## 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 µl |
| 161-0304 | **SDS-PAGE Standards,** Low, 200 µl |
| 161-0317 | **SDS-PAGE Standards,** Broad, 200 µl |
| 161-0314 | **Silver Stain SDS-PAGE Standards,** Low, 200 µl |
| 161-0315 | **Silver Stain SDS-PAGE Standards,** High, 200 µl |
| 161-0306 | **Biotinylated SDS-PAGE Standards,** Low, 250 µl |
| 161-0311 | **Biotinylated SDS-PAGE Standards,** High, 250 µl |
| 161-0319 | **Biotinylated SDS-PAGE Standards,** Broad, 250 µl |
| 161-0320 | **2-D SDS-PAGE Standards** |
| 161-0326 | **Polypeptide SDS-PAGE Standards,** 200 µl |
| **Prestained Standards** | |
| 161-0305 | **Prestained SDS-PAGE Standards,** Low, 500 µl |
| 161-0309 | **Prestained SDS-PAGE Standards,** High, 500 µl |
| 161-0318 | **Prestained SDS-PAGE Standards,** Broad, 500 µl |
| 161-0324 | **Kaleidoscope Prestained Standards,** 500 µl |
| 161-0325 | **Kaleidoscope Polypeptide Standards,** 500 µl |
| **IEF Standards** | |
| 161-0310 | **IEF Standards,** pI range 4.45-9.6, 250 µl |


***Bio-Rad Laboratories, 2000 Alfred Nobel Drive, Hercules CA 94547***



4006035 Rev C


# SDS-PAGE Molecular Weight Standards, Broad Range

## Catalog Number 161-0317

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

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# Specifications

| | |
|---|---|
| **Contents** | Approximately 400 µg of each protein blended 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 µl 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%<br>High range 7.5%<br>Broad range 4-20 % gradient gels |



***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 |
| ß-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

Dilute standards 1:20 in SDS Reducing Sample Buffer.* Heat for 5 minutes at 95 °C. Cool and load 10 µl/well for full length gels (16-20 cm) or 5 µl/well for mini gels.

*** SDS Reducing Sample Buffer** (prepare immediately before use)

| | |
|---|---|
| ß-mercaptoethanol | 25 µl |
| Stock Sample Buffer | 475 µl |
| | 500 µl |

**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 |
| | 9.5 ml |

Use of Sample Buffer with insufficient or old ß-mercaptoethanol may result in doublets at the soybean trypsin inhibitor and ovalbumin bands.



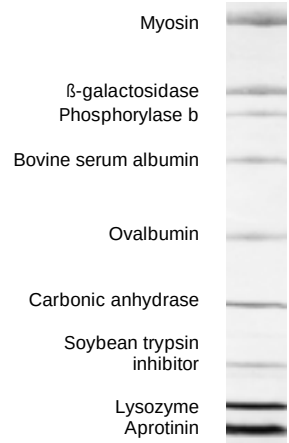


**Fig. 1. SDS polyacrylamide gels run in the Mini-PROTEAN® II cell according to the method of Laemmli.[1]** Broad molecular weight standards run on a 4-20% gradient gel, stained with Coomassie R-250.



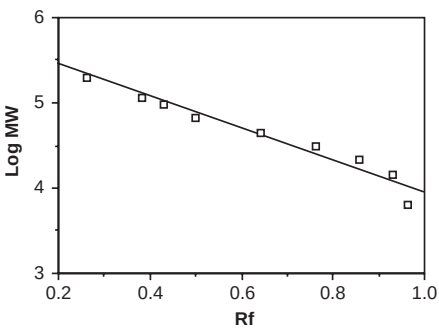


**Fig. 3. Curve generated by plotting the log of the molecular weight of the broad range standards vs. the relative mobility (Rf).**

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

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., *J. Biol. Chem.*, **238,** 2374 (1963). |
| ***E. coli* ß-galactosidase** | Fowler, A. V. and Zabin, I., *Proc. Natl. Acad. Sci. USA*, **74,** 1507 (1977). |
| **Rabbit muscle phosphorylase b** | Titani, K., et al., *Proc. Natl. Acad. Sci. USA*, Vol. **74**, 4762 (1977). |
| **Bovine serum albumin (BSA)** | Brown, J. R., *Fed. Proc.*, **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 Scherage, H. A., *Biochemistry*, **1,** 698 (1962). |
| **Hen egg white lysozyme** | Jolles, P., *Angew. Chem Intl. Edit.*, **8,** 227 (1969). |
| **Bovine pancreatic trypsin inhibitor (Aprotinin)** | Kassell,B. and Laskowski, M., *Biochem. Biophys. Res. Comm.*, **20,** 463 (1965). |