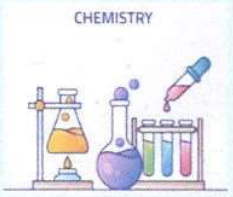

Fertilizer Analysis
(2019-20)

Introduction

"The Official Methods of Analysis of Fertilizers" stipulated by the Ministry of Agriculture, Forestry and Fisheries is the only analysis method to assess main components and harmful components in fertilizers in Japan and contributes to maintaining quality and securing safety of fertilizers. However, no new revision has been issued since "The Official Methods of Analysis of Fertilizers 1992" was issued. Some quarters such as fertilizer manufacturers and inspection instruction agencies have requested a revised edition of "The Official Methods of Analysis of Fertilizers" since new kinds of fertilizers and its new components were added into the public standard, and analysis instruments and technologies have progressed during the period. Incorporated Administrative Agency, Food and Agricultural Materials Inspection Center (FAMIC) has revised the Official Methods of Analysis of Fertilizers by introducing the analysis conditions and the analysis methods, etc. which meet the latest situation. Additionally, FAMIC tried to study how to introduce the analysis methods or the new analysis instruments to cope with new effective components or harmful components and new fertilizers which are not documented in the Official Methods of Analysis of Fertilizers, and established new

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testing methods. At the same time, FAMIC conducted a validity test according to the requirements of ISO/IEC 17025 and opened the results and new testing methods which were discussed and approved by "the Technical Committee for Fertilizers etc." including outside experts on FAMIC's web site in 2008 as "The Testing Methods for Fertilizers 2008". Since then, the contents have been annually added and updated. In this year, High Performance Liquid Chromatograph, etc. for uric acid within fluid fertilizers which have been studied anew in FY2017 were merged, and the "Testing Methods for Fertilizes 2018" was opened on FAMIC's web site.

The "Testing Methods for Fertilizes" uses reagents and instruments which are

stipulated in JIS standards, etc. and its validity of the testing method is checked by referencing IUPAC protocols and it is listed as an analysis method whose validity is checked in "The Management Handbook of Heavy Metal in Sludge Fertilizers" published by the Ministry of Agriculture, Forestry and Fisheries in August 2010. Therefore, FAMIC would like people engaged in the quality control and analysis of fertilizes to use this as a practical document.

1. General Rule Common Items

(1) Applicable range

The Testing Methods for Fertilizers stipulate the official method of analysis of fertilizers and fertilizer materials. The type of samples in the tests is shown in the summary of respective test items.

(2) General matters in common, procedures and terms

(2.1) Terms related to laws and ordinances

a) Main components or major components: The main components or major components in fertilizers in Table 1 are stipulated as components to be calculated by a public notice of the Ministry of Agriculture, Forestry and Fisheries.

Table : Components to be calculated as main componentor major component in fertilizers

Main Component	Component to be Calculated
Phosphate	Phosphorus pentoxide (P_2O_5)
Potassium	Potassium oxide (K_2O)
Silicate	Silicon dioxide (SiO_2)
Magnesium	Magnesium oxide (MgO)
Manganese	Manganese oxide (MnO)
Boron	Diboron trioxide (B_2O_3)
Sulfur content	Sulfur trioxide (SO_3)

Lime	Calcium oxide (CaO)

Description methods, procedures and terms in testing methods for fertilizers.

a) **Reagent name**: Unless otherwise specified, conform to the names by the chemical nomenclature established by International Union of Pure and Applicable Chemistry (IUPAC).

b) **Organic matters**: Fertilizers such as Organic fertilizers, sludge fertilizers and compost and fertilizer materials. However, organic compounds.

c) **Actual article**: A laboratory sample in original state.

d) **Drying matter**: The matter which remains after drying the actual article.

e) **Notes, comments, figures, tables and formulae**: Serial numbers for each test item should be recorded in notes, comments, figures, tables and formulae.

f) **Dilution of solution**: "Transfer accurately a predetermined amount (to a vessel)" means the procedure to measure any volume of solution as per lab method

1) **Description of mixture solution**: Mixture solutions are prepared as per standard methods.

2) **Reagent + reagent**: Describe as reagent name 1–reagent name 2 (v_1 + v_2). In this case, v_1 volume of reagent name 1 is mixed with v_2 volume of reagent name 2

Example: acetonitrile–water (1+1), hexane–ethyl acetate (2+1), methanol–buffer solution (3+1)

3) **Reagent + water**: Reagents are made hydrochloric acid (1+1), sulfuric acid (1+2), ammonia solution (1+3)

4) **Solution + reagent**: Describe as solution name a (concentration) - reagent name b [V_1+V_2]. In this case, it means V_1 volume of solution name a of a certain concentration is mixed with V_2 volume of reagent name b.

Example: sodium hydroxide solution (4 g/L)–methanol [1+4]

5) **Diluted reagent + reagent**: Describe as reagents name a (V_1+V_2) - reagent name b [V_3+V_4].

