



X-Ray Fluorescence Analysis Of Bauxite Ore In Central Part Of India

Akash Behera¹, Smruti Ranjan Sahu, Dharampal Singh Kandari, Kishan Singh Rawat, Ms Sulekha Varma²

¹Department of Civil Engineering, Graphic Era Deemed to be University, Dehradun-248002, India.

²Assistant Professor, Humanities and Social Sciences, Graphic Era Hill University, Dehradun

Email: ksr.kishan@gmail.com

Abstract

Mineralogical assessment is a bigwig tool for both mining and industrial process. XRF method is used to identify the chemical composition of minerals. This technique is very fast, gives very high accuracy, require minimum sample preparations and also non-destructive. Samples are collected from three different parts of Mainpat plateau of surguja province. The elements that analyzed the XRF technique and there detection level mainly depends on spectrometer system used. The precision and reproducibility of XRF analysis is very high.

Keywords: XRF (X-Ray fluorescence), Bauxite, Laterite, Major oxide.

Introduction

The study area is located in Mainpat plateau, Surguja province in Chhattisgarh state, India. The whole study area is covered with Deccan trap. The top of the plateau is covered with laterite and bauxite. The whole plateau has gone through extreme chemical weathering. Odisha, Chatishgarh, Jharkhand, Gujurat, Maharshtra, Madhyapradesh, Karnataka, Tamilnadu, Uttarpradesh and Goa are the major producers of bauxite ore in India. XRF is one of the important study for the identification of the chemical composition. Major Bauxite deposits are found in the east coast of India. Aluminum is the primary ore of Bauxite which is used in the metallurgy, industries, building materials and road aggregates.

Study Area

The area of the research is Mainpat Plateau in Surguja province Chattisgarh state in India. It is located between longE83°18'0" to 83°22'30" and lat N22°43'30" to 22°49'30". The whole

study area is 83.33sq.km and it covered with Deccan traps. The area is located in 1060m above MSL. Bauxite and laterite are the extreme chemical weathering of preexisting aluminous rock. Since 1998 mining in this area is going on in 25 places of the study area.

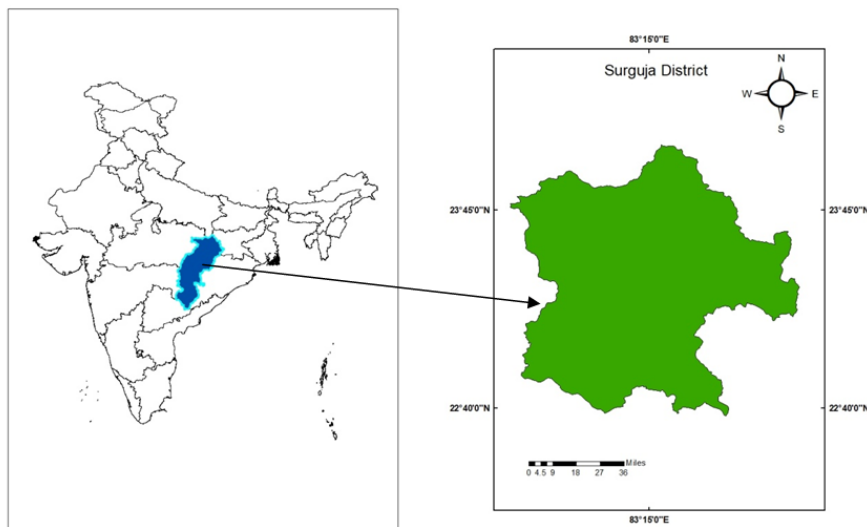


Fig: 1 Study area

X-Ray Fluorescence analysis

XRF is a technique to identify the chemical composition and it is also non-destructive. It shows the chemical composition of the minerals. X-ray emitted from a sample when it is excited by a primary source. In the XRF analysis possible when the atoms are interact with the radiation. Bauxite's geochemistry can be better study by the analysis of trace element distribution, majoroxide and their corresponding normative mineral composition. Three samples were taken from our study area. The analysis is taken place in Laboratory of NIIST,CSIR, Thiruvananthapuram with the help of a Bruker modelS4 Pioneer wave length dispersive x-ray spectrometer equipped with a goniometer, 60 samples automatic loading system, 4kWRh x-xray tube, 0.23⁰ and 0.46⁰ collimators. Argon/methane flow proportional counter and scintillation counter are present in the main detector.

Table 1. Major oxide forAl₂O₃,Fe₂O₃ and SiO₂ of Mainpat Plateau Bauxite Samples

Sample No.	Location	Coordinates	Al ₂ O ₃	Fe ₂ O ₃	SiO ₂	Grade
CH-01	BARIMA WEST	N 22° 47' 40.6" E 83° 19' 10.1"	57.975 %	14.228 %	0.986 %	High grade Bauxite

CH-02	BARIMA SOUTH	N 22° 47' 48.3" E 83°18' 58.0"	37.78%	46.161 %	0.608 %	Bauxite
CH-03	NARVADAPUR	N 22° 46' 02.0" E 83° 20' 59.8"	64.655 %	12.906 %	2.348 %	High grade Bauxite

