



The MiraChem® Corporation
PO Box 27608 · 1045 S. Edward Dr. · Tempe, AZ 85281 · (800)847-3527 · FAX (480)966-0890
www.mirachem.com cservice@mirachem.com

**C O N F I D E N T I A L T E C H N I C A L
I N F O R M A T I O N D O C U M E N T**

TITLE: Analytical Test Method: 0.1 Hydrochloric Acid Titration
Determination of Detergent Activity

NUMBER OF PAGES IN RELEASE: 4

RELEASE DATE: 1/22/97

EXPIRATION DATE: N/A

APPROVED FOR RELEASE TO: All MIRACHEM customers, distributors and team members
(&1&)

FOR INFORMATION CONTACT: MIRACHEM Customer Service

The information contained in and accompanying this document contains confidential and proprietary information belonging to the MIRACHEM Corporation and is intended only for the use of the individual or entity to which it was directed. If the reader of this document is not the intended recipient or the employee or agent responsible for delivery to the named recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. This information is protected intellectual property and/or trade secret information under the Uniform Trade Secrets Act. If you have received this communication in error, please accept our apology, and notify us as indicated above. Thank you.

Mirachem Corporation

Analytical Test Method

0.1N Hydrochloric Acid Titration Determination of Detergent Activity

Scope

This titration method is for determining the concentration of detergent in solutions of Mirachem® 500 Cleaner/Degreaser and Mirachem® 750 Low Foam Cleaner/Degreaser. A sample of 25 to 200 grams of test solution is titrated with 0.1N HCl to a pH of 3.5. The milliliters of acid required to reach the pH of 3.5 will, with comparison to the corresponding chart, provide an estimate of the detergent activity of the sample. Additional quantities of undiluted Mirachem® necessary to achieve the desired cleaning dilution can then be calculated.

This method has not been calibrated for soil interference resulting from cleaning activities.

Equipment

1. Digital pH meter which reads to two decimal places that is equipped with a glass electrode.
2. 50 ml titration burette
3. Hydrochloric Acid, 0.1N Volumetric Solution
4. Isopropyl alcohol, 99% (optional)
5. 150 up to 400 ml glass beaker
6. Magnetic stir plate
7. Magnetic stir bar
8. pH buffers 4 and 7

Procedures

1. Calibrate pH meter to the pH 4 buffer following the meter manufacturer's directions.
2. Looking at Tables I or II, select a 25, 50, 100, or 200 gram sample size depending on the dilution range that best fits your target.^{a,b}
3. While stirring, titrate to a pH of 3.5.
4. Compare the number of ml required to the appropriate chart attached.
5. Calculate the required amount of undiluted detergent to add depending on the equipment being used.
6. Mix the solution in the equipment and re-titrate to verify the correction.

^a If using an automatic titrator with a chart recorder or an indicator solution, dilute this sample 1:1 with isopropyl alcohol. This will help clarify the end point.

^b If the sample cannot be weighed, milliliters can be used instead.

Calculation

1. Calculate the gallons of detergent in the existing mix by multiplying the calculation factor (Table I for Mirachem[®] 500 and Table II for Mirachem[®] 750) that corresponds to the milliliters of 0.1N HCl required to reach the pH of 3.5 times the total gallons of the mix.
2. Calculate the required gallons of detergent by multiplying the calculation factor for the specified dilution times the total gallons of the final mix.
3. Subtract the existing gallons of detergent (step #1) from the specified gallons (step #2), to determine the gallons of cleaner that need to be added.

Example #1:

The existing equipment has a 30 gallon tank capacity. The specified dilution for Mirachem[®] 500 is 1:1. The titration of a 50 gram sample requires 12 mls of 0.1N HCl.

The titration of the existing mix indicates that it is at a 3:1 dilution. The calculation factor for this dilution is 0.250. The current mix has $30 \times 0.25 = 7.5$ gallons of detergent. The specified dilution requires $30 \times 0.50 = 15.0$ gallons of Mirachem[®] 500. The makeup detergent quantity is $15.0 - 7.5 = 7.5$ gallons.

Example #2:

The existing equipment has a 100 gallon tank capacity. The specified dilution for Mirachem[®] 750 is 3:1. The titration of a 100 gram sample requires 20 mls of 0.1N HCl.

The titration of the existing mix indicates that it is at a 5:1 dilution. The calculation factor for this dilution is 0.167. The current mix has $100 \times 0.167 = 16.7$ gallons of detergent. The specified dilution requires $100 \times 0.25 = 25.0$ gallons of Mirachem[®] 750. The makeup detergent quantity is $25.0 - 16.7 = 8.3$ gallons.

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF THE MIRACHEM CORPORATION AND ITS RECEIPT OR POSSESSION DOES NOT CONVEY ANY RIGHT TO REPRODUCE, DISCLOSE ITS CONTENTS, OR TO MANUFACTURE, USE OR SELL ANYTHING IT MAY DESCRIBE. REPRODUCTION, DISCLOSURE OR USE WITHOUT SPECIFIED WRITTEN

Method No.: 0143

Revision No. 00

Date: 1/22/97

AUTHORIZATION FROM THE MIRACHEM CORPORATION IS STRICTLY FORBIDDEN

Table I

Mirachem^o 500

Dilution	Milliliters of 0.1N HCl				Calculation Factor
	25 gram Sample	50 gram Sample	100 gram Sample	200 gram Sample	
neat	22.4	44.9	---	---	1.000
1:1	11.4	24.8	48.1	---	0.500
2:1	7.9	15.1	30.2	---	0.330
3:1	5.5	11.5	22.5	44.1	0.250
4:1	---	9.5	18.8	36	0.200
5:1	---	7.3	15.3	29.7	0.167
6:1	---	---	13.5	25.8	0.143
7:1	---	---	11.2	22.8	0.125
8:1	---	---	---	20.9	0.111
9:1	---	---	---	19.1	0.100
10:1	---	---	---	16.3	0.091

Table II

Mirachem^o 750

Dilution	Milliliters of 0.1N HCl				Calculation Factor
	25 gram Sample	50 gram Sample	100 gram Sample	200 gram Sample	
neat	29.4	---	---	---	1.000
1:1	15.0	30.0	---	---	0.500
2:1	9.7	20.5	39.5	---	0.330
3:1	7.5	16.3	29.7	---	0.250
4:1	---	11.7	24.1	47.6	0.200
5:1	---	9.4	20.1	40.5	0.167
6:1	---	---	17.2	34.8	0.143
7:1	---	---	15.0	30.7	0.125
8:1	---	---	13.5	26.9	0.111
9:1	---	---	---	24.1	0.100
10:1	---	---	---	22.1	0.091