



## OPTIDOSE™ TRACEABLE POLYMER SYSTEM OPTIDOSE TEST KITS

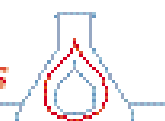
Ever since polymers have been used as dispersants in cooling water treatment systems, there has been a need for a method of testing the polymer concentration. The best estimate of the concentration of polymer in the cooling water has been by tracking the “dosed” level, the total amount of polymer added. This method, while accurate enough for estimating the total polymer in the system, gives no indication as to how much of the polymer is “free,” that is, available for prevention of corrosion and fouling, as opposed to already bound by contaminant particles.

Rohm and Haas has made a tremendous advance in this area with the introduction of the Optidose™ Traceable Polymer System. Optidose polymers have a unique tag permanently attached to the molecule. The tag allows immunoassay reagents to specifically identify the tagged polymers at ppm concentrations without interference from other treatment components or contaminants. A simple and inexpensive strip test is used to determine the amount of free polymer in a cooling water system.

### BENEFITS

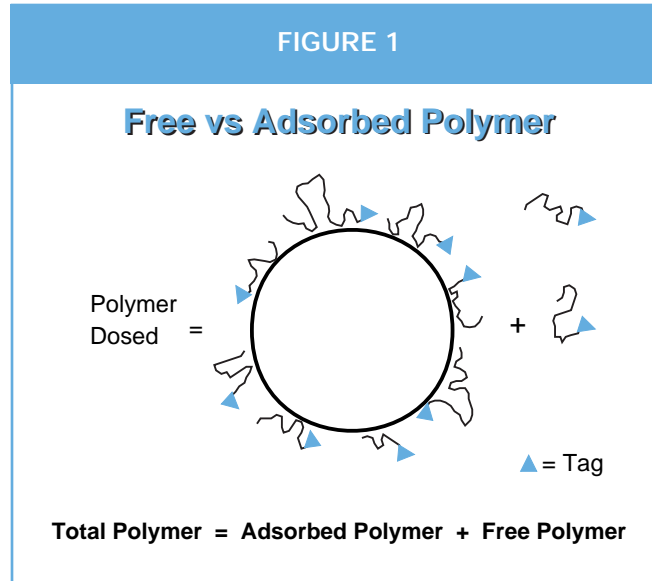
- Rapid, portable, reasonably priced, and easy-to-use strip test
- Direct measurement of free polymer concentration
- Reliable under a variety of conditions
- Non-hazardous test components which may be easily disposed of and recycled after use
- No interference from common water treatment components
- Accurate determination of 2, 5, or 10 ppm free polymer in the field
- Additional precision under controlled laboratory conditions
- Available in affordable 8- or 32-test kits

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## FREE POLYMER

The Optidose test was specifically designed to measure the “free” polymer in a cooling water system. Polymeric dispersants have two primary functions in cooling water treatment programs: 1) to prevent fouling of heat transfer surfaces by insoluble inorganic particles, and 2) to minimize corrosion by inhibiting crystal growth and aggregation. The polymer adsorbs onto the particles to disperse them, or onto crystals to prevent their growth. However, when the polymer is adsorbed, it is no longer free to adsorb onto new potential foulants. Since only unbound polymer is available to prevent fouling and inhibit corrosion, the measurement of free polymer is much more significant than the measurement of total polymer. The relationship between free, bound, and total polymer is shown in Figure 1.



## TESTING METHOD

Optidose testing in the field consists of three simple steps, taking about 10 minutes total. The strip detects discrete polymer concentrations of 2, 5, or 10 ppm free polymer depending on the amount of buffer used. The strip is read by two red bands that indicate whether the polymer level is less than, greater than, or equal to the chosen test concentration. Figure 2 illustrates the test procedure.



Step 1. First, 50  $\mu\text{l}$  of water is added to the test tube, and then the test tube is filled with buffer solution up to the selected test level line (2, 5, or 10 ppm).



Step 2. After mixing, 100  $\mu\text{l}$  of the mixture is transferred to the reagent vial and the test strip is placed in the vial.



Step 3. After 5 to 10 minutes, the strip is read for the concentration of free polymer above, equal to, or below the selected test level.

The two red bands on the test strip indicate the sample concentration. If the top stripe is darker, the sample contains free polymer at a concentration greater than the selected test level (2, 5, or 10 ppm). If the bottom stripe is darker, the sample contains polymer at less than the test level. If the two stripes are of equal intensity, the sample contains polymer equal to the test level. An illustration of test strip results is shown in Figure 3.

