

Method of Test for  
**DETERMINING PERCENT WEIGHT OF 2, 4-DICHLOROPHENOXY  
ACETIC ACID IN HERBICIDES**

DOTD Designation: TR 520

**I. Scope**

This method describes the determination of percent weight of 2, 4-dichlorophenoxy acetic acid concentration in herbicides.

**II. Apparatus**

- A. **Analytical balance** – 120 g capacity with accuracy to  $\pm 0.0001$  g
- B. **Erlenmeyer flasks**- 250 mL
- C. **Burette**- 50 mL
- D. **Graduated cylinder**- 100 mL
- E. **Magnetic stirrer with adjustable speed**
- F. **Magnetic stir bar**
- G. **Syringe**, 1-mL
- H. **Herbicide worksheet**

**III. Reagents**

- A. **Neutral ethyl alcohol**
- B. **N- Standardized NaOH**
- C. **Phenolphthalein Indicator**- 1% Solution in ethyl alcohol

**IV. Health Precautions**

Proper equipment, ventilation, and precautions are to be used whenever toxic samples are used. Use appropriate safety equipment such as safety glasses and gloves. Wash hands frequently. Refer to MSDS of herbicide for more precautions.

**V. Sample**

Refer to LA DOTD Materials Sampling Manual S 601-99 Section III, Liquid in Drums and Other Containers. Ensure that the sample is stored in a non-metallic, plastic container with a screwed lid.

**VI. Procedure**

- A. Draw a representative portion of approximately 1 mL from the sample of the herbicide with a syringe
- B. Tare a 250 mL Erlenmeyer flask on the analytical balance. Dispensing the herbicide from the syringe, weigh approximately 1.0 g of the representative portion in the flask.
- C. Record weight of representative portion to 0.0001 grams on the worksheet as "C".
- D. Add approximately 75 mL of neutral ethyl alcohol to the flask.
- E. Add 6 to 8 drops of phenolphthalein indicator solution to the flask.
- F. Insert a magnetic stir bar into the flask.
- G. Place the flask on top of the magnetic stirrer.

- H. Ensure that the stirrer is on and at a speed as fast as possible without the test specimen splashing on the sides of the flask.
- I. Titrate the solution, while stirring, with 0.1 N standardized NaOH to phenolphthalein end point using a burette (permanent and consistent light pink color).
- J. Record the volume of 0.1 N standardized NaOH used in burette to the nearest 0.1 mL onto the herbicide worksheet.

## VII. Calculations

$$\%A = \frac{B \times 0.0221}{C} \times 100$$

Where:

C = Weight (g) of representative portion of herbicide

B = Volume (mL) of 0.1 N standardized NaOH used in burette to titrate

0.0221 = constant (See Part X.)

100 = constant to convert to percentage

%A = % 2, 4- D acetic acid

Example:

C = 1.0403 g

B = 19.4 mL

$$\%A = \frac{19.4 \times 0.0221}{1.0403} \times 100$$

$$\%A = 0.4121 \times 100$$

$$\%A = 41.2\%$$

## VIII. Report

The data shall be reported to nearest tenth percent of 2, 4-D acetic acid onto the herbicide worksheet.

## IX. Normal Test Reporting Time

Normal test reporting time is 1 day.

## X. Additional Information

The constant 0.0221 derives from the following correlation:

It takes a milliliter of 0.1 N NaOH to react completely with 0.0221 grams of 2, 4-D Dichlorophenoxy acetic acid.

E = 178

3/99

Louisiana Department of Transportation and Development  
Materials & Testing Section

HERBICIDES (STERILANT OR WEED KILLER)  
DOTD TR 520/TR 521

REMARKS 2

Grid lines for remarks

TEST RESULTS P/F  
(Max. of 15 characters)

XXXXXXXXXXXXXXXXXXXXXXX | XXX

TYPE .....

2,4 D | \*XX

XXXXXXXXXXXXXXXXXXXXXXX | XXX

2, 4-D ACID, % (TR 520) .....

41.2% | P

% A = (B x 0.0221) / C x 100

0.1 N NaOH mL 19.4 (B)  
Specimen Wt., g 1.0403 (C)

MSMA, % (TR 521) .....

(E x DF x 2.1614) / (SW x 10,000)

As in MSMA, ppm \_\_\_\_\_ (E)  
Dilution Factor \_\_\_\_\_ (DF)  
Specimen Weight, g \_\_\_\_\_ (SW)

Grid lines for MSMA result

Tested by: TAT Date: 1/27/10 Checked by: \_\_\_\_\_ Date: \_\_\_\_\_

APPROVED by: ENGINEER Date: 1/27/10

09/ /606/ 2 12 - /N

Figure 1