

# Dual-Range™ Bradford Protein Assay

BR01-500/BR05-500/BR05-500-K

V3.0

Store at 2-8 °C

For Research Use Only

**Caution: Including corrosive liquid**

## ■ Introduction

**Dual-Range™ Bradford Protein Assay** is a fast protein quantification method. It is based on the Bradford method, where Coomassie Brilliant Blue binds to proteins in an acidic solution. The absorbance shifts from 465 nm (brown) to 595 nm (blue) upon protein binding. In addition, the coloration differs greatly depending on the basic and aromatic amino acid residues of protein. **Dual-Range™ Bradford Protein Assay** provides a wide quantification range of 1-1,000 µg/mL and the absorbance at 595 nm remains stable for 5-60 minutes after the reaction begins.

## ■ Product Components

### Dual-Range™ Bradford Reagent (BR01-500)

Bradford Reagent	500 mL	1 bottle
User's manual		

### Dual-Range™ Bradford Reagent (5X) (BR05-500)

Bradford Reagent (5X)	500 mL	1 bottle
User's manual		

### Dual-Range™ Bradford Protein Assay Kit (BR05-500-K)

Bradford Reagent (5X)	BR05-500	500 mL	1 bottle
Bovine Serum Albumin Standard (2 mg/mL)	AS02-2S	2 mL	5 tubes
User's manual			

## ■ Safety Information

Please wear gloves, a lab coat, and goggles while operating. Avoid direct contact with the product. In case of contacting, wash with large amount of water.

## ■ Storage

**Dual-Range™ Bradford Protein Assay Kit** should be stored at 2-8 °C. The expiration date is indicated on the bottle or packaging.

## ■ Materials needed but not provided

1. Spectrophotometer capable of measuring absorbance in the region of 595 nm
2. Microplate Reader capable of measuring absorbance in the region of 595 nm
3. Test tubes
4. 96 well plate
5. Vortex mixer
6. Plate shaker

**NOTE:** If a 595 nm filter is not available, perform measurement with a 575-615 nm filter, please note that the slope of standard curve and overall assay sensitivity will be reduced.

## ■ Instruction

### ***A. Preparation of the Bradford Reagent (For BR05-500/BR05-500-K Only)***

1. Prepare the working reagent by mixing 1 part **Bradford Reagent (5X)** with 4 parts deionized water (ddH<sub>2</sub>O).
2. The required Bradford Reagent for each sample of Test Tube Procedure is 6.0 mL and that of the Microplate Procedure is 300 µL.

**NOTE:** The Bradford Reagent is a light brown solution and is stable for several days when stored in a closed container at room temperature.

**NOTE:** Certain substances are known to interfere with the Bradford assay and should be avoided in the sample buffer. The maximum compatible concentrations for these substances are listed in **Table 5**.

### ***B. Preparation of the Protein Standards***

1. Preparation of diluted protein standards.
2. For “**Test Tube Procedure**”, use standard guide of 20-1,000 µg/mL in **Table 1** for the standard protocol and 1-25 µg/mL in **Table 2** for the enhanced protocol. For “**Microplate Procedure**”, use standard guide of 20-1,000 µg/mL in **Table 3** for the standard protocol and 1-25 µg/mL in **Table 4** for the enhanced protocol.

Table 1. Preparation of Diluted Albumin (BSA) Standards for Test tube Procedure (working range: 20-1,000 µg/mL)

Tube	Volume of Diluent (µL)	Volume and source of protein Standards (µL)	Final BSA Standard Concentration (µg/mL)
A	500	500 of Stock	1,000
B	125	375 of tube A dilution	750
C	325	325 of tube A dilution	500
D	325	325 of tube C dilution	250
E	325	325 of tube D dilution	125
F	400	100 of tube E dilution	25
G	400	0	0

Table 2. Preparation of Diluted Albumin (BSA) Standards for Test tube Procedure (working range: 1-25 µg/mL)

Tube	Volume of Diluent (µL)	Volume and source of protein Standards (µL)	Final BSA Standard Concentration (µg/mL)
A	3,160	40 of Stock	25
B	3,960	40 of Stock	20
C	1,000	1,000 of tube A dilution	12.5
D	2,000	2,000 of tube B dilution	10
E	2,000	2,000 of tube D dilution	5
F	2,000	2,000 of tube E dilution	2.5
G	2,000	0	0