Example: hydrochloric acid (1+100)–methanol [2+3]

g) **Preparation of a calibration curve**: "Transfer A mL - B mL of the standard solution to volumetric flasks step-by-step." means the procedure to transfer a volume of 4 - 6 steps in the range from A mL to B mL of the standard solution to respective volumetric flasks step-by-step.

Prepare a calibration curve every time a test is conducted. Also, when the same test item is measured under the same conditions for multiple samples continuously, measure the standard solution at regular intervals to check the indicated value.

h) **Washing of apparatus**: Wash containers with a detergent and tap water before usage andwash sufficiently with water In case of sampling a sample to test a metallic element and organic materials, after previous washing, dip with nitric

acid (1+9) or hydrochloric acid (1+9) as appropriate and further wash sufficiently with water of A2, A3 or A4.

i) **Handling of reagents and liquid waste, etc.**: Handle with care and in compliance with relevant laws and regulations. When treatment methods are specified in respective test items, comply with the methods.

j) **Referential matters related to the validity of testing methods**: Information related to the validity of respective testing methods such as quantification range (minimum limits of quantification, etc.), mean recovery, repeatability, intermediate precision and reproducibility is described in a Comment, etc. Note that the numerical values such as Minimum Limit of Quantification, etc. are not standards to be targeted but examples.

Note (1) When the dilution factor is large, accuracy should be secured by procedures such as repeating the dilution procedure.

(2) Set according to the specification and operation method of the measurement instrument used. There is no need to include the minimum and the maximum values of the calibration curb range described in the Testing Methods for Fertilizers.

(3) Water

a) **Water**: Pure double distilled water is used for all protocols.

(4) Reagents

a) **Reagents**:A.R. grades chemicals and materials used.

b) **Reference materials**: The preparation of standard solutions or standardization of titration solutions using reference materials below other than materials specified in respective testing items is possible.

1) **Standard Solutions**: In the cases of specifying in the comment in respective testing items, the preparation of standard solutions for a calibration curve using the solution.

(5) Apparatus

a) **Glass apparatus**: Borosilicate glass ware are used.

b) **Non-glass apparatus**: Unless otherwise specified, use plastic apparatus.

c) **Desiccants for desiccators**: Unless otherwise specified, use silica gel.

d) **Filter Paper:** Whatmann filter paper No. 1&2 used.

Preparation of test samples

Summary

a) Prepare a test sample by pre-drying, reducing, and grinding laboratory samples as necessary.

b) Conduct pre-drying if a laboratory sample is moist and hard to grind.

c) A laboratory sample made from such fertilizers as a fluid fertilizer or a particle-fertilizer, etc.that is sufficiently homogeneous can be used as a test sample.

d) If contamination by apparatus affects a test result, procedures such as pre-drying, reductionand grinding are

prohibited

e) Note that part of a test sample should not scatter, nor should surrounding fine particles orother alien substances be mixed with the test sample being prepared

pH:

Glass electrode method

Summary

Measure the pH of fertilizers with a pH meter using a glass electrode.

(1) **Reagent:** Reagents are as shown below.

a) **Oxalate pH standard solution:** Oxalate pH standard solution class 2 traceable to NationalMetrology.

b) **Phthalate pH standard solution:** Phthalate pH standard solution class 2 traceable toNational Metrology.

c) **Neutral phosphate pH standard solution:** Neutral phosphate pH standard solution class 2traceable to National Metrology.

d) **Borate pH standard solution:** Borate pH standard solution class 2 traceable to NationalMetrology.

e) **Carbonate pH standard solution:** Carbonate pH standard solution class 2 traceable toNational Metrology.

(2) **Instruments:** Instruments are as shown below:

a) **pH meter.** Calibrate the instrument by using freshly prepared buffer solutions of P^H by using std P^H solution

(3) **Test procedures for Inorganic Fertilizers:**

a) Transfer a predetermined amount of an analytical sample into a ground-in stopper flask andadd water 5 - 10 times the volume.

b) Mix with a magnetic stirrer, filter with Type 3 filter paper to make a sample solution.

Inorganic fertilizers

a) Transfer a predetermined amount of an analytical sample into a ground-in stopper flask and add water 100 times the volume.

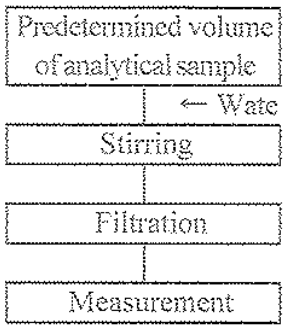
b) Mix with a magnetic stirrer, filter with Type 3 filter paper to make a sample solution.

Measurement:. Actual calibration operation isaccording to the operation procedure of the pH meter used for measurement.

a) Wash the read station of a calibrated pH meter repeatedly no less than 3 times with water andwipe out with clean and soft paper, etc.

b) Transfer a sample solution into a beaker, dip the read station in the solution and measurethe pH value.

