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SUPERSEDING
MIL-H-51153(MU)
9 MAY 1963

MILITARY SPECIFICATION

HERBICIDE, MONURON

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

Sampling and
Testing.

1.1 This specification covers herbicide, monuron (3-(p-chlorophenyl)-1, 1-dimethylurea) (see 6.6), a wettable powder to be mixed with water and applied as a spray to the surface of the ground for control of weeds. Effects are slow to appear and will not become apparent until the chemical has been carried into the root zone of the weeds by moisture. Sterility of the soil may last from one to three years depending on rates applied, soil type, and rain fall.

2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

PPP-D-723--Drums, Fiber.

STANDARDS

FEDERAL

Federal Test Method—Soap and Soap-
Standard No. 536 Products
(Including
Synthetic
Detergents);

MILITARY

MIL-STD-105—Sampling Procedures
and Tables for
Inspection by
Attributes.

MIL-STD-129—Marking for Shipment
and Storage.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT

(Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules

(Application for copies of these freight classification rules should be addressed to Uniform Classification Committee, 202 Union Station, Chicago 6, Ill.)

FSC 6840

3. REQUIREMENTS

3.1 Description. The product shall be a free flowing powder, low solubility in hydrocarbon solvents and water. It shall be composed of monuron and inert ingredients.

3.1.1 Monuron. The monuron content of the herbicide shall be a minimum of 80 percent by weight when tested as specified in 4.6.1.

3.1.2 Inert ingredients. The inert ingredients shall be such biologically inert diluting, modifying, and conditioning agents as are needed to meet the requirements of this specification.

3.2 Granulation. The finished insecticide shall conform to the following granulation requirements when tested as specified in 4.6.2. Retained on a 297 micron (no 50) sieve 0.05 percent maximum, retained on a 149 micron (no. 100) sieve 0.50 percent maximum.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Special provisions.

4.2.1 Alternative inspection. The supplier may utilize any alternative inspection procedures which will provide equal or better assurance of quality by submitting a written proposal with justification and obtaining written approval from the Government prior to instituting the procedure. In case of dispute, the procedures of this specification will govern.

4.2.2 Objective evidence. The supplier shall provide objective evidence acceptable to the contracting officer that the requirements of 3.1, 3.1.2, and section 5 for which specific inspection has not been provided in this specification have been satisfied.

4.3 Lotting. A lot shall consist of the herbicide, offered for acceptance at one time, which has been produced by one manufacturer under essentially the same manufacturing conditions and with no change in materials provided the operation is continuous. In the event that the process is a batch operation, each batch shall constitute a lot. (See 6.3.)

4.4 Sampling.

4.4.1 For examination. Sampling shall be conducted in accordance with MIL-STD-105.

4.4.2 For destructive tests. Sampling shall be conducted in accordance with MIL-STD-105 using level S-1. A specimen shall be removed from each container in the sample and placed in a suitable, clean, dry container labeled to identify the lot and the container from which it was taken.

4.5 Inspection provisions.

4.5.1 For examination. The level A and B preparation for delivery shall be examined in accordance with the classification of defects and MIL-STD-105.

4.5.2 For destructive tests. Samples shall be tested in accordance with 4.6 and MIL-STD-105 using an AQL of 1.0 percent defective.

4.5.3 Classification of defects.

4.5.3.1 Preparation for delivery (section 5).

Categories	Defects
Critical:	None defined
Major:	AQL 1.5 percent defective
101	Shipping container not as specified
102	Container closure not as specified
103	Container damaged
104	Marking of shipping container illegible, incomplete, or incorrect

4.6 Tests. Distilled water and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.6.1 Monuron. The dimethylurea compound is hydrolyzed in an alkaline medium to form the chlorinated aniline, carbon dioxide, and dimethylamine. The dimethylamine is distilled over into a measured excess of standard acid and the residual acid is then titrated with standard base. Correction is made for the presence of amine salts which is normally the only source of significant interference.

4.6.1.1 Procedure. (See fig. 1 for apparatus.) Accurately weigh 0.7 ± 0.01 gram (g) of specimen to the nearest 0.1 milligram (mg) and transfer quantitatively to a clean, dry reaction flask. Add 15 milliliters (ml) of methyl alcohol and swirl to completely disperse the specimen. Add 100 ml of glycerol, several drops of defoaming agent, one or two boiling chips, and 100 ml of 20 percent potassium hydroxide solution. Swirl to mix the contents after each addition. Immediately attach the reaction flask to the hydrolysis apparatus. Add 50 ml of 0.1 N hydrochloric acid accurately measured from a buret and 50 ml of methanol to the absorption trap. With cooling water flowing through each condenser independently, heat the contents of the reaction flask to boiling by means of the heating mantle and maintain reflux conditions for one hour or until the contents of the reaction flask clears. Drain the cooling water from condenser A to start distillation and continue the hydrolysis and distillation until the pot temperature reaches 175° C. Adjust the heating rate so that the temperature is maintained and distillation is completed in 30 to 40 minutes. Turn on cooling water into condenser A and turn off the power.