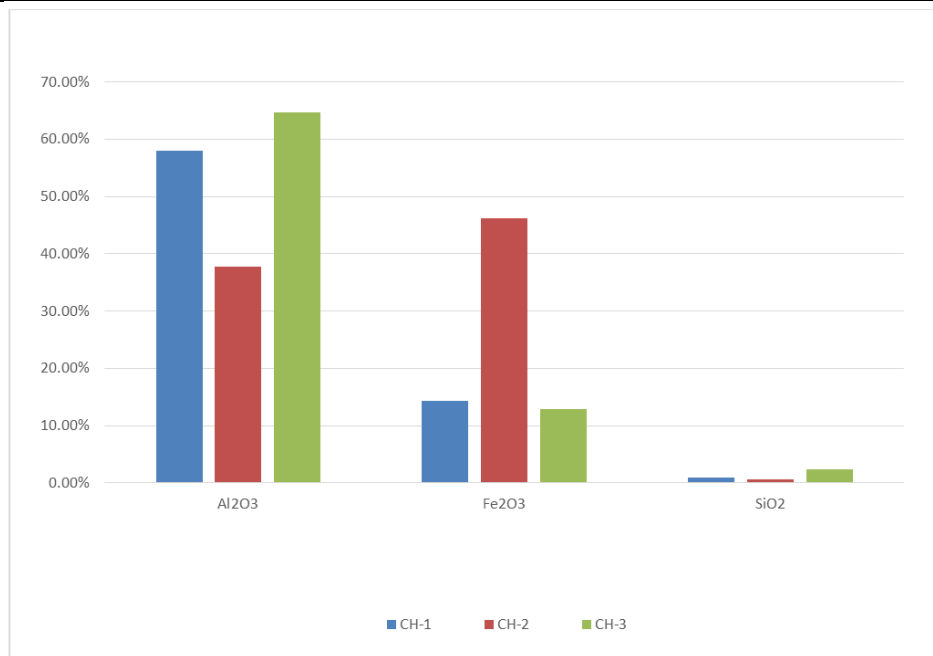


Fig. 2 Al₂O₃, Fe₂O₃ and SiO₂ concentration

Result and Discussion

XRF analysis is carried out in three samples collected from the study area. In all the three samples shows that the presence of Gibbsite, Anatase, Diaspore, Hematite and bohemite which are very high quality. In the first location of Barima west has shown the normal grade of Bauxite, while the second location of the study area Barima south has the high grade of Bauxite and similarly the third location of the study area Narvadapur has also high grade of Bauxite.

Conclusion

XRD analysis offer identification of different minerals like gibbsite, anatase, bohemite, hematite minerals have been identified in most of the bauxite samples. It is a nonferrous metal and principle ore of aluminum and has a huge impact in modern industry. Haematite, Goethite, Bohemite and silica are the various iron oxide bauxite ore are present in it. Pink is the original color of Bauxite with little impurities it shows brownish. Bauxite has pisolitic and

oolitic structure and its hardness varies from low specific gravity to 2.6. Kalahandi, Bolangir, Koraput, Sundargarh and Sambalpur of Odissa are the main bauxite producing districts.

Acknowledgements

The author would like to extend his warm thanks to Dr. S Aravindan for providing all types of support and help to carried out the research. The authors convey his sincere thanks to the all the staff members of Department of Earth Science Annamalai University, Chidambaram (India), for providing access and support to the laboratory for the study.

References

1. Rawat K.S. and Sehgal V.K., Ray SS IF: 0.858 Soil Moisture Retrieval using observation at C-band of RISAT-1 over a Sub-Tropical Semi Arid Area of Rewari District State of Haryana (India)
2. Rawat, K.S., Mishra, A.K. and Bhattacharyya, R. IF:1.224 Soil erosion risk assessment and spatial mapping using LANDSAT7 ETM+, RUSLE and GIS-A case study
3. Kumar R., Rawat KS., Singh J., Singh A., and Rai A., NASS: 5. 08 Soil Aggregation Dynamics and Carbon Sequestration
4. Rawat K.S Soil erosion risk assessment and spatial mapping in Jhagrabaria watershed, Allahabad, U.P. (India) by using LANDSAT 7ETM+ remote sensing data, Revised Universal Soil Loss Equation (RUSLE) and Geographical Information System (GIS)
5. Mishra, B. K., Hemraj, Saha, B. and Shreeramamurthy, A. (2008): Regional search for lamproite/ kimberlite in Tapti lineament zone in Raigarh, Jashpur and Surguja districts of C.G., Unpub. Rep. Geol. Surv. Ind., F.S. 1997 to 2000
6. Patel, D. R., Dhekaware, H. D. and Kankane, S. (2005): Bauxite deposits of Mainpat plateau, Surguja district, Chhattisgarh, India. ICSOBA-2005, pp 242-249.
7. Rao, M. G. and Raman, P. K. (1979): The east coast bauxite deposits of India. Bull. Series A, Econ. Geol. No. 46, G.S.I. pp 24
8. Schellmann,W(1975): Formation of and prospecting for tropical bauxite above silicate rocks: mining magazine, vol. 133, no. 1, pp 33-39.
9. Valetton, Ida (1972) Bauxite, Elsevier publishing company, Amsterdam, London, New York, pp 1- 126.
10. V. N. Patel, R. K. Trivedi, S. H. Adil and R. B. Golekar (2013): Geochemical and mineralogical study of bauxite deposit of Mainpat Plateau, Surguja District, Central India, Vol-7, pp- 3505-3512
11. Hosking JR and LW Tubey (1973): Experimental production of Calcined bauxite for use as road aggregate, p-25.
12. VA, Zans (1961): Classification and genetic types of bauxite deposits

