFR
Resolve DNA fragments (1-22kb)	Agarose I
Resolve DNA fragments (1-25kb)	Agarose II
Resolve DNA fragments (>10kb)	Agarose III and IV
Southern and northern analysis	Agarose I, III, IV and 3:1 HRB
Pulsed-field gel electrophoresis (PFGE)	Agarose III and IV
PCR, in-gel	Agarose II and agarose SFR
Cloning, in-gel	Agarose II and agarose SFR
Restriction digestion, in-gel	Agarose II and agarose SFR
Sequencing, in-gel	Agarose II and agarose SFR
DNA labeling, in-gel	Agarose II and agarose SFR

Running conditions

Product	Gel %	Range for separation (bp)	Recommended buffer
Agarose I (all purpose)	0.8	800-22000	TAE
	1	500-10000	TAE/TBE
	1.2	400-7000	TAE/TBE
	2	250-5000	TBE
Agarose SFR (Super Fine Resolution)	2	500-2000	TAE/TBE
	3	100-1200	TAE/TBE
	4	50-500	TAE/TBE
	5	20-250	TAE/TBE
Agarose 3:1 HRB High Resolution Blend	1	500-2000	TBE
	2	250-750	TBE
	3	125-500	TBE
	4	50-250	TBE
Agarose II (Low Melting)	0.5	2000-20000	TAE/TBE
	0.8	500-15000	TAE/TBE
	1	200-10000	TAE/TBE
	2	100-1000	TAE/TBE
Agarose III (Pulsed field gel electrophoresis)	0.5	10000-40000	TAE
	0.7	1000-20000	TAE
Agarose IV (Highest gel strength)	0.5	10000-2000000	TAE
	1	3000-500000	TAE

Agarose I

Agarose I is a standard melting-temperature agarose with no detectable DNase and RNase activity. It is suitable for a wide variety of nucleic acid and protein analytical and preparative applications. DNA purified from agarose I maintains full biological activity. Agarose I has a low Electro-Endo-Osmosis (EEO) for shorter electrophoretic runs without compromising resolution.

Description	Cat.#	Qty
Agarose I	312720	25 g
	312721	100 g
	312722	500 g

Specification	Amount
Gel strength (1.5%)	≥1200 g/cm ²
Gelling range (1.5%)	36-39°C
Melting range	87-89°C
EEO	≤0.10
Sulfate	≤0.10%
DNase, RNase, Protease activity	Non detected

Agarose I sample kit

This specially packaged kit contains sample sizes of agarose I, TBE buffer, 6X agarose gel loading dye, and destaining bags, all the necessary components to run between 3-6 minigels.

Description	Cat.#	Qty
Agarose I sample kit	GS3480	kit

Agarose II

Agarose II is a low-melting temperature agarose that melts at temperatures between 62-68°C and will remain for several hours as a liquid at 37°C. These properties allow users to more readily purify macromolecules from agaroses slices or to conduct in-gel enzymatic manipulations.

Description	Cat.#	Qty
Agarose II	284490	25 g
	284491	100 g

Specification	Amount
Gel strength (1.0%)	≥250 g/cm ²
Gelling range (1.0%)	27-29°C
Melting range	62-68°C
EEO	≤0.15
Sulfate	≤0.15%
DNase, RNase, Protease activity	Non detected

Agarose III

Agarose III is optimized for intermediate and Pulsed Field Gel Electrophoresis (PFGE) applications. Agarose III has an exceptionally low EEO (≤0.06) and sulfate (≤0.06%) content, which facilitates fast electrophoresis running time. Agarose III can be used in all larger separation applications.

Description	Cat.#	Qty
Agarose III	900780	25 g
	900781	100 g
	900782	250 g

Specification	Amount
Gel strength (1.5%)	≥2000 g/cm ²
Gelling range (1.5%)	37-41°C
Melting range	93-96°C
EEO	≤0.06
Sulfate	≤0.06%
DNase, RNase, Protease activity	Non detected

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Agarose

Specification	Amount
Gel strength (1.5%)	≥3200 g/cm ²
Gelling range (1.5%)	34.5-37.5°C
Melting range	85-89°C
EEO	≤0.12
Sulfate	≤0.12%
DNase, RNase, Protease activity	Non detected

Agarose IV

Agarose IV is our highest strength and is suitable for the separation of a wide range of molecules. Due to its high gel strength and low EEO, Agarose IV is ideal for PFGE applications such as gene mapping and chromosomal analysis. In addition, Agarose IV can also be used for resolving DNA fragments down to approximately 200bp.

