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Waste Lock[®] Superabsorbent Polymer Determination of Absorbency Ratio

Waste Lock[®] polymers are cross-linked Sodium Polyacrylate homo-polymers and/or Sodium Polyacrylate/Polyacrylamide co-polymers. The Sodium neutralization along the polymer backbone creates a diffusion gradient whereby aqueous liquids are drawn into the matrix of polymer chains. The water is then held tightly in place by Hydrogen bonding.

Thermodynamics of diffusion dictate the absorbency rates of the polymer. Solutions with low concentrations of soluble cations show very high absorbency rates. That is why deionized water will have a 400 to 600 gram/gram absorbency ratio. As cations are introduced, the diffusion gradient narrows and absorbency is restricted. (A 1% NaCl solution has 50 – 60 grams/gram absorbency.)

Strongly acidic solutions also detrimentally affect the absorbency. Acids replace the Sodium ions of the polymer backbone with protons which reduces the diffusion gradient in the polymer granules. We therefore recommend acidic solutions be pH adjusted to pH of 4 or higher.

Determination of Absorbency Ratio:

1. Tare a 500 ml beaker. Add waste and weigh so that a known quantity of waste is in the beaker.
2. Very gradually, begin to add **Waste Lock[®]** at a ¼ - ½ teaspoon per addition. Thoroughly stir after addition.
3. Wait 30 seconds, and then add more polymer. Stir.
4. Repeat until the product appears to be mostly solid but still with a little visible free liquid.
5. Stop the addition and allow the sample to sit for 10 minutes.
6. If free liquid is still visible, add a little more polymer. If no free liquid is visible and the gel appears to pass Paint Filter Test, re-weigh the sample and calculate the weight of polymer that has been added.

Calculate Absorbency Ratio as follows:

$$\text{Absorbency Ratio (grams/gram)} = \frac{\text{Weight of Waste Sample}}{\text{Weight of Polymer Added}}$$