



**SDS-PAGE Molecular
Weight Standards,
Broad Range**

**Catalog Number
161-0317**

**Product shipped at room temperature.
Store at -20°C upon arrival.**

BIO-RAD

Specifications

Contents	*Approximately 4 mg total protein/200 μ l to give bands of equal intensity on SDS polyacrylamide gels run according to Laemmli ¹ and stained with Coomassie Blue R-250	
Storage buffer	50% glycerol, 300 mM NaCl, 10 mM Tris, 2 mM EDTA, 3 mM NaN ₃	
Volume	200 μ l concentrated solution	
Storage	-20 °C	
Shipping conditions	Room temperature,	
Shelf life	1 year at -20 °C	
Applications per vial	400 with Coomassie R-250	
Recommended gel percentage**	Low range	12.5%
	High range	7.5%
	Broad range	4-20 % gradient gels

***Note:** Protein amounts are approximate. Standards are intended to be used for molecular weight sizing and not for quantitation purposes.

****Note:** These standards can be run on other percentage gels, but all proteins may not be visible. Lower percentage gels may cause the low molecular weight proteins to migrate with or in front of the dye front. Higher percentage gels may prevent the high molecular weight proteins from separating.

Protein Molecular Weights (daltons)

Protein	Molecular Weight	Broad Range	Low Range	High Range
Myosin	200,000	X		X
β -galactosidase	116,250	X		X
Phosphorylase b	97,400	X	X	X
Serum albumin	66,200	X	X	X
Ovalbumin	45,000	X	X	X
Carbonic anhydrase	31,000	X	X	
Trypsin inhibitor	21,500	X	X	
Lysozyme	14,400	X	X	
Aprotinin	6,500	X		

Protocol

For Coomassie Staining: Dilute standards 1:20 in SDS reducing sample buffer* or a pre-made Laemmli sample buffer (catalog #161-0737) with reducing agent. Heat for 5 min at 95°C. Cool and load 10 µl/well for full length gels (16–20 cm) or 5 µl/well for mini gels.

For Silver Staining: Dilute standards 1:70 in SDS reducing sample buffer* or a pre-made Laemmli sample buffer (catalog #161-0737) with reducing agent. Load 10 µl/well.

* **SDS reducing sample buffer** (prepare immediately before use)

β-mercaptoethanol	25 µl
Stock sample buffer	475 µl
	<u>500 µl</u>

Stock sample buffer (store at room temperature)

Distilled water	4.8 ml
0.5M Tris-HCl pH 6.8	1.2 ml
Glycerol	1.0 ml
10% (w/v) SDS	2.0 ml
0.1% (w/v) Bromophenol blue	0.5 ml
	<u>9.5 ml</u>

Note: Use of sample buffer with insufficient or old β -mercaptoethanol may result in doublets at the soybean trypsin inhibitor and ovalbumin bands.

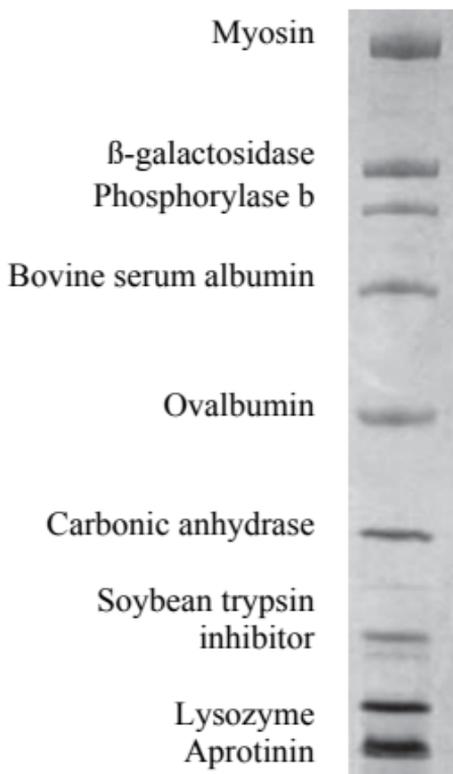


Fig. 1. SDS polyacrylamide gels run in the Mini-PROTEAN® II cell according to the method of Laemmli.¹ Broad molecular weight standards run on a 4–20% gradient gel, stained with Coomassie R-250.