Description	Cat.#	Qty
Agarose IV	987561	25 g
	987560	100 g
	987562	250 g

Specification	Amount
Gel strength (1.5%)	≥2000 g/cm ²
Gelling range (1.5%)	34-38°C
Melting range	85-89°C
EEO	≤0.12
Sulfate	≤0.12%
DNase, RNase, Protease activity	Non detected

Agarose 3:1 HRB

Agarose 3:1 HRB is a unique blend of agarose developed to provide high resolution of small nucleic acids and PCR products. Agarose 3:1 HRB is specifically designed for analytical resolution of DNA fragment less than 1000bp and provides precise banding patterns without smearing or high fluorescence background. The high gel strength provides easy-to-handle gels that is optimal for blotting applications.

Description	Cat.#	Qty
Agarose 3:1 HRB	327281	25 g
	327280	100 g
	327282	250 g

Specification	Amount
Gel strength (1.5%)	≥860 g/cm ²
Gelling range (1.5%)	25-29°C
Melting range	65-69°C
EEO	≤0.13
Sulfate	≤0.75%
DNase, RNase, Protease activity	Non detected

Agarose SFR (Super Fine Resolution)

Agarose SFR is a high resolution sieving agarose which rivals acrylamide in its ability to resolve DNA fragments less than 1000bp. DNA bands differing in size by only 2% can be resolved in the range of 200 to 1000bp. Agarose SFR is suitable for the analysis of AMPFLP's (Amplification Fragment Length Polymorphisms), STR's (Single Tandem Repeats) and tetra nucleotide repeats.

Description	Cat.#	Qty
Agarose SFR	053950	25 g
	053951	100 g
	053953	250 g

Agarose blenders

Agarose Blends with TBE & TAE added

- ◆ Pre-Mixed with Buffers
- ◆ Improved Background and Clarity
- ◆ Convenient and Ready-to-Use

Nothing could be simpler – Just add water, heat, and pour the gel. Agarose I™/TBE and Agarose I™/TAE powder blends provide improved background and clarity for electrophoresis researchers in addition to excellent resolution. The TBE (or TAE) is already mixed in with the agarose at a 1X concentration. This unique product is not only easy to use, but also provides excellent clarity and low background for optimal electrophoresis results.

Description	Cat.#	Qty
Agarose Blenders™ Agarose I™/TBE Blend 0.8%	GS3391	50 g
	GS3390	100 g
Agarose Blenders™ Agarose I™/TBE Blend 1.0%	GS3401	50 g
	GS3400	100 g
Agarose Blenders™ Agarose I™/TBE Blend 1.5%	GS3411	50 g
	GS3410	100 g
Agarose Blenders™ Agarose I™/TBE Blend 2.0%	GS3421	50 g
	GS3420	100 g
Agarose Blenders™ Agarose I™/TAE Blend 0.8%	GS3431	50 g
	GS3430	100 g
Agarose Blenders™ Agarose I™/TAE Blend 1.0%	GS3441	50 g
	GS3440	100 g
Agarose Blenders™ Agarose I™/TAE Blend 1.5%	GS3451	50 g
	GS3450	100 g
Agarose Blenders™ Agarose I™/TAE Blend 2.0%	GS3461	50 g
	GS3460	100 g

GelAmp Electrophoresis kit

- ◆ Ideal for BAC, YAC, cosmid DNA, genomic DNA
- ◆ Resolves up to 50 kb DNA fragments using standard horizontal electrophoresis equipment
- ◆ Fast and easy to use
- ◆ Excellent resolution and sharp banding
- ◆ Improves sieving power of agarose alone
- ◆ Achieves high quality photo documentation

GelAmp Electrophoresis kit resolves high MW DNA eliminating the need for expensive pulsed field electrophoresis (PFGE) equipment.

The GelAmp Electrophoresis kit is an all inclusive kit containing high strength agarose, running buffer and a propriety polymer additive that allows for a superior resolution and separation of high molecular weight DNA. The GelAmp Electrophoresis kit is ideally suited for purification of plasmid DNA or PCR products prior to cloning. Each kit contains enough reagents for 20 gels.

The kit includes :

- ◆ High strength agarose
- ◆ GelAmp additive
- ◆ Running buffer

Description	Cat.#	Qty
GelAmp Electrophoresis kit	BI6160	1 Kit.