(4) **Flow sheet for pH value**: The flow sheet for pH value in fertilizers is shown below.



Electrical conductivity:

Measurement method with an electrical conductivity meter

Summary

Measure the electrical conductivity of organic fertilizers such as compost or sludge fertilizers withan electrical conductivity meter.

(1) **Reagent:** Reagents are as shown below.

a) **Potassium chloride:** Grind potassium chloride used for measurement of electrical conductivity as per standard method.

b) **Potassium chloride standard solution:** Measure predetermined volume of potassium chloride of on a weighing dish, dissolve in a small amount of water, transfer it into a 1000-mL volumetric flask, and add up to the marked line with water.

Instruments: Instruments are as shown below:

Electrical conductivity meter:

Preparation of sample solution:

a) Transfer the predetermined volume of an analytical sample into a ground-in stopper flaskand add water 10 times the equivalent volume of dry matter .

b) Mix with a magnetic stirrer, filter with filter paper to make a sample solution.

Measurement: Actual measurement operation is according to the operation procedure of the electrical conductivity meter used for measurement.

a) Wash the read station of an electrical conductivity meter repeatedly no less than 3 times with water.

b) Transfer a sample solution into a beaker, dip the read station and measure electrical conductivity.

Kjeldahl method

Summary

This testing method is applicable to fertilizers containing no nitrate nitrogen.

Add sulfuric acid, potassium sulfate and copper (II) sulfate pentahydrate to an analytical sample, pretreat by Kjeldahl method to change total nitrogen (T-N) to ammonium ion, and add a sodium hydroxide solution to subject to steam distillation. Collect isolated ammonia with 0.25 mol/L sulfuric acid and measure surplus sulfuric acid by (neutralization) titration using a 0.1 mol/L - 0.2 mol/L sodium hydroxide solution to obtain the total nitrogen (T-N) in an analytical sample. Or collect isolated ammonia with a boric acid solution and measure ammonium ion by (neutralization) titration using 0.25 mol/L sulfuric acid to obtain the total nitrogen (T-N) in an analytical sample. This testing method corresponds to the sulfuric acid method in the Official Methods of Analysis of Fertilizers (1992).

(1) **Reagent:**

0.1 mol/L - 0.2 mol/L sodium hydroxide solution: Transfer about 30 mL of water to a polyethylene bottle, dissolve about 35 g of sodium hydroxide specified, seal tightly and leave at rest for 4-5 days. Transfer 5.5 mL -11 mL of the supernatant to a ground-in stoppered storage container, and add 1000 mL ofwater.

Standardization:

Dissolve in a small amount of water, transfer to a 250-mL volumetric flask, and add water up to the marked line. Transfer a predetermined amount of the solution to a 200-mL - 300-mL Erlenmeyer flask, add a few drops of bromothymol blue solution (0.1 g/100 mL) as an indicator, and titrate with a 0.1 mol/L - 0.2 mol/L sodium hydroxide solution until the color of the solution becomes green. Calculate the factor of a 0.1 mol/L - 0.2 mol/L sodium hydroxide solution by the following formula:

$$\text{Factor of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution } (f_1) = (W_1 \times A \times 0.01/97.095) \times (V_1/V_2) \times (1000/V_3) \times (1/C_1)$$

W_1: Mass (g) of sulfamic acid sampled

A: Purity (% (mass fraction)) of sulfamic acid

V_1: Volume (mL) of sulfamic acid solution transferred

V_2: Constant volume (250 mL) of sulfamic acid solution

V_3: Volume (mL) of 0.1 mol/L - 0.2 mol/L sodium

hydroxide solution needed fortitration

C_1: Set concentration (mol/L) of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution

a) **Sulfuric acid:.**

b) **0.25 mol/L sulfuric acid**: Add about 14 mL of sulfuric acid to a beaker containing 100 mL of water in advance, stir well, and add water to make 1000 ml and titrate with a 0.1 mol/L - 0.2 mol/L sodium hydroxide solution until the color of the solution becomes gray-green. Calculate the volume of a 0.1 mol/L - 0.2 mol/L sodium hydroxide solution equivalent to 1 mL of 0.25 mol/L sulfuric acid by the following formula. Or, calculate the factor of 0.25 mol/L sulfuric acid by the following formula:

Volume (B) of 0.1 mol/L -0.2 mol/L sodium hydroxide solution equivalent to 1 mL of 0.25mol/L sulfuric acid

$= V_4/V_5$.....(1)

Factor of 0.25 mol/L sulfuric acid (f_2)

$= (f_1 \times C_1 \times V_4/V_5)/(C_2 \times 2)$.....(2)

V_4: Volume (mL) of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution needed fortitration