Caution: It is essential that the joint between the condensers be broken immediately when the heating mantle is shut off and cool-

ing water admitted to condenser A; any suck-back into the reaction flask would result in a violent eruption.

Rinse condenser B and the connecting tube with methanol. Add the rinsings to the beaker trap. Titrate the contents of the beaker with 0.1 N sodium hydroxide using a pH meter with a glass-calomel electrode system and determine the end point by the differential method (see 6.4). Record the titration to the nearest 0.01 ml. Calculate the percent monuron as follows:

$$\text{Percent monuron} = \frac{19.865(AB-CD)}{W} - E$$

where:

A = Milliliters of hydrochloric acid,
 B = Normality of hydrochloric acid,
 C = Milliliters of sodium hydroxide,
 D = Normality of sodium hydroxide,
 W = Weight of Specimen in grams, and
 E = Total amines as DMA·HCl (see 4.6.1.2) x 2.4360.

4.6.1.2 Total amine. The specimen is dissolved in methanol and the ionic chloride titrated with a standard silver nitrate solution (see 4.6.1.2.1) to potentiometric end point. The ionic chloride is calculated as amine hydrochloride. A special mercurous sulfate-potassium sulfate ($\text{Hg}_2\text{SO}_4\text{-K}_2\text{SO}_4$) reference electrode is used in combination with a silver-silver chloride indicating electrode in a pH meter.

4.6.1.2.1 Standard silver nitrate solution. Dissolve 9.5828 g of reagent grade silver nitrate (accurately weighed to 0.0001 g) in chloride-free water and dilute to one liter.

Standard silver nitrate solution,
 1 ml = 0.002 g Cl

4.6.1.2.2 Procedure. Accurately weigh 5.0 g of specimen to the nearest 0.1 mg and transfer quantitatively to a 400-ml beaker. Add 150 to 200 ml of methanol and 1 ml of concentrated nitric acid. Stir until the specimen is dissolved. Connect the $\text{Hg}_2\text{SO}_4\text{-K}_2\text{SO}_4$ electrode to the calomel electrode jack