Table 3. Preparation of Diluted Albumin (BSA) Standards for Microplate Procedure (working range: 20-1,000 µg/mL)

Tube	Volume of Diluent (µL)	Volume and source of protein Standards (µL)	Final BSA Standard Concentration (µg/mL)
A	50	50 of Stock	1,000
B	10	30 of tube A dilution	750
C	30	30 of tube A dilution	500
D	30	30 of tube C dilution	250
E	30	30 of tube D dilution	125
F	40	10 of tube E dilution	25
G	40	0	0

Table 4. Preparation of Diluted Albumin (BSA) Standards for Microplate Procedure (working range: 1-25 µg/mL)

Tube	Volume of Diluent (µL)	Volume and source of protein Standards (µL)	Final BSA Standard Concentration (µg/mL)
A	790	10 of Stock	25
B	990	10 of Stock	20
C	200	200 of tube A dilution	12.5
D	400	400 of tube B dilution	10
E	400	400 of tube D dilution	5
F	400	400 of tube E dilution	2.5
G	400	0	0

### C. Test tube Procedure

- **Standard Protocol (Working range: 20-1,000 µg/mL)**
  1. Pipette 100 µL of each standard (Table 1) and unknown sample replicate into an appropriately labeled test tube.
  2. Add 6.0 mL of the Bradford Reagent to each tube and vortex well.
  3. Incubate at room temperature for at least 5 minutes.
  4. Turn on the spectrophotometer and set to 595 nm to measure the absorbance of all the samples and the BSA standard within 1 hour of the reaction.
  5. Prepare a standard curve by measuring the absorbance of BSA at 595 nm and determine protein concentrations from the curve.
- **Enhanced Protocol (Working range: 1-25 µg/mL) (For BR05-500/BR05-500-K Only)**
  1. Pipette 800 µL of each standard (Table 2) and unknown sample replicate into an appropriately labeled test tube.
  2. Add 200 µL of the **Bradford Reagent (5X)** to each tube. Mix the sample and **Bradford Reagent (5X)** thoroughly using vortex mixer.
  3. Incubate at room temperature for at least 5 minutes.
  4. Turn on the spectrophotometer and set to 595 nm to measure the absorbance of all the samples and the BSA standard within 1 hour of the reaction.
  5. Prepare a standard curve by measuring the absorbance of BSA at 595 nm and determine protein concentrations from the curve.

### D. Microplate Procedure

- **Standard Protocol (Working range: 20-1,000 µg/mL)**
  1. Pipette 5 µL of each standard (Table 3) and unknown sample replicate into a microplate well.
  2. Add 300 µL of the Bradford Reagent to each well. Mix the sample and the reagent thoroughly using plate shaker.
  3. Incubate at room temperature for at least 5 minutes.
  4. Measure the absorbance at 595 nm on a microplate reader within 1 hour of the reaction.
  5. Prepare a standard curve by measuring the absorbance of BSA at 595 nm and determine protein concentrations from the curve.
- **Enhanced Protocol (Working range: 1-25 µg/mL) (For BR05-500/BR05-500-K Only)**
  1. Pipette 160 µL of each standard (Table 4) and unknown sample replicate into a microplate well.

#### D. Microplate Procedure (~continued)

2. Add 40  $\mu$ L of the **Bradford Reagent (5X)** to each well. Mix the sample and **Bradford Reagent (5X)** thoroughly using plate shaker.
3. Incubate at room temperature for at least 5 minutes.
4. Measure the absorbance at 595 nm on a microplate reader within 1 hour of the reaction.
5. Prepare a standard curve by measuring the absorbance of BSA at 595 nm and determine protein concentrations from the curve.