V_5: Volume (mL) of 0.25 mol/L sulfuric acid subjected to standardization

C_1: Set concentration (mol/L) of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution

C_2: Set concentration (0.25 mol/L) of 0.25 mol/L sulfuric acid

c) **Boric acid solution (40 g/L)**: Dissolve 40 g of boric acid 1000mL in water.

d) **Catalyst**: Mix potassium sulfate copper (II) sulfate pentahydrate

e) **Sodium hydroxide solution (200 g/L - 500 g/L)** : Dissolve 100 g - 250 g of sodiumhydroxide in water to make 500 mL.

f) **Bromothymol blue solution (0.1 g/100 mL)**: Dissolve 0.1 g of bromothymol blue in 20 mL of ethanol (95), add water to make 100 mL.

g) **Methyl red solution (0.1 g/100 mL)**: Dissolve 0.1 g of methyl red in100 mL of ethanol.

h) **Methylene blue solution (0.1 g/100 mL)**: Dissolve 0.1 g of methylene blue in 100 mL of ethanol.

i) **Methyl red–methylene blue mixture solution**: To 2 volumes of methyl red solution (0.1g/100 mL), add 1 volume of methylene blue solution (0.1 g/100 mL).

j) **Bromocresol green solution (0.5 g/100 mL)**: Dissolve 0.5 g of bromocresol green in 100 mL of ethanol

k) **Methyl red–bromocresol green mixture solution**: To a methyl red solution (0.1 g/100 mL),add equal volume of bromocresol green solution (0.5 g/100 mL).

(2) **Apparatus and instruments:**

a) **Steam distillation apparatus**

b) **Digestion flask**: Kjeldahl flask

c) **Distillation flask**: A Kjeldahl flask or round bottom flask that can be connected to a steamdistillation apparatus.

Kjeldahl method:

a) Weigh 0.5 g - 5 g of an analytical sample to the order of 1 mg, and put it in a 300-mL -500-mL digestion flask.

b) Add 5 g - 10 g of catalyst, and further add 20 mL - 40 mL of sulfuric acid, shake to mix andheat gently.

c) After bubbles cease to form, heat until white smoke of sulfuric acid evolves.

d) Ignite until organic matters are completely digested .

e) After standing to cool, add a small amount of water, mix well by shaking, transfer to a250-mL - 500-mL volumetric flask with water , and further mix by shaking.

f) After cooling is complete, add water up to the marked line to make the digestion solution.

Distillation:

Conduct distillation as shown below. Specific distillation procedures are according to the operation method of the steam distillation apparatus used in measurement.

a) Transfer a predetermined amount of 0.25 mol/L sulfuric acid

to an acceptor , add a few drops of methyl red–methylene blue mixture solution, and connect this acceptor to a steam distillation apparatus. Or, transfer a predetermined amount of boric acid solution (40 g/L) to an acceptor , add a few drops of methyl red–bromocresol green mixture solution, and connect this acceptor to a steam distillation apparatus.

b) Transfer a predetermined amount of the digestion solution to a 300-mL distillation flask, add a proper amount of sodium hydroxide solution (200 g/L - 500 g/L), and immediately connect this distillation flask to the steam distillation apparatus.

c) Send steam to the distillation flask to heat the solution in the distillation flask, and distill at a distillation rate of 5 mL/min - 7 mL/min.

d) Stop distilling when the distillate has reached 120 mL - 160 mL.

e) Wash the part of the steam distillation apparatus that came in contact with the solution in the acceptor with a small amount of water, and pool the washing with the distillate.

Measurement

a) Titrate the distillate with a 0.1 mol/L - 0.2 mol/L sodium hydroxide solution until the color ofthe solution becomes gray-green.

b) Calculate the total nitrogen (T-N) in the analytical sample by the following formula:

Total nitrogen (T-N) (% (mass fraction)) in the analytical sample

$= (B \times V_6 - V_7) \times C_1 \times f_1 \times (V_8/V_9) \times (14.007/W_3) \times (100/1000)$

$= (B \times V_6 - V_7) \times C_1 \times f_1 \times (V_8/V_9) \times (1.4007/W_3)$

B: Volume of 0.1 mol/L -0.2 mol/L sodium hydroxide solution equivalent to 1 mLof 0.25 mol/L sulfuric acid

V_6: Volume (mL) of 0.25 mol/L sulfuric acid transferred

V_7: Volume (mL) of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution needed fortitration

C_1: Set concentration (mol/L) of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution

f_1: Factor of 0.1 mol/L - 0.2 mol/L sodium hydroxide solution

V_8: Predetermined volume (mL

V_9: Transferred amount (mL)

W_3: Mass (g) of the analytical sample

a) Titrate the distillate with 0.25 mol/L sulfuric acid until the color of the solution becomes light$_{red}$ (13).

b) Calculate the total nitrogen (T-N) in the analytical sample by the following formula:

