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B E A D S • A B O V E T H E R E S T™

## Description

Carboxyl (COOH) microparticles can be used for covalent coupling of proteins by activating the carboxyl groups with water-soluble carbodiimide. The carbodiimide reacts with the carboxyl group to create an active ester that is reactive toward primary amines on the protein of interest.

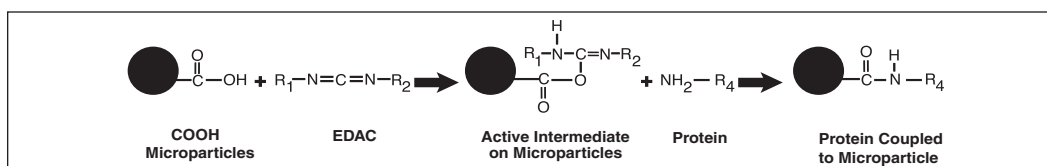


Figure 1

Bangs Laboratories, Inc. offers the PolyLink Protein Coupling Kit for COOH Microspheres for the covalent coupling of proteins to carboxylated microspheres. The procedure that follows has been optimized for polymer microspheres 1µm or larger. The contents of the kit are sufficient for 50 coupling reactions using 200-500µg of protein per reaction. The kit has been optimized using purified IgG as the coupling protein.

## Material

### Material Supplied

- PolyLink Coupling Buffer (50mM MES, pH 5.2, 0.05% Proclin® 300): 55mL
- PolyLink Coupling Buffer (50mM MES, pH 5.2, 0.05% Proclin® 300): 55mL
- PolyLink Wash/Storage Buffer (10mM Tris, pH 8.0, 0.05% Bovine Serum Albumin, 0.05% Proclin® 300): 45mL
- PolyLink EDAC (Carbodiimide): 750mg. Note: Store powder desiccated at -20°C. Flood headspace with N<sub>2</sub> gas for best preservation. Warm the sealed vial to room temperature in a desiccator to avoid condensate formation in the bottle. Make working solutions just before use.

### Material Required

- Centrifuge
- Test tubes

## Procedure

Researchers are advised to optimize the protein to microsphere ratio and incubation times for their particular protein

1. Warm microparticles, PolyLink Coupling Buffer and PolyLink Wash/Storage Buffer to room temperature.
2. Pipet 12.5mg of microparticles into a 1.5-2mL polypropylene microcentrifuge tube.
3. Pellet the microparticles via centrifugation for 5-10 minutes at approximately 500-1000 x G. Note: Centrifugation times will vary according to the size of the particle.
4. Resuspend microparticle pellet in 0.4mL of PolyLink Coupling Buffer.
5. Pellet again via centrifugation for 5-10 minutes at approximately 500-1000 x G.
6. Resuspend the microparticle pellet in 0.17mL of PolyLink Coupling Buffer.
7. Just before use, prepare a 200mg/mL EDAC solution by dissolving 10mg PolyLink EDAC in 50µL PolyLink Coupling Buffer. **Use immediately.**

8. Add 20µL of the EDAC solution to the microparticle suspension.
9. Mix gently end-over-end or briefly vortex.
10. Add protein equivalent to 200-500µg. Mix gently end-over-end or briefly vortex. Note: The amount of protein bound to the microparticles is dependent on the concentration of protein in solution and on the size of the microparticles. For an example of this relationship, please refer to Figure 2.
11. Incubate for 30-60 minutes at room temperature with gentle mixing. Note: End-over-end mixing is best. Longer incubation times may result in greater protein binding. See Figure 3.
12. Centrifuge mixture for 10 minutes at approximately 500-1000 x G. Save this supernatant for determination of the amount of bound protein.
13. Resuspend microparticle pellet in 0.4mL PolyLink Wash/Storage Buffer.
14. Repeat Steps 12-13, combing supernatants for use in bound protein calculation.
15. Store particles at 2-8°C in PolyLink Wash/Storage Buffer.

