Mineralogical Status of Soil Collected from Kauthal Village using XRD Method

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Abstract:

Soil samples were collected from soil field Kauthal village of Shahada Tehsil of Nandurbar District of Maharashtra, India. The mineralogical identification of soil samples were carried out by using 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 detection of mineralogical composition.

Keywords: XRD, Mineral, Renewable, Diffraction, Soil.

Introduction:

Soil serve as a substrate supporting plant development, as a nutrient reservoir, and as the location for much biological process involved in decomposition and recycling of plant and animal products [1]. Soils affect air quality through interactions with the atmosphere and as a storage and refining 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 [2]. It is also a medium that is challenged by changing environmental and management conditions [3]. Soil resource is non-renewable thing in human time scales [4]. The importance of soils to evolution is accepted by the many ancient and old civilizations, some of which misplaced because mismanagement and damaged the soils on which they depended [5].

Study of mineralogical composition of soil is important parameter to the proper understanding of soil progress, fertility status as well as upgrading of management practices for profitable crop production. The kind of mineral present in soil has impact on accessibility of major and micro-nutrients to the crops. Soil mineralogy is determined regularly because of its strong influence on soil activities, its use in soil classification, and its significance to soil hereditary processes [6].

1. Experimental:

1.1. Extraction and Concentration of Soil Samples:

After collection of soil samples from different location of Kauthal village of district Nandurbar, Maharashtra, 500 gm. fine powdered soil sample was in use in a one litre measuring container and mixed with one litre of distilled water, and then this soil solution is shaken for 30 minutes with the help of automatic shaker. After appropriate shaking kept this soil solution for the night and next day the supernant liquid was separated with the aid of pipette in to a plastic bottles. This liquid sample is concentrated with the

assist of centrifugation on centrifugal machine at 4000 rpm for 10 min. after that these centrifuged samples were stored in a glass bottle.

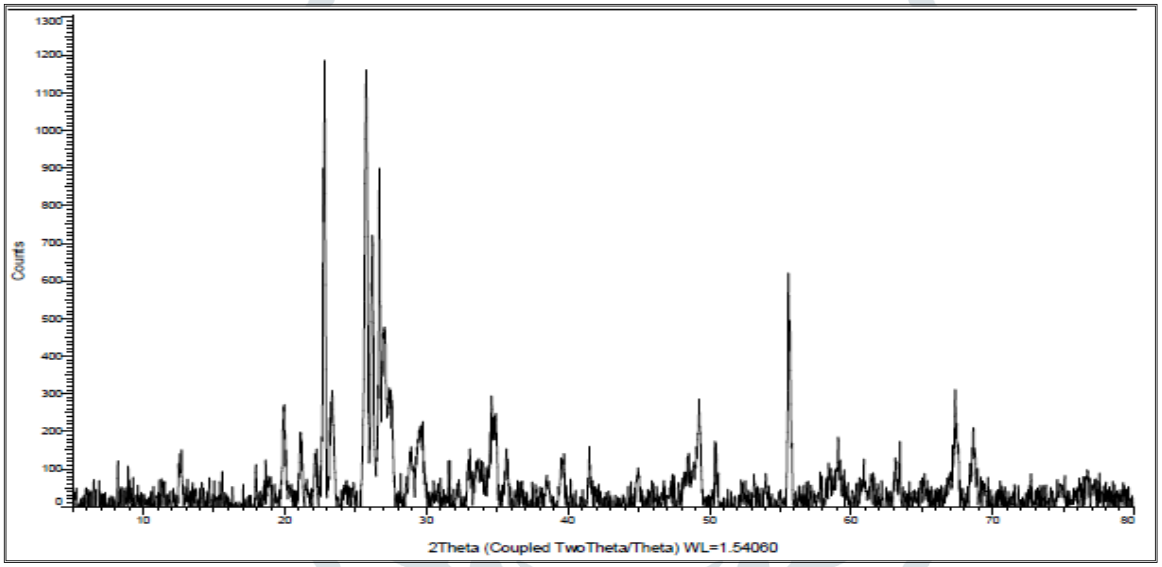
1.2. Preparation of sediment sample for XRD:

Very accepted method of mounting sample for X-ray study is the preparation of oriented sample on microscopic glass slide or on porous ceramic plates. A soil suspension is completed properly and pipette on the slide. So that around 15-25 mg of soil is available per 10 cm ^{3}. After that sample is allow to dry at room temperature. It is ready for analysis with direct recording X-ray diffractometer, in which X-ray outline are printed on charts. The result is usually shown in terms of 2θ values.

Results And Discussion

The XRD results of soil samples obtained during the route of present revision are given in table 1

The XRD diffractograms are being presented in following figure:



X-ray diffractograms of Kauthal soil series

Outline of preferred soil samples are analyzed and the interpretation is used to identify the mineralogical composition. Preferred representative XRD patterns of soil samples in different locations are shown in Fig.

XRD Peak Intensity and Minerals			
Dominant	**Medium**	**Weak**	**Trace**
Wenkite	Odintsovite	Krieselite	Calderite
Lovozerite	Muscovite	Kaolinite	Elyite
Kurunakhite	Akhtenskite	Tialocite	Bariosincosite
____	Blodite	Leucophoenicite	Davidite
____	Lokkaite	_____	____
____	Rectorite	_____	____

The mineralogical composition of Kauthal (E) soil series is noticed with reference to the d-spacing values obtained from X-ray diffractograms with the standard d-spacing values. It is perceived that, the dominant minerals nearby Kauthal (E) soil series are, Wenkite, Lovozerite and kurunakhite at d-spacing 3.4587, 3.8994 and 3.4013A^o respectively. The medium minerals present at Kauthal (E) soil series are odintsovite, muscovite, akhtenskite, blodite, lokkaite, rectorite, jeremejevite and calodenite at the distinguishing d-spacing values 3.3004, 3.3272, 1.6503, 3.2547, 3.8090, 4.4492, 1.3882, and 1.8486 A^o respectively. The Weak minerals existing at Kauthal (E) soil series are krieselite, kaolinite, tialocite and leucophoenicite the corresponding d-spacing values 3.01646, 2.577, 4.2008 and 1.806 A^o respectively. The Trace minerals present at Kauthal (E) soil series are pyrite, calderite, elyite, bariosincosite, and davidite at the characteristic d-spacing values 2.7071, 1.5745, 6.9994, 2.0151 and 1.6969 A^o respectively, are discovered from diffractograms presented in above said figure.

Conclusion:

Results are discussed and it is find that the method is quite quicker and more reliable in mineral analysis of soil samples. The XRD results indicates the presence of various minerals, namely - wenkite, lovozerite and kurunakhite, dintsovite, muscovite, akhtenskite, blodite, lokkaite, rectorite, jeremejevite and calodenite, krieselite, kaolinite, tialocite and leucophoenicite, pyrite, calderite, elyite, bariosincosite, and davidite From the above study, it is concluded that the different types of minerals are present in the Kauthal soil series.

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