Total nitrogen (T-N) (% (mass fraction)) in the analytical sample

$= V_{10} \times C_2 \times 2 \times f_2 \times (V_{11}/V_{12}) \times (14.007/W_2) \times (100/1000)$

$= V_{10} \times C_2 \times 2 \times f_2 \times (V_{11}/V_{12}) \times (2.8014/W_2) \times (100/1000)$

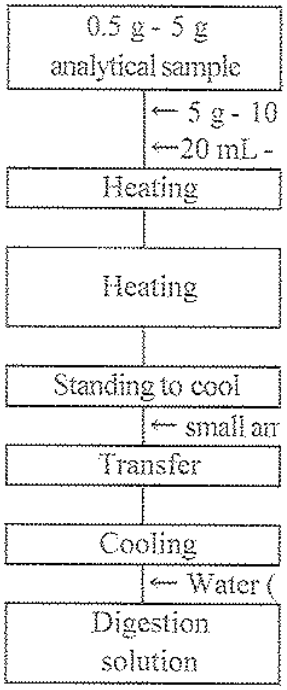
V_{10}: Volume (mL) of 0.25 mol/L sulfuric acid needed for titrationC_2: Set concentration (0.25 mol/L) of 0.25 mol/L sulfuric acid f_2: Factor of 0.25 mol/L sulfuric acid

V_{11}: Predetermined volume (mL) of the digestion solution

V_{12}: Transferred amount (mL) of the digestion solution subjected to distillation

W_2: Mass (g) of theanalytical sample

Flow sheet for total nitrogen: The flow sheet for total nitrogen in fertilizers is shown below:



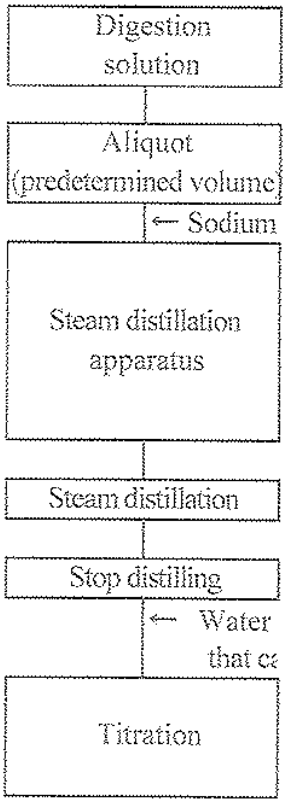
Weigh to the order of 1 mg into a 300-mL digestion flask.g catalyst

After foam no longer evolves, ignite until organic matters are completely digested.

ount of water

250-mL - 500-mL volumetric flask, water

Figure 1 The flow sheet for total nitrogen in fertilizers (Kjeldahl method procedure)



300-mL distillation flask

hydroxide solution (200 g/L - 500 g/L)

Receiver: 200-mL - 300 - mL Erlenmeyer flask or beaker A predetermined amount of 0.25 mol/L sulfuric acid and

a few drops of methyl red-methylene blue mixture solution, or boric acid solution (40 g/L), several drops of

methyl red - bromocresol green mixture solution Distillation rate: 5 mL/min -7 mL/min

120 mL – 160 mL distillate

(wash the part of the distillation apparatus

me in contact with the solution in the receiver)

0.1 mol/L-0.2 mol/L sodium hydroxide solution (until thesolution becomes gray-green), or

0.25 mol/L sulfuric acid (until the solution becomes

light Figure. Flow sheet for total nitrogen in fertilizers.

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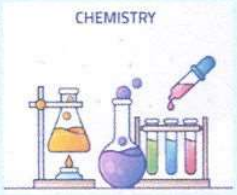
Department of Chemistry



Certificate Course
(Fertilizer Analysis)

TIME TABLE (6 Dec.- .4 Jan. 2020)
(2019-20)(PG)

Class	Time	Friday(06/12/2019)	Saturday(07/12/2019)
M.Sc.- I	11.20 am-12.08pm	Theory (SDJ)	Theory (NDN)
	12.08pm-12.56pm	Theory(NDN)	Theory(NMG)
	3.00 pm-6.00pm	Practical(SDJ)	Practical(NDN)

Class	Time	Friday(20/12/2019)	Saturday(21/12/2019)
M.Sc.- I	11.20 am-12.08pm	Theory (PSP)	Theory (NAG)
	12.08pm-12.56pm	Theory(NBP)	Theory(PPJ)
	3.00 pm-6.00pm	Practical(NBP)	Practical(NAG)

Class	Time	Friday(27/12/2019)	Saturday(28/12/2019)
	11.20 am-12.08pm	Theory (NBP)	Theory (NSG)

M.Sc.- I	12.08pm-12.56pm	Theory(PSP)	Theory(KBJ)
	3.00 pm-6.00pm	Practical(PSP)	Practical(ABD)