FIGURE 3

## Traceable Polymer Strip Test

Example Using 5 ppm Sample of Optidose™ Polymer

Greater than 2 ppm

Equal to 5 ppm

Less than 10 ppm

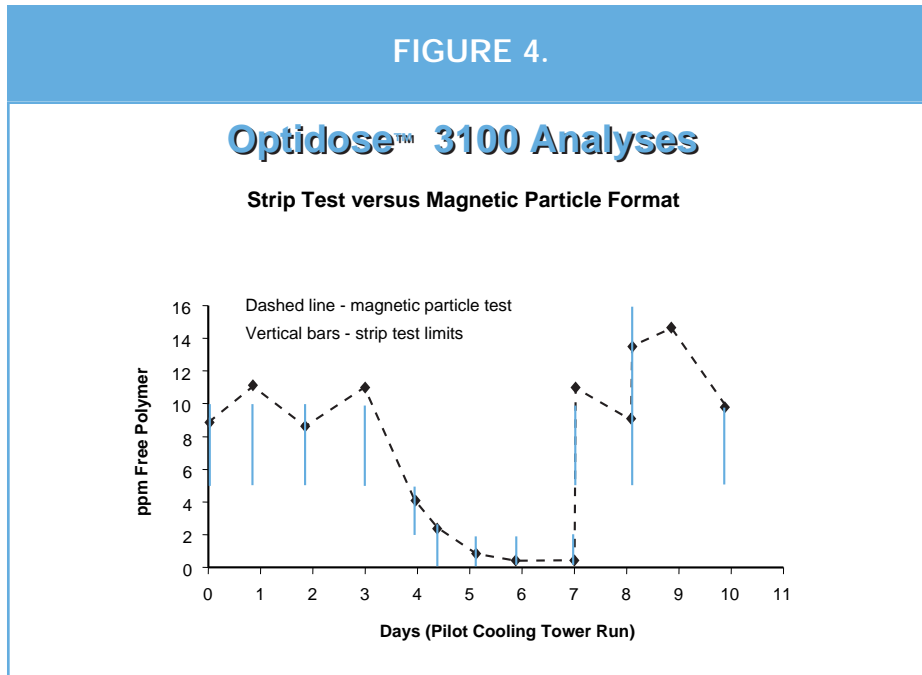


Chosen test level, ppm	2	5	10
Test strip result, ppm	>2	~5	<10
Actual sample concentration, ppm	5	5	5

## ACCURACY OF STRIP TESTS

The detection system for the traceable polymer is based on an extremely sensitive immunoassay technique that uses tagged polymer-specific antibodies with an attached color developing moiety. When the polymer tags and antibodies were originally developed, the results were obtained using a magnetic particle assay technique. The magnetic particle analysis, while extremely accurate, consisted of about thirty steps in the laboratory taking three hours to complete.

When the immunoassay technique was adapted to develop the strip test, detailed analyses confirmed that the strip test results were accurate. A graphical comparison of the sample analyses by both methods is shown in Figure 4.



## Potential Interferences

Optidose polymers have been tested for interference from a wide range of common water treatment additives and contaminants. No interference has been found from any of the materials tested. See Table 2 for the results. Optidose test strips were designed to respond best when used in formulations containing Optidose) polymers available from Rohm and Haas Company.

TABLE 2  
EVALUATION OF POTENTIAL INTERFERENCES

Material Tested	PPM Tested	Result
PBTC phosphonate	5	negative
HEDP phosphonate	5	negative
Molybdate	6	negative
Tolyltriazole	3	negative
Benzotriazole	3	negative
Humic acid	100	negative
Tannins	20	negative
Lignins	20	negative
Lignosulfonates	20	negative
Hypochlorite	4	negative
Quaternary biocide	30	negative
Isothiazolone biocide	6	negative
Glutaraldehyde	200	negative

### CAUTION:

- 1) Temperatures below 32°F (0°C) may cause inaccurate strip test results. Care should be taken to avoid freezing of the test strips and buffer solutions.

## MATERIAL SAFETY DATA SHEETS

Rohm and Haas Company maintains Material Safety Data Sheets (MSDS) on all of its products. These contain important information that you may need to protect your employees and customers against any known health and safety hazards associated with our products. We recommend you obtain copies of MSDS for our products from your local Rohm and Haas technical representative or the Rohm and Haas Company. In addition, we recommend you obtain copies of MSDS from your suppliers of other raw materials used with our product.

Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that appropriate training and information be provided to all employees and that MSDS be available on any hazardous products in their workplace.

For additional information, a sample, a Material Safety Data Sheet, or to have a technical representative call for an appointment, please call: **1-800-223-3897**.

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