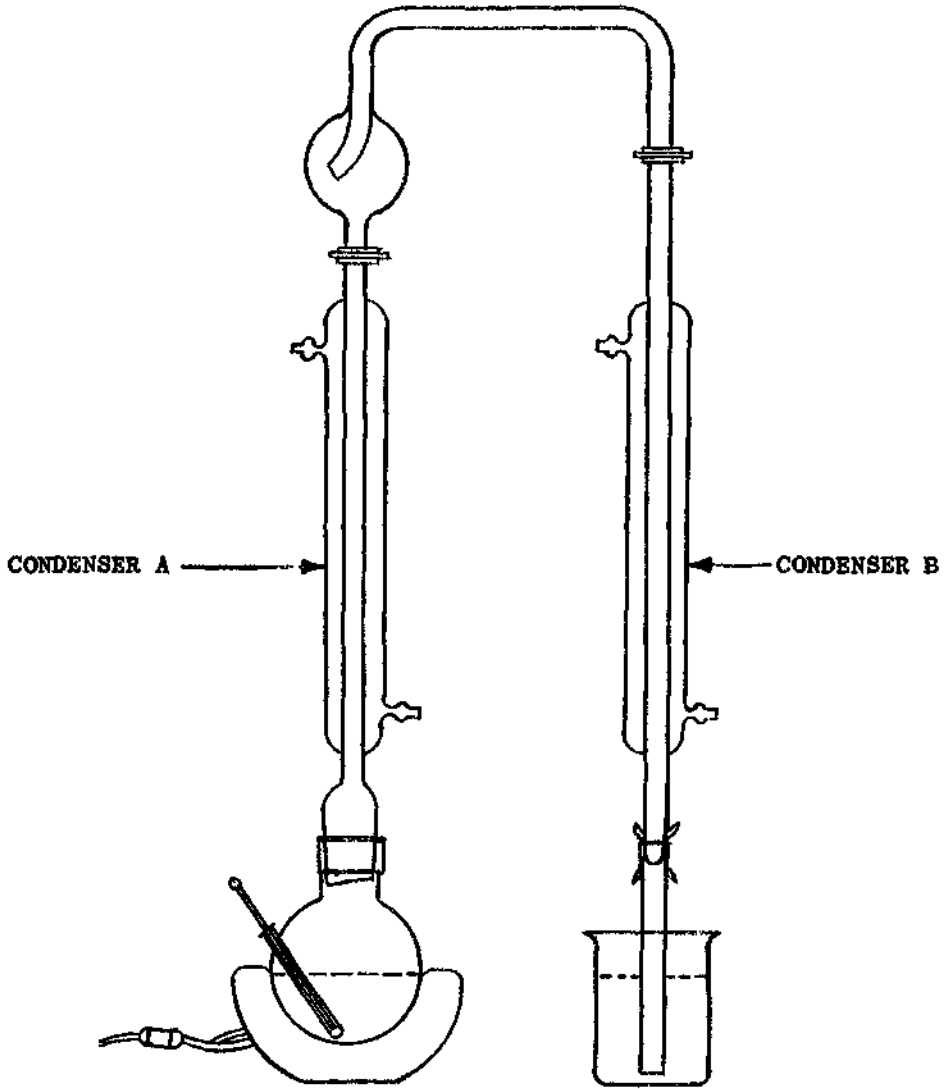


Figure 1- Apparatus for basic hydrolysis

FIGURE 1. Apparatus for basic hydrolysis.

of the pH meter and the silver-silver chloride electrode to the glass electrode jack. Titrate to the end point by differential

method (see 6.4) using the standard silver nitrate solution and calculate the percent amine hydrochloride, DMA·HCl, as follows:

$$\text{Percent DMA}\cdot\text{HCl} = \frac{\text{ml std AgNO}_3 \text{ solution} \times 0.002 \times 2.2999 \times 100}{\text{weight of specimen in g}}$$

4.6.2 Granulation. Determine the granulation in accordance with applicable portion of method 2101 of Federal Test Method Standard No. 536 using specified sieves.

5. PREPARATION FOR DELIVERY

5.1 Packing. Packing shall be level A, B, or C as specified (see 6.2).

5.1.1 Level A. Fifty pounds of herbicide shall be packed in an appropriate size drum conforming to Specification PPP-D-723, type II, grade A.

5.1.2 Level B. Fifty pounds of herbicide shall be packed in an appropriate size drum conforming to Specification PPP-D-723, type I, grade A.

5.1.3 Level C. Herbicide shall be packed in a manner to insure carrier acceptance and safe delivery at first domestic destination. Containers shall be in accordance with Uniform Freight Classification Rules or regulations of other carriers applicable to the mode of transportation.

5.2 Marking. In addition to any marking required by the contract or order, shipments shall be marked in accordance with MIL-STD-129.

5.2.1 Labeling. The label shall be cleared for compliance with the Federal Insecticide, Fungicide, and Rodenticide Act. Application to the Pesticide Regulations Branch, U.S. Department of Agriculture, Washington 25, D.C., must be made for registration of the label prior to shipment of the finished herbicide in interstate commerce. Date of pack and lot number shall appear on the label. The label data shall be applied to the containers with materials and methods prescribed in MIL-STD-129.

6. NOTES

6.1 Intended use. This herbicide is an effective general herbicide for the control of many annual and perennial grasses and herbaceous weeds on noncropland areas where bare ground is desired. The degree of control and duration of effect will vary with the amount of chemical applied, soil type, rainfall, and other conditions. Herbicide may be used at any time for non-cropland weed control, except when ground is frozen, provided adequate moisture is supplied by rainfall or artificial means. Best results are obtained if applied shortly before weed growth begins. If dense growth is present, remove tops and spray the ground. The herbicide selectively controls weed seedlings such as crabgrass, watergrass, foxtail, Johnson grass, pigweed, purslane, Spanish needle, ragweed, chickweed, wild mustard, annual morning glory, and lambs quarters. Any well established weeds should be first eliminated by mechanical or other means. Unless otherwise directed, the surface of the soil should not be cultivated or disturbed after application as efficiency may be reduced.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Level of packing required.

6.3 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

6.4 End point by differential method. End point determination by the differential

method is illustrated in Standard Methods for the Examination of Water and Wastewater (published by American Public Health Association, Inc., 1790 Broadway, New York 19, New York), pages 280 and 281. Paragraph 4.4 illustrates the procedure and paragraph 4.5 illustrates the plotting of the data to determine the end point.

6.5 Significant places. For the purpose of determining conformance with this specification, an observed or a calculated value shall be rounded off "to the nearest unit" in the

last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (ASTM Designation: E29).

6.6 Common names. Monuron is the common name for 3-(p-chlorophenyl)-1, 1-dimethylurea accepted for use by the American Standards Association Sectional Committee on Common Names for Pest Control Chemicals K62 (ASA-K62).

Custodians:

Army—MU
Navy—Docks
Air Force—MAA

Review activities:

Army—MU, MD
Navy—Docks
Air Force—MAA

Preparing activity:

Army—MU
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