Class	**Time**	**Friday**(03/01/2020)	**Saturday**(04/01/2020)
M.Sc.- I	11.20 am-12.08pm	Theory (NBP)	Theory (NSG)
	12.08pm-12.56pm	Theory(PSP)	Theory(KBJ)
	3.00 pm-6.00pm	Practical(NSG)	Practical(ABD)

SDJ - Dr. S. D. Jadhav

NDN - Dr. N. D. Nikam

NMG - Mr. N. M. Gosavi

PSP - Miss. P. S. Patil

NSG - Miss. N. S. Ghadge

NAG - Miss. N. A. Ghadge

KBJ - Miss. K. B. Jagtap

PPJ - Miss .P. P. Jadhav

ABD - Miss. A. B. Deshmukh

Course Coordinator

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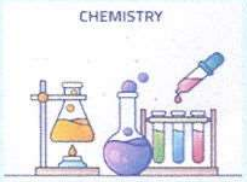

(2019-20)

Notice

Date :27/11/2020

All the Students of M.Sc.-I (Analytical Chemistry) are here by informed that Department of Chemistry going to organize your Certificate Course (Fertilizer Analysis) has been Scheduled from 06/12/2019 to 04/01/2020 Kindly, remain present at prescribed time in lecture hall.

Course Coordinator

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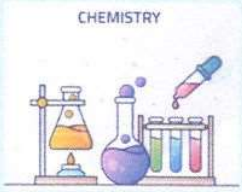

(2019-20)

Certificate Course
(Fertilizer Analysis)

Registration

Sr.No	Roll No.	Students Name
1	4501	Bhilare Dipali Sayaji
2	4502	Dhende Nikhil Pandurang
3	4503	Dhumal Vijay Sudhakar
4	4504	Indulkar Ashitosh Prakash
5	4505	Jadhav Ankita Dilip
6	4506	Jadhav Sayali Jotiram
7	4507	Kumbhar Rutuja Rajendra
8	4508	Malawadkar Chaitanya Pravin
9	4509	Mandare Poonam Dadaso
10	4510	Mane Aniruddha Mahesh

11	4511	Mulani Anish Dilawar
12	4512	Nikam Kiran Krishnadev
13	4513	Patil Vishakha Mahadeo
14	4514	Pawar Akshay pralhad
15	4515	Pawar Mahesh Madhukar
16	4516	Raut Komal Mahadev
17	4517	Sawant Snehal Shankar
18	4518	Shinde (Patil)Prashant Vitthal
19	4519	Shinde Pallavi Prakash
20	4520	Shinde Prachi Prashant
21	4521	Varekar pornima Suresh
22	4522	Yadav Priyanka Baburao

Course Coordinate

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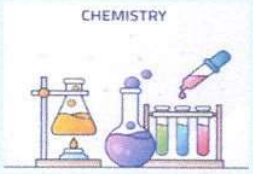


(2019-20)

Certificates Course
Question Paper (Fertilizer Analysis)

Day & Date: 04/01/2020 **Marks- 20**
Time – 12:30pm to 01:00pm

1.For Which of the following fertilizer, sulphuric acid is being used in large amounts?
a) Organic fertilizers
b) Phosphate fertilizers
c) Potassium fertilizers
d) Nitrogen fertilizers

2. Urea contains -------% of Nitrogen?
a) 51
b) 75
c) 46
d) 91

3. Fertilizer which supply only one major plant nutrient's is--------.
a) Straight fertilizer
b)Complex fertilizer
c) Complete fertilizer
d) Double fertilizer

4. Nitrogen content in Ammonium nitrate is--------.
a) 26
b) 18
c) 28
d) 33

5. Which among the following is not a Nitrogenous fertilizer?
a) Ammonium sulphte
b) Calcium cyanamide
c) Super phosphate of lime
d)Urea

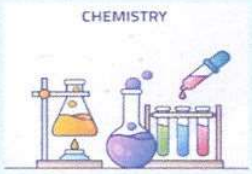
6. The seed treatment can be done by using…… along with P.S.M.
a) Rhizobium
b) Azotobacter
c) Azospirillum
d) All of above

7):Which form of fertilizers is designed to be scratched into soil and water soluble?
a) Granular
b) Powered
c) Liquid
d) Foliage

8): Urea, animal tankage and sludge are the examples of ……
a) Inorganic fertilizers
b) Organic fertilizers
c) a) and b)
d) None of them

9.:…… Are natural fertilizers that are microbial, bacteria, algae and fungi.
a) Fertilizers
b) Bio-fertilizers
c) Primary consumers
d) Consumers

10. Which of the following symbiotic nitrogen fixing bacteria?
a) Rhizobium
b) Rat
c) Maggots
d) None of them



(2019-20)

Certificate Course

Model Answer Paper (Fertilizer Analysis)