## Troubleshooting

Problem	Possible cause	Remedy
A precipitate forms in all tubes	Sample contains a surfactant (detergent)	Dialyze or dilute the sample
	Samples not mixed well or left to stand for extended time, allowing aggregates to form with the dye	Mix samples immediately prior to measuring absorbance
The standard curve shows poor linear regression	Sample and reagent were not adequately mixed	Mix thoroughly using vortex mixer or plate shaker
Sample color is weaker than expected	Reagent still cold	Allow Reagent to warm to RT
	Sample protein (peptide) has a low molecular weight (e.g. less than 3,000)	Use Dual-Range™ BCA Protein Assay Kit (Visual Protein)
All the tubes are dark blue	Strong alkaline buffer raises pH of formulation	Dialyze or dilute the sample
	Sample volume too large, thereby raising reagent pH	Dialyze or dilute the sample

## Appendix

Table 5. Compatible concentration of common substances

Salts/Buffers		Salts/Buffers	
ACES, pH 7.8	100 mM	Ferric chloride in TBS, pH 7.2	10 mM
Acetate	600 mM	Glycine	100 mM
Adenosine	1 mM	Guanidine•HCl	3.5 M
Ammonium sulfate	1 M	HEPES, pH 7.5	100 mM
Asparagine	10 mM	Imidazole, pH 7.0	200 mM
ATP	1 mM	MES, pH 6.1	100 mM
Bicine, pH 8.4	100 mM	MOPS, pH 7.2	100 mM
Bis-Tris, pH 6.5	100 mM	Nickel chloride in TBS, pH 7.2	10 mM
Borate, pH 9.5	50 mM	PBS; Phosphate (0.1 M), NaCl (0.15 M), pH 7.2	undiluted
Calcium chloride in TBS, pH 7.2	10 mM	PIPES, pH 6.8	100 mM
Cesium bicarbonate	100 mM	RIPA lysis buffer; 50mM Tris, 150mM NaCl, 0.5% DOC, 1% NP-40, 0.1% SDS, pH 8.0	1/10 dilution
CHES, pH 9.0	100 mM	Sodium acetate, pH 4.8	180 mM
Cobalt chloride in TBS, pH 7.2	10 mM	Sodium azide	0.50%
EPPS, pH 8.0	100 mM		

## ■ Appendix

Table 5. Compatible concentration of common substances (~continued)

Salts/Buffers		Misc. Reagents & Solvents	
Sodium bicarbonate	100 mM	Acetone 10%	
Sodium chloride	5 M	Acetonitrile 10%	
Sodium citrate, pH 4.8 or pH 6.4	200 mM	Aprotinin 10 mg/L	
Sodium phosphate	100 mM	DMF, DMSO 10%	
Tricine, pH 8.0	100 mM	Ethanol 10%	
Triethanolamine, pH 7.8	100 mM	Glycerol (Fresh) 10%	
Tris	2 M	Hydrochloric Acid 100 mM	
TBS; Tris (25mM), NaCl (0.15 M), pH 7.6	undiluted	Leupeptin 10 mg/L	
Tris (25mM), Glycine (192mM), pH 8.0	undiluted	Methanol 10%	
Chelating agents		Phenol Red 0.5 mg/L	
EDTA	100 mM	PMSF 1 mM	
EGTA	50 mM	Sodium Hydroxide 100 mM	
Sodium citrate	200 mM	Sucrose 10%	
Detergents		TLCK 0.1 mg/L	
Brij-35	0.12%	TPCK 0.1 mg/L	
Brij-56, Brij-58	0.03%	Urea 6 M	
CHAPS, CHAPSO	5.00%	Reducing & Thiol-Containing Agents	
Deoxycholic acid	0.05%	N-acetylglucosamine in PBS, pH 7.2 100 mM	
Octyl $\beta$ -glucoside	0.50%	Ascorbic acid 50 mM	
Nonidet P-40 (NP-40)	0.50%	Cysteine 10 mM	
Octyl $\beta$ -thioglucopyranoside	3.00%	Dithioerythritol (DTE) 1 mM	
SDS	0.12%	Dithiothreitol (DTT) 5 mM	
Span 20	0.50%	Glucose 1 M	
Triton X-100, X-114	0.12%	Melibiose 100 mM	
Triton X-305, X-405	0.50%	2-Mercaptoethanol 1 M	
Tween-20, Tween-80	0.06%	Potassium thiocyanate 3 M	
Tween-60	0.10%	Thimerosal 0.01%	
Zwittergent 3-14	0.02%		