Chapter 34

Total Carbon, Organic Carbon, and Organic Matter

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GENERAL INFORMATION

This chapter is an updated, revised version of the material contained in Chapter 29, in Volume 2, of Methods of Soil Analysis, 2nd edition (Nelson & Sommers, 1982). Much of the material presented in the original chapter has been modified or replaced by more modern procedures and recent literature pertaining to the methods has been included. In addition, the total C section has been modified to include the latest information on automated instruments for analysis of C.

Total C in soils is the sum of both organic and inorganic C. Organic C is present in the soil organic matter fraction, whereas inorganic C is largely found in carbonate minerals. Not all soils contain inorganic C because of dissolution during soil formation of carbonate minerals originally present in parent material. However, organic C is present in all agricultural soils. In soils formed from calcareous parent material under arid conditions, it is not unusual for the inorganic C concentration to exceed the amount of organic C present.

Organic C is contained in the soil organic fraction, which consists of the cells of microorganisms, plant and animal residues at various stages of decomposition, stable “humus” synthesized from residues, and highly carbonized compounds such as charcoal, graphite and coal (elemental forms of C). Organic C in soil may be estimated as the difference between total C and inorganic C. Organic C can be determined directly by total C procedures after removal of inorganic C or by rapid dichromate, oxidation-titration techniques. In the absence of inorganic C, a total C analysis can be used to determine organic C and recover all forms of organic C in soils. However, organic C methods based on dichromate oxidation recover variable proportions of elemental C (e.g., charcoal) and, in some procedures, variable amounts of organic C contained in “humus.”