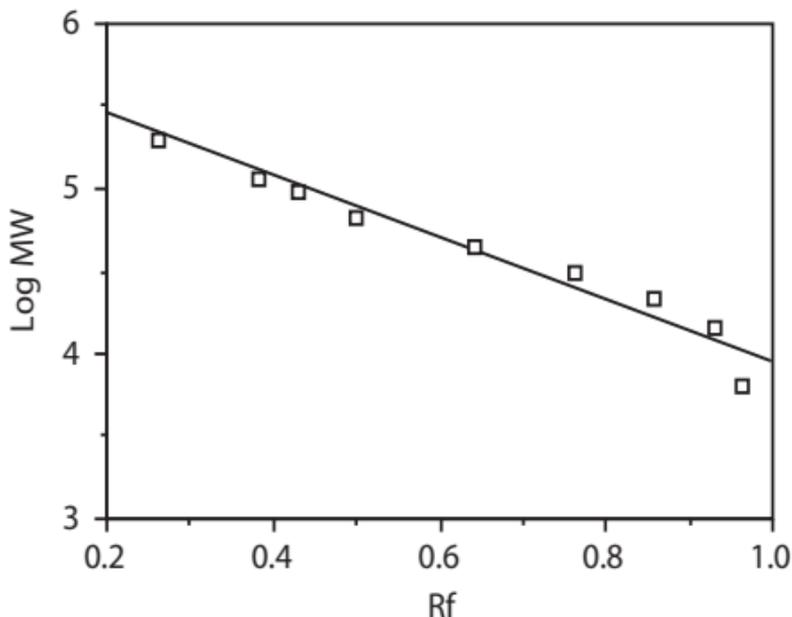


Fig. 2. Curve generated by plotting the log of the molecular weight of the broad range standards vs. the relative mobility (Rf).

$$Rf = \frac{\text{distance migrated by protein}}{\text{distance migrated by dye}}$$

The curve can be used to determine molecular weights of unknown proteins.²

Protein References

Protein	Reference
Rabbit skeletal muscle myosin	Woods, E. F., Himmelfarb, S. and Harrington, W. F., <i>J. Biol. Chem.</i> , 238 , 2374 (1963).
<i>E. coli</i> β -galactosidase	Fowler, A. V. and Zabin, I., <i>Proc. Natl. Acad. Sci. USA</i> , 74 , 1507 (1977).
Rabbit muscle phosphorylase b	Titani, K., et al., <i>Proc. Natl. Acad. Sci. USA</i> , Vol. 74 , 4762 (1977).
Bovine serum albumin (BSA)	Brown, J. R., <i>Fed. Proc.</i> , 34 , 591 (1975).
Hen egg white ovalbumin	Warner, R. C., "Egg Proteins," in: The Proteins , Vol. IIA, p. 435 (Neurath, H. and Bailey, K., eds.), Academic Press, New York (1954).
Bovine carbonic anhydrase	Davis, R. P., "Carbonic Anhydrase," in: The Enzymes , Vol V, p. 545, (Boyer, P. D., ed.) Academic Press, New York (1971)
Soybean trypsin inhibitor	Wu, Y. V. and Scheraga, H. A., <i>Biochemistry</i> , 1 , 698 (1962).
Hen egg white lysozyme	Jolles, P., <i>Angew. Chem Intl. Edit.</i> , 8 , 227 (1969).
Bovine pancreatic trypsin inhibitor (Aprotinin)	Kassell, B. and Laskowski, M., <i>Biochem. Biophys. Res. Comm.</i> , 20 , 463 (1965).

Reference

1. Laemmli, U. K., *Nature*, **227**, 680 (1970).
2. Hames, B. D. and Rickwood, D., **Gel Electrophoresis of Proteins: A Practical Approach**, Second Edition, p. 17, Oxford University Press, New York (1990).

Ordering Information

Catalog

Number Product Description

Molecular Weight Standards

- 161-0303 **SDS-PAGE Standards**, High, 200 μ l
161-0304 **SDS-PAGE Standards**, Low, 200 μ l
161-0317 **SDS-PAGE Standards**, Broad, 200 μ l
161-0320 **2-D SDS-PAGE Standards**, 500 μ l
161-0326 **Polypeptide SDS-PAGE Standards**, 200 μ l

Prestained Standards

- 161-0305 **Prestained SDS-PAGE Standards**, Low, 500 μ l
161-0309 **Prestained SDS-PAGE Standards**, High, 500 μ l
161-0318 **Prestained SDS-PAGE Standards**, Broad, 500 μ l
161-0324 **Kaleidoscope Prestained Standards**, 500 μ l

IEF Standards

- 161-0310 **IEF Standards**, pI range 4.45-9.6, 250 μ l

Comassie is a trademark of BASF.

Bio-Rad Laboratories, 2000 Alfred Nobel Drive, Hercules CA 94547
4006035 Rev E