

SHORT COMMUNICATION

OCCURRENCE OF SCORODITE, A SECONDARY ARSENATE IN ALLUVIAL DEPOSITS AROUND DURGAPUR, BARDHAMAN DISTRICT, WEST BENGAL

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Scorodite ($\text{FeAsO}_4 \cdot 2\text{H}_2\text{O}$) has been identified for the first time in the alluvial samples around Durgapur in the Bardhaman district of West Bengal necessitating further detailed studies. Arsenic pollution in groundwater is one of the most focussed problems in the present day world in many countries. Presence of $\text{As} > 0.01 \text{ mg l}^{-1}$ in drinking water has toxicological effects. The primary sources of As in groundwater include elemental arsenic, arsenides, sulphides, oxides, arsenates and arsenites. In West Bengal, elevated As in groundwater has been reported from a number of localities, the source of which has been attributed to pyrite, arsenopyrite, (Mallick and Rajagopal, 1996; Das et al. 1996) and siderite concretions containing bacteria (Pal et al. 2002).

Recent studies on the sedimentology of the Older alluvium around Durgapur, W. B. ($23^\circ 31' \text{N}; 87^\circ 21' \text{E}$) has revealed the presence of scorodite ($\text{FeAsO}_4 \cdot 2\text{H}_2\text{O}$), a

secondary arsenate by X-ray powder diffraction (Table 1) (using $\text{Cu K}\alpha$ radiation). The diffractogram of the clay fractions of the sediment is shown in Fig.1 with the corresponding $2d$ values. The alluvium is represented by brown to brownish grey, sticky, caliche rich silty clay sometimes containing thin (0.2 to 0.5 m) horizon of angular, coarse to very fine dirty opaque rich sand. The mineralogy of the sediments is represented by quartz and plagioclase as lighter minerals, nontronite, illite, chlorite and kaolinite as clay minerals, and amphibole, epidote, kyanite, sillimanite, tourmaline garnet, rutile, limonitic concretions and sideritic concretions as heavy minerals. Scorodite is found to occur within Younger and Older alluvium along with the transitional zone, which has been reported in other parts of the World (Smedley and Kinniburgh, 2002). However, elevated As concentration in groundwater has not been reported from the study area.

The oxyanion forming element arsenic is most sensitive to mobilization between pH 6.5 to 8.5 under both oxidizing

Table 1. XRD results of scorodite along with the depth, nature of sediment and mineralogy of the studied samples

Sample no.	Sample Depth bgl (in metre)	Nature of sediment	Mineralogy of the sediment	d against 20 values of scorodite	
				20	2d
BH5/3	6	Sticky brownish grey clayey silt	Quartz, plagioclase, garnet kyanite, amphibole, sphene tourmalene, zircon epidote, montmorillonite, illite and kaolinite	20° 28.1° 35.1°	4.439 Å 3.175 Å 2.556 Å
BH5/5	9	Sticky grey clayey silt with pebbles of quartz and feldspar	Quartz, plagioclase, limonitic concretions kyanite, tourmaline montmorillonite, illite and kaolinite	19.9° 28° 35°	4.465 Å 3.186 Å 2.503 Å
BH6/7	9	Coarse dirty grey angular sand	Quartz, plagioclase, garnet kyanite, amphibole, amphibole, carbonate, sphene, tourmaline sideritic concretions, zircon, epidote, sillimanite, montmorillonite, illite and kaolinite	19.9° 28° 35°	4.465 Å 3.186 Å 2.563 Å
BH9/3	5	Grey sandy silt	Quartz, plagioclase, garnet kyanite, amphibole, sphene, tourmaline, zircon, epidote, montmorillonite, illite and kaolinite	19.9° 29.1° 32.5°	4.465 Å 3.068 Å 2.554 Å