Day & Date: 04/01/2020 **Marks- 20**
Time – 12:30pm to 01:00pm

1. For Which of the following fertilizer, sulphuric acid is being used in large amounts?
a) Organic fertilizers
b) Phosphate fertilizers
c) Potassium fertilizers
d) Nitrogen fertilizers

2. Urea contains -------% of Nitrogen?
a) 51
b) 75
c) 46
d) 91

3. Fertilizer which supply only one major plant nutrient's is--------.
a) Stright fertilizer
b) Complex fertilizer
c) Complete fertilizer
d) Double fertilizer

4. Nitrogen content in Ammonium nitrate is--------.
a) 26
b) 18
c) 28
d) 33

5. Which among the following is not a Nitrogenous fertilizer?
a) Ammonium sulphte
b) Calcium cyanamide
c) Super phosphate of lime
d) Urea

6. The seed treatment can be done by using ..... along with P.S.M.

a) Rhizobium
b) Azotobacter
c) Azospirillum
d) All of above

7):Which form of fertilizers is designed to be scratched into soil and water soluble?
a) Granular
b) Powered
c) Liquid
d) Foliage

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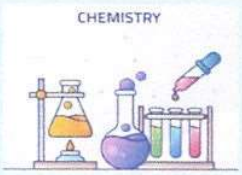
Head
Department of Chemistry
D. P. Bhosale College, Koregaon

Rayat Shikshan Sanstha's,

D. P. Bhosale College, Koregaon

Department of Chemistry



(2019-20)

Certificate Course
(Fertilizer Analysis)

Result Analysis

Sr.No	Roll No.	Students Name	Marks	Grade
1	4501	Bhilare Dipali Sayaji	18	A
2	4502	Dhende Nikhil Pandurang	16	B+
3	4503	Dhumal Vijay Sudhakar	18	A
4	4504	Indulkar Ashitosh Prakash	20	A+
5	4505	Jadhav Ankita Dilip	20	A+
6	4506	Jadhav Sayali Jotiram	16	B+
7	4507	Kumbhar Rutuja Rajendra	18	A
8	4508	Malawadkar Chaitanya Pravin	16	B+
9	4509	Mandare Poonam Dadaso	16	B+
10	4510	Mane Aniruddha Mahesh	14	B
11	4511	Mulani Anish Dilawar	18	A

12	4512	Nikam Kiran Krishnadev	18	A
13	4513	Patil Vishakha Mahadeo	20	A+
14	4514	Pawar Akshay pralhad	14	B
15	4515	Pawar Mahesh Madhukar	16	B+
16	4516	Raut Komal Mahadev	18	A
17	4517	Sawant Snehal Shankar	20	A+
18	4518	Shinde (Patil)Prashant Vitthal	14	B
19	4519	Shinde Pallavi Prakash	16	B+
20	4520	Shinde Prachi Prashant	18	A
21	4521	Varekar pornima Suresh	20	A+
22	4522	Yadav Priyanka Baburao	14	B

Course Coordinate

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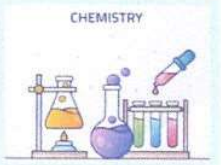

Fertilizer Analysis (PG)

Report (2019-20)

It has been noted that, the fertilizer recommendations contain important factors including fertilizer form, source, application timing, and placement and irrigation management. The optimum fertilizer amount is determined from laboratory experiments conducted on various parameters like primary element and secondary elements, and micronutrient analysis. The goal of fertilizer analysis research on fertilizer rate is to determine the amount of fertilizer needed to achieve commercial crop yield. Generally, available nitrogen, Phosphorous and potassium can be estimated in chemical laboratory with Kjeldahl's Work and flame photometer. Some software's are developed in order to feed the calculated fertilizer readings so that it is possible to get Soil Health Card (SHC) are given to the farmers.

The common simple parameters like P^H and E.C. are very much applicable in deciding micronutrient availability to the crops. Thus, if P^H is below than 7, soil can be made alkaline by adding lime till P^H becomes neutral. On the other side if P^H is more than 7 soil can be made acidic by adding Gypsum till P^H becomes neutral. The determination of E.C. ensures total amount of Salts present in the soil and proper recommendation is made accordingly. The E.C. should be less than 1for better crop yield.

Overall, 22 students of M.Sc. I Students worked for the samples from nearby Koregoan Tehsil. Students have been participated in the said course with actual demonstration and hands on training with proper guidance. After completion of the Course, certificates are conferred individually at the end of Course.

