

STUDENT STUDY PROJECT WORK

"TO ESTIMATE ORGANIC MATTER IN THE SOIL SAMPLES"

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Objective :- To estimate organic matter in the soil samples.

Reagents :- The reagents needed are:

1. 1N solution of potassium dichromate ($K_2Cr_2O_7$)
2. concentrated sulphuric acid (H_2SO_4)
3. orthophosphoric acid (H_3PO_4)
4. diphenyl amine and
5. ferrous ammonium sulphate.

Apparatus :- Burette, conical flask.

Theory :- The oxidation of the soil organic matters may be carried out by the dichromate-sulphuric acid mixture and the intensity of green colour of the chromium sulphate formed gives directly the amount of carbon oxidised.

procedure :- One gram each of the soil samples were weighed and transferred to three marked conical flasks. Ten millilitres of potassium dichromate was added. Then 20ml of concentrated sulphuric acid was added. The conical flask was shaken and left undisturbed for half an hour. Similarly in a conical flask a "blank" was made i.e.

$K_2Cr_2O_7$ + conc H_2SO_4 . The blank was titrated with 1N solution of ferrous ammonium sulphate and the volume used was noted (B ml).

In the mean time in other three soil samples, 5ml of orthophosphoric acid and 1ml of diphenylamine were added. These mixtures were then titrated with ammonium ferrous sulphate solution. The end point was bottle green. Let the volume used be V ml.

Observations:- The volume $FeSO_4(NH_4)_2SO_4 \cdot 7H_2O$ used for various samples is given in tables.

Table 6.6 volume of $FeSO_4(NH_4)_2SO_4 \cdot 7H_2O$

S.No	initial volume in ml	final volume in ml	volume used in ml
1	0	29.7	29.7
2	0	29.6	29.6
3	0	29.6	29.6

mean of three concordant readings = 29.6 ml.

Table 8.7 volume of $FeSO_4(NH_4)_2SO_4 \cdot 7H_2O$ used for Soil A

S.No	initial volume in ml	final volume in ml	volume used in ml
1	0	27.8	27.8
2	0	27.7	27.7
3	0	27.6	27.6

mean of three concordant readings = 27.7 ml.

Table 6.8 volume of $FeSO_4(NH_4)_2SO_4 \cdot 7H_2O$ used for soil B.

S.No	initial volume in ml	final volume in ml	volume used in ml
1	0	21.2	21.2
2	0	21.2	21.2
3	0	21.2	21.2

Table 8.9 volume of $\text{FeCl}_3(\text{NH}_4)_2 \cdot 10 \cdot 7\text{H}_2\text{O}$ used for soil C

S.No	initial volume in ml	Final volume in ml	volume used in ml
1	0	19.3	19.3
2	0	19.3	19.3
3	0	19.3	19.3

mean of the concordant readings = 19.3 ml

calculations :- The percentage of organic compounds presents in various soil samples may be calculated as follows:

$$\text{organic carbon (OC)\%} = \frac{10(\text{B}-\text{T}) \times 0.003 \times 100\%}{\text{weight of soil}}$$

$$\text{Soil A : OC \%} = \frac{10 \times 29.6 - 27.7}{29.6} \times 0.003 \times 100\% = 0.218\%$$

$$\text{Soil B : OC \%} = \frac{10 \times 29.6 - 21.2}{29.6} \times 0.003 \times 100\% = 0.414\%$$

$$\text{Soil C : OC \%} = \frac{10 \times 29.6 - 19.3}{29.6} \times 0.003 \times 100\% = 0.646\%$$

Result :- Among the three soil samples soil C contained the maximum quantity of organic matter followed by B and then A.

$$\text{Soil C} = 0.646\%$$

$$\text{Soil B} = 0.414\%$$

$$\text{Soil A} = 0.218\%$$