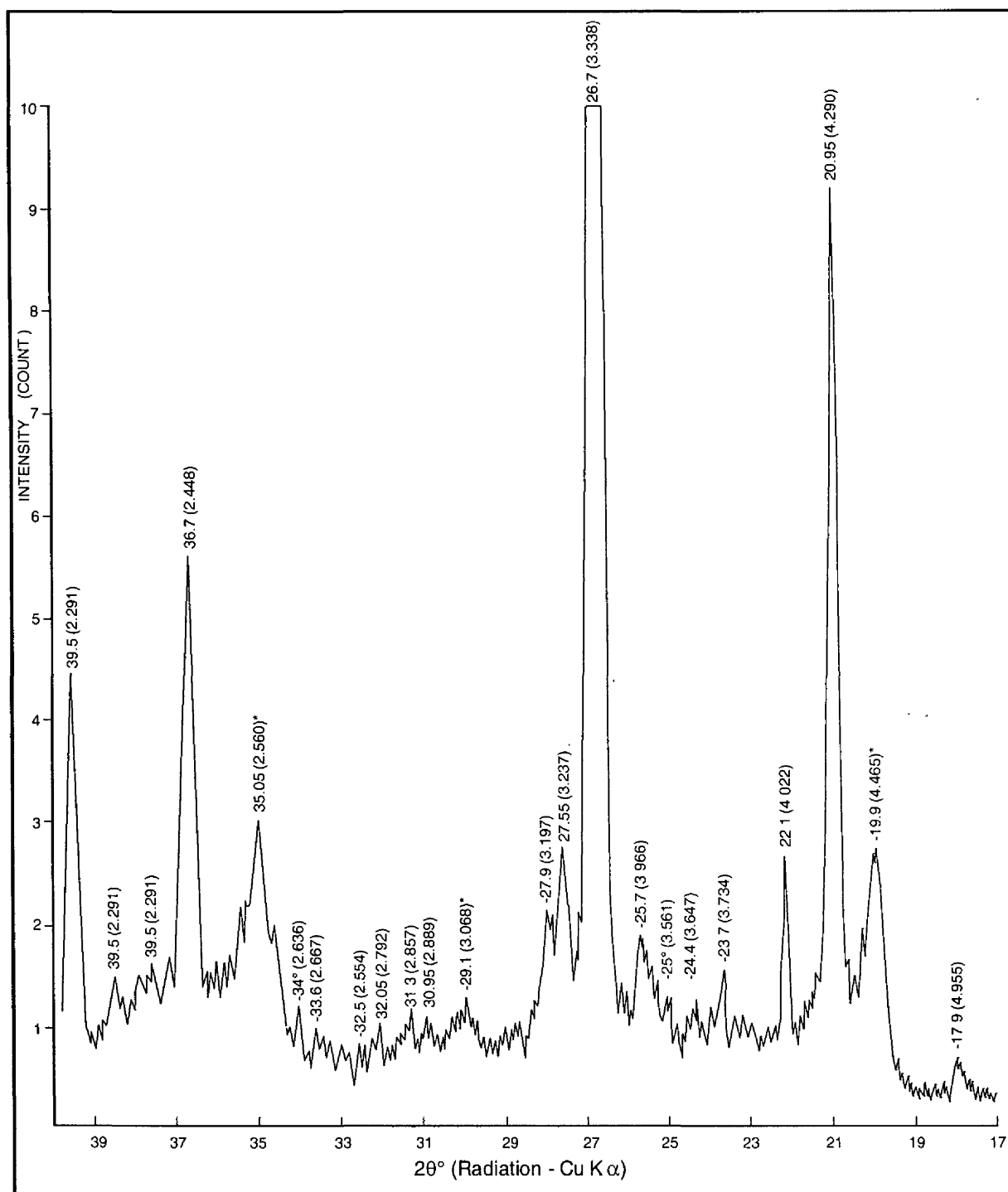


Fig.1. Diffractogram showing the XRD pattern of the clay sample from alluvial sediments of Durgapur area indicating the principal reflections of scorodite (Radiation - Cu K α) * scorodite.

and reducing conditions (Smedley and Kinniburgh, 2002). pH is one of the most important factors controlling arsenic speciation. The investigated area has shown the variation of pH between 5 to 6.5. Although the pH is lower than the arsenic sensitive pH, its nearness to the sensitive range is

alarming due to the presence of scorodite in sediment. Further detailed studies on the groundwater as well as more detailed sediment sampling in the area is called for, in understanding the arsenic distribution pattern in the area.

References

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National Mineral Awards - 2004

The National Mineral Awards Scheme has been instituted by the Ministry of Mines, Government of India, with the purpose of honouring individual scientists and teams of scientists for their extraordinary achievements and contributions in fundamental or applied geosciences and, thus, to provide an incentive for striving towards excellence. The awards are given annually in the field of Earth Sciences. The National Mineral Awards are of two categories:

- (A) **National Mineral Award for Excellence:** This special single Award for Excellence is made to an outstanding scientist/technologist of very high attainments for his/her sustained and significant contributions in any field(s) of Geosciences and related areas. The award carries a cash prize of Rs.300,000/-, a certificate, citation and trophy.
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The last date of receipt of nominations is 31st March 2005. Nominations in prescribed proforma received beyond the stipulated date, incomplete nomination(s) or made in any format other than the prescribed one will not be considered.

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