Course Coordinator

Head
Department of Chemistry
D. P. Bhosale College, Koregaon

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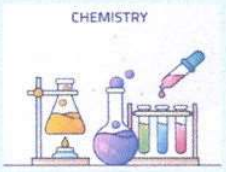

Fertilizer Analysis - (2019-20)

Feedback

Name Of Student	Nikam Kiran Krishnadev
Roll. No	4512
Mobile. No	—
Email. Id	—

Give your Valuable feedback marking the appropriate option With

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus		✓		
3	Topics Taught		✓		
4	and Overall Management	✓			
5	Overall impression	✓			

Suggestion for improving, if any

_____

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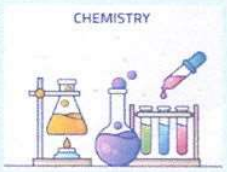

Fertilizer Analysis - (2019-20)

Feedback

Name Of Student	Jadhav Ankita Dilip.
Roll. No	4505
Mobile. No	–
Email. Id	–

Give your Valuable feedback marking the appropriate option With

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus		✓		
3	Topics Taught	✓			
4	and Overall Management		✓		
5	Overall impression	✓			

Suggestion for improving, if any

_____

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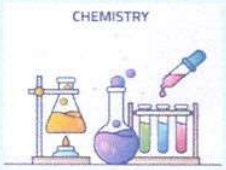

Fertilizer Analysis - (2019-20)

Feedback

Name Of Student	Bhilare Dipali Sayaji
Roll. No	4501
Mobile. No	
Email. Id	

Give your Valuable feedback marking the appropriate option With

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus	✓			
3	Topics Taught	✓			
4	and Overall Management		✓		
5	Overall impression	✓			

Suggestion for improving, if any

_____

Rayat Shikshan Sanstha's,

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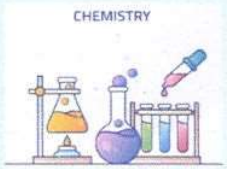

Fertilizer Analysis - (2019-20)

Feedback

Name Of Student	Shinde Prachi Prashant
Roll. No	4520
Mobile. No	–
Email. Id	–

Give your Valuable feedback marking the appropriate option With

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus	✓			
3	Topics Taught	✓			
4	and Overall Management		✓		
5	Overall impression	✓			

Suggestion for improving, if any

_____

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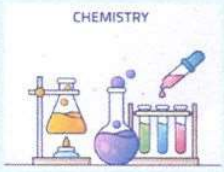

Fertilizer Analysis - (2019-20)

Feedback

Name Of Student	Yadav Priyanka Baburao
Roll. No	4522
Mobile. No	—
Email. Id	—

Give your Valuable feedback marking the appropriate option With

Sr. No	Course Particulars	Excellent	Good	Satisfactory	Pour
1	Transparency in conduct of the course	✓			
2	Syllabus	✓			
3	Topics Taught	✓			
4	and Overall Management		✓		
5	Overall impression	✓			

Suggestion for improving, if any

RAYAT SHIKSHAN SANSTHA'S

D. P. BHOSALE COLLEGE, KOREGAON

DIST-SATARA, MAHARASHTRA, INDIA-415501

DEPARTMENT OF CHEMISTRY

CERTIFICATE COURSE

Certificate

This is to certify that, Miss. Bhilare Dipali Sayaji Class: M.Sc. I Subject: Analytical Chemistry Successfully completed One month Certificate Course on "Fertilizer Analysis" with A grade Organized by Department of Chemistry, in January 2020.

Mr. N. M. Gosavi	**Prof. Dr. S. D. Jadhav**	**Hon. Dr. V. S. Sawant**
Course Coordinator	**HoD Chemistry**	**Principal**

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DEPARTMENT OF CHEMISTRY

CERTIFICATE COURSE

Certificate

This is to certify that, Mr. Dhende Nikhil Pandurang Class: M.Sc. I Subject: Analytical Chemistry Successfully completed One month Certificate Course on "Fertilizer Analysis" with B+ grade Organized by Department of Chemistry, in January 2020.

Mr. N. M. Gosavi	Prof. Dr. S. D. Jadhav	Hon. Dr. V. S. Sawant
Course Coordinator	HoD Chemistry	Principal

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DEPARTMENT OF CHEMISTRY

CERTIFICATE COURSE

Certificate

This is to certify that, Mr. Dhumal Vijay Sudhakar Class: M.Sc. I Subject: Analytical Chemistry Successfully completed One month Certificate Course on "Fertilizer Analysis" with A grade Organized by Department of Chemistry, in January 2020.

Mr. N. M. Gosavi	**Prof. Dr. S. D. Jadhav**	**Hon. Dr. V. S. Sawant**
Course Coordinator	**HoD Chemistry**	**Principal**

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DEPARTMENT OF CHEMISTRY

CERTIFICATE COURSE

Certificate

This is to certify that, Mr. Indulkar Ashitosh Prakash Class: M.Sc. I Subject: Analytical Chemistry Successfully completed One month Certificate Course on "Fertilizer Analysis" with A+ grade Organized by Department of Chemistry, in January 2020.

Mr. N. M. Gosavi	**Prof. Dr. S. D. Jadhav**	**Hon. Dr. V. S. Sawant**
Course Coordinator	**HoD Chemistry**	**Principal**

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Course Coordinator	**HoD Chemistry**	**Principal**