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Full Length Research Article

MINERALOGICAL IDENTIFICATION OF SOIL SAMPLES COLLECTED FROM SHAHADA TEHSIL OF NANDURBAR DISTRICT, MAHARASHTRA USING XRD METHOD

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ABSTRACT

Soil samples were collected from an industrial ShahadaTehsil of Nandurbar District, Maharashtra, India. Mineralogical identification of powdered soil samples were carried out by using powder X-Ray Diffraction (XRD) technique. The XRD results revealed the presence of various minerals. XRD Method is non-destructive and can be used in the identification of mineralogical composition.

INTRODUCTION

Soil serves as a substrate supporting plant growth, as a nutrient reservoir, and as the site for many biological processes involved in decomposition and recycling of plant and animal products (Wienhold *et al*., 2004). Soils affect air quality through interactions with the atmosphere and as a storage and purification medium for water as it passes through the soil. Soil integrates, transforms, stores and filters material relevant to its environmental and management conditions in the spatial context (Sharma *et al*., 2005). It is also a medium that is challenged by changing environmental and management conditions (Haque *et al*., 2007). Soil resource is non-renewable thing in human time scales (Toth *et al*., 2007). The importance of soils to humankind is documented by the many ancient and old civilizations, some of which vanished because mismanagement destroyed the soils on which they depend (Jenny, 1980). Study of mineralogical composition of soil is important parameter to the proper understanding of soil development, fertility status as well as improvement of management practices for economic crop production. The types of mineral present in soil has a impact on availability of major, secondary and micronutrients to the crops. Soil mineralogy is determined routinely because of its strong influence on soil behavior, its use in soil classification, and its relevance to soil genetic processes (Thakre *et al*., 2014).

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Experimental

Extraction and Concentration of Soil Samples

After collection of soil samples from different parts of Shahada Tehsil, District Nandurbar, Maharashtra, 500 gm. fine powdered soil sample was taken in a one litre measuring cylinder and mixed with one litre of distilled water, then this soil solution is shaken for 30 minutes with the help of mechanical shaker. After proper shaking kept this soil solution overnight and next day the supernent liquid was separated with the help of pipette in to a plastic bottles. This liquid sample is concentrated with the help of centrifugation on centrifugal machine at 4000 rpm for 10min. Then these centrifuged solid samples after air drying were stored in a glass bottle.

Preparation of sediment sample for XRD

More popular method of mounting sample for X-ray analysis is the preparation of oriented sample on microscopic glass slide or on porous ceramic plates. A soil suspension is made properly and pipetted onto the slide. So that approximately 15-25 mg of soil is transferred per $10cm^2$. After sample has been

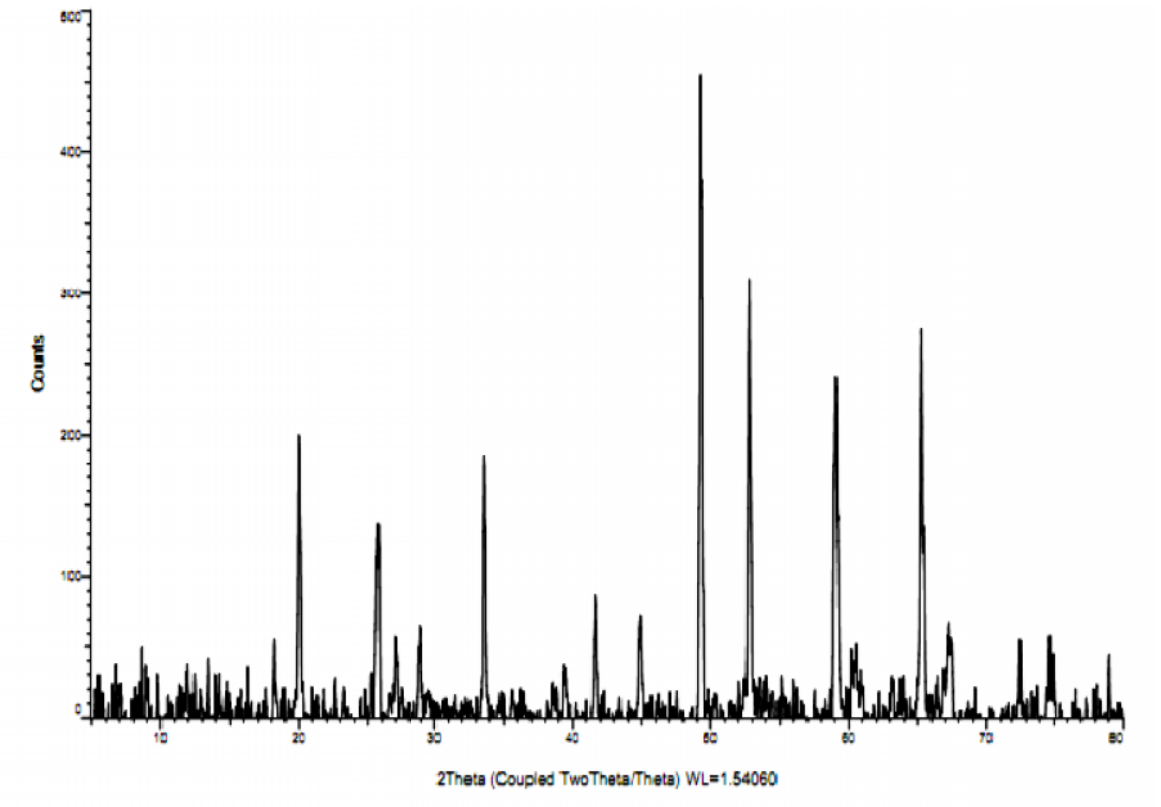

Fig. 1. XRD pattern of soil from site 1 samples (S1)

