

## Product Information

### Latex beads Amine-modified blue

Product Number **L 0780**  
 Store at Room Temperature

#### Product Description

Latex beads are available in a wide assortment of sizes, modified forms, and color conjugates. The selections available are listed in table 1.

The refractive index value for polystyrene is 1.591 at 590 nm.

The charge density ranges from 30 to 300 angstroms squared per charge group.

The excitation/emission wavelengths (according to the color of the bead) are as follows:

|              | Excitation (nm) | Emission (nm) |
|--------------|-----------------|---------------|
| Blue         | 360             | 420           |
| Orange       | 520             | 540           |
| Red          | 575             | 610           |
| Yellow-green | 470             | 505           |

All the beads are made by polymerizing styrene, but the larger sizes have a small percentage of divinylbenzene added as a cross-linking agent to stabilize the structure.

The sulfate modified beads are not used for covalent modification. They adsorb to practically any protein. The protein of interest is dissolved in buffer at its isoelectric point and mixed with the beads. The beads are then washed with the same buffer until the wash is protein free or at a suitably low level. These are most often used with antibodies.

Amine modified latex is useful for attaching ligands that do not have amine groups. For example, N-protected polypeptides can be attached through their carboxyl-terminal ends by water soluble carbodiimide or N-hydroxy ester derivatives. This provides a complementary method of coupling polypeptides to latex particles compared to carboxylate-modified latex, in which polypeptides can be attached to the surface by their amine-terminal ends.

Table 1.

| Average bead size (µm)  | Product Numbers |        |        |              |        |
|---|-----------------|--------|--------|--------------|--------|
|   | Blue            | Orange | Red    | Yellow-green | Undyed |
| <b>Amine-modified, 2.5% solids</b>                            |                 |        |        |              |        |
| 0.05  | L 0780          | L 0155 | L 9404 | L 1405       | —      |
| 0.1   | L 0655          | L 9904 | L 9279 | L 1280       | —      |
| 0.5   | L 0530          | L 9779 | L 9154 | L 1155       | —      |
| 1.0   | L 0405          | L 9654 | L 2778 | L 1030       | —      |
| 2.0   | L 0280          | L 9529 | L 2653 | L 0905       | —      |
| <b>Carboxylate-modified, 2.5% solids</b>                      |                 |        |        |              |        |
| 0.03  | —               | —      | L 3655 | L 5155       | —      |
| 0.05  | L 4280          | L 5780 | L 3530 | L 5030       | —      |
| 0.1   | L 4155          | L 5655 | L 3405 | L 4905       | —      |
| 0.5   | L 4030          | L 5530 | L 3280 | L 4780       | —      |
| 1.0   | L 3905          | L 5405 | L 3155 | L 4655       | —      |
| 2.0   | L 3780          | L 5280 | L 3030 | L 4530       | —      |
| <b>Carboxylate-modified biotin-labeled, 1.0% solids</b>       |                 |        |        |              |        |
| 0.05  | L 7530          | —      | L 7905 | L 8280       | L 8655 |
| 0.25  | L 7655          | —      | L 8030 | L 8405       | L 8780 |
| 1.0   | L 7780          | —      | L 8155 | L 8530       | L 8905 |
| <b>Carboxylate-modified streptavidin-labeled, 1.0% solids</b> |                 |        |        |              |        |
| 0.05  | L 6030          | —      | L 6405 | L 6780       | L 7155 |
| 0.25  | L 6155          | —      | L 6530 | L 6905       | L 7280 |
| 1.0   | L 6280          | —      | L 6655 | L 7030       | L 7405 |
| <b>Sulfate-modified, 2.5% solids</b>                          |                 |        |        |              |        |
| 0.03  | L 1028          | L 1778 | L 0278 | L 2528       | —      |
| 0.05  | L 0903          | L 1653 | L 0153 | —            | —      |
| 0.1   | L 0778          | L 1528 | L 9902 | L 2278       | —      |
| 0.5   | L 0653          | L 1403 | L 9777 | L 2153       | —      |
| 1.0   | L 0528          | L 1278 | L 9652 | L 2028       | —      |
| 2.0   | L 0403          | L 1153 | L 9527 | L 1903       | —      |

Another potentially important application of amine modified latex is through reaction with ligands containing aldehyde groups. For example, most antibodies have glycosyl groups that can be oxidized by periodate to give aldehyde groups which will react with amine-modified particles. The glycosyl regions of antibodies are usually located away from the binding sites, so attachment of antibodies to the solid surface in this manner may result in high activity for the bound ligand.

Small molecule ligands such as drugs, hormones and dye molecules can be readily attached to amine modified latex surfaces if they can be derivatized with an amine-reactive group such as a carboxylic acid, sulfonic acid, ketone, aldehyde, acyl azide, etc. The variety of organic functional groups that will readily react with amines makes amine modified particles useful for this application.

To minimize the nonspecific binding of proteins to the latex particles, whether carboxylate modified or magnetic or other, one can block the available hydrophobic binding sites with 1% BSA and 0.05% TWEEN<sup>®</sup>20. Treat the beads before exposing them to the antibodies in the plasma, for example. It is important to choose the right concentration of the blocking agents and be careful not to cover up too much of the desired binding sites in order for the beads to work effectively.<sup>1</sup> For monocyte/phagocytosis cell counting assay a range of 0.45  $\mu\text{m}$  – 2  $\mu\text{m}$  sizes have been used.<sup>2</sup>

Given the % solids, and particle diameter, the number of particles per ml (N) can be calculated as follows:

$$N = \frac{6.03 \times 10^{10} \times S}{3.30 \times d^3}$$

Where: S is the % solids  
d is the diameter in  $\mu\text{m}$

### Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

### Preparation Instructions

The liquid in which the beads are suspended is water with a proprietary surfactant. The surfactant prevents the beads from clumping and thus allows for Brownian motion of the beads in the fluid. If the water has evaporated, but the surfactant is still present in the dried latex beads, resuspension is possible by simply adding water.

If the surfactant has been dialyzed or washed away and the beads dry out at a later date, resuspension is nearly impossible. Research indicates that most detergents don't work in helping to resuspend the beads - the proprietary detergent must be used.

### Storage/Stability

Suspensions of latex beads are stable to ethanol or sodium azide which can be used for sterilization. Autoclaving is not recommended.

### References

1. J. Clin. Immunoassay, **13**, 99-104 (1990).
2. Exp. Cell. Res., **162**, 449 (1986).

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