## Notes

### Calculation of the Amount of Bound Protein

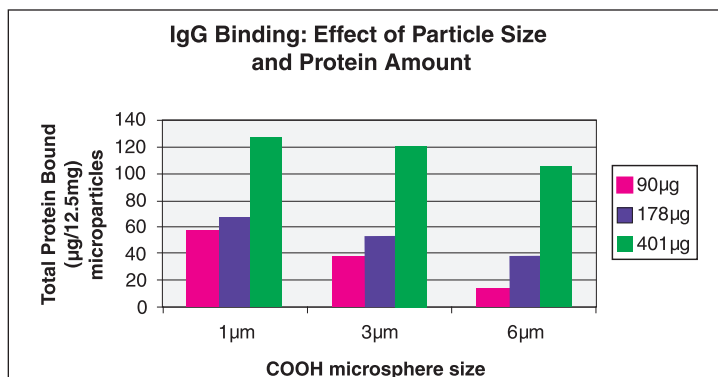
The amount of protein added in Step 10 less the amount of protein left in the supernatants in Steps 12 and 14 represents the amount of protein bound to the microparticles. Protein concentrations of the starting solution and supernatants after binding may be determined by measuring the absorbance at 280nm or by utilizing commercial protein assay kits. Note: If measuring absorbance at 280nm, solutions used for calculation of bound protein should not contain EDAC. EDAC may contribute to the absorbance at 280nm.

#### Example:

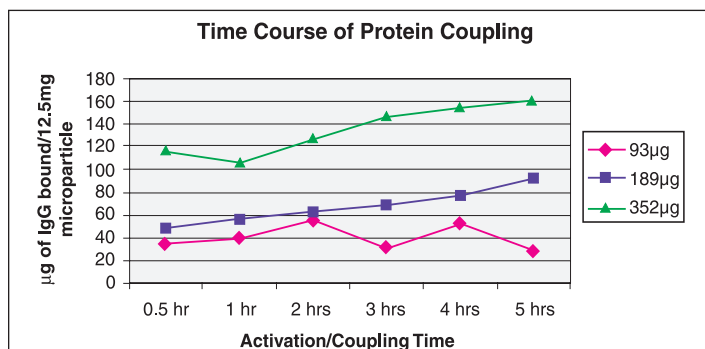
$$\left[ \begin{array}{c} \mu\text{g of protein in} \\ \text{starting solution} \end{array} \right] - \left[ \begin{array}{c} \mu\text{g of protein in} \\ \text{wash supernatants} \end{array} \right] / \text{mg of microparticles} = \mu\text{g of protein bound/mg microparticles}$$

$$\left[ \begin{array}{c} 100\mu\text{g of protein in} \\ \text{starting solution} \end{array} \right] - \left[ \begin{array}{c} 45\mu\text{g of protein in} \\ \text{wash supernatants} \end{array} \right] / 12.5\text{mg of microparticles} = 4.4\mu\text{g of protein bound/mg microparticles}$$

## Expected Results



**Figure 2: The Effect of Particle Size on Protein Binding at Equal Solids.** Three different sizes of carboxyl microspheres were exposed to three different levels of Goat anti-Rat IgG protein. The smaller particles represent more surface area per unit of mass and therefore bind more total protein.



**Figure 3: Time Course of Protein Binding.** Three different levels of protein were used in the PolyLink procedure using 3µm carboxyl microspheres. As expected, more input protein results in more protein bound. The majority of the protein binding occurs in the first 30 minutes.

## Storage and Stability

Store at 2-8°C. Freezing of particles may result in irreversible aggregation and loss of binding activity.

**This product is for research use only and is not intended for use in humans or for *in vitro* diagnostic use.**



**Ordering Information**

**Catalog Code**

PL01N

**Description**

PolyLink Protein Coupling Kit

**Size**

1 kit

Order online anytime at [www.bangslabs.com](http://www.bangslabs.com).