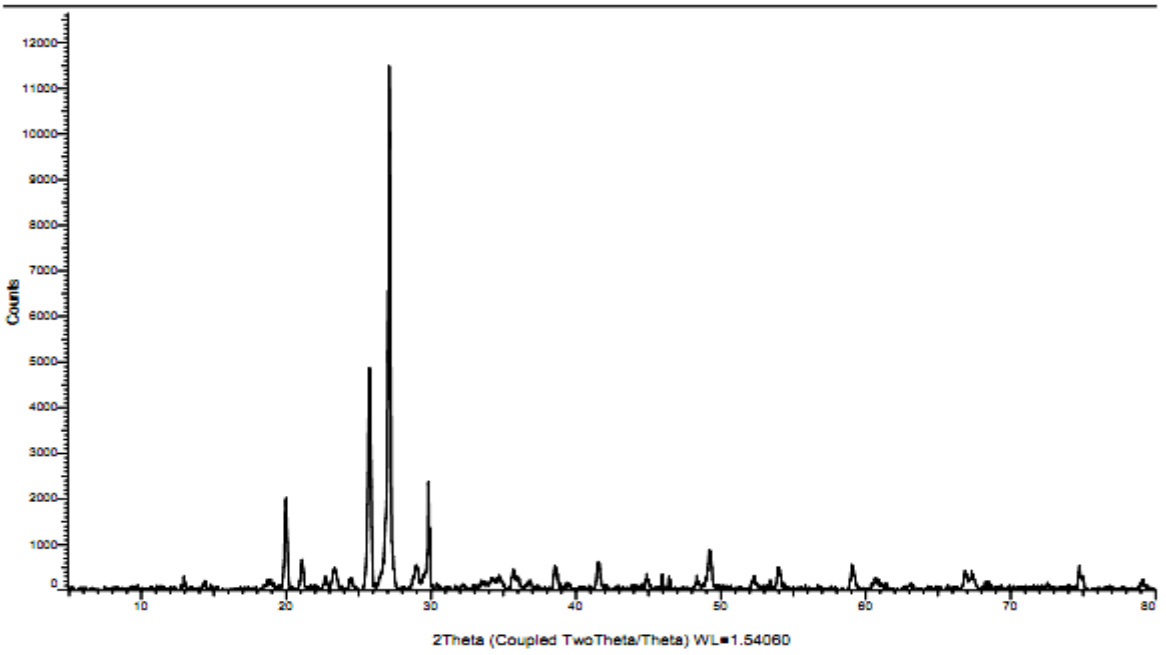

Fig. 2. XRD pattern of soil from site 2 samples (S2)

allowed to dry at room temperature. It is ready for analysis with a direct recording X-ray Deffractometer, in which X-ray pattern are printed on charts. The result is normally shown in terms of 2θ values.

RESULTS AND DISCUSSION

The XRD results of soil samples obtained during the course of present study are given in table 1 and 2. The XRD diffractograms are being presented in figure 1-2.

XRD pattern of selected two soil samples are quality analyzed. Samples were numbered as S1 and S2. This study is used to know the mineralogical composition. Selected representative XRD patterns of soil samples in different locations are shown in Fig. 1 & Fig. 2. The d-spacing values of black gray soil sample no. 1 (S1) is obtained from diffractograms presented in figure 1 are 4.86630, 4.43485, 3.46409, 3.29587, 2.66522, 2.28221, 2.16878, 2.01708, 1.84712, 1.73284, 1.56296, 1.42780, 1.30120, 1.21022 etc. In the sample 1, was found to have Characteristics value of the minerals such as Magnesite,

Gibbsite, Feldspars, Arsenopyrite, Mertieite, Paolovite, Koutekite, Synchysite, Vincentite, Davidite (ce), Oxyvanite, Rhodium etc. The Synchysite, Vincentite, Davidite (Ce), are the major constituents. The d-spacing values of Black gray soil sample no. 2(S2) is obtained from diffractogram presented in figure 2 are 4.44121, 4.21002.3.91005, 3.80588, 3.45668, 3.28623, 3.07683, 2.99470, 2.51205, 2.330772.17086, 1.84893, 1.56164, 1.39709, 1.26802 etc. In the sample 2, was found to have the Characteristic values of the minerals such as Illite (Akdalaite), Palygorskite (Mohrite), Rostite, Franzinite, Matteucite, Terskite, Clinobisvanite, Moralandite, Clinosafflorite, Florenskite, Mertieite, Synchysite (Y), Davidite (Ce), Polkanovite, Oxyvanite etc. The Illite (Akdalaite), Matteucite, Terskite Moralandite are the major constituents.

Conclusion

Results were discussed and it was arrived that the method is relatively quicker and more reliable in mineral analysis of soil samples. The XRD results indicated the presence of various minerals, namely Magnesite, Gibbsite, Feldspars, Arsenopyrite, Mertieite, Paolovite, Koutekite, Synchysite, Vincentite Davidite (ce), Oxyvanite, Rhodium Illite (Akdalaite), Palygorskite (Mohrite), Rostite, Franzinite, Matteucite, Terskite, Clinobisvanite, Moralandite, Clinosafflorite, Florenskite, Mertieite, Synchysite (Y), Davidite-From the above study it is concluded that the composition soil in sample 1 and 2 from different parts shahada Tahsil are different from one another.

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