Geochemical interaction of fluorite and geofluid cripples life in parts of India

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The Toxicity of Fluoride from Drinking Water

Fluoride problems are wide spread in India especially in nine States covering almost the entire country. In order to assess the water quality and the related health problems due to high fluoride content, water samples from nine States across India have been collected and analyzed. Analyses from surface, subsurface and thermal water samples had fluoride concentration that range from < 0.2 to 20 ppm.

Discussion of Results

The probable source of high fluoride relates to the water-rock interaction within the sedimentary basins. During rock weathering and subsequent circulation of pore water through the soil and rock matrix, fluorine is leached out, mainly from the mineral fluorite (CaF_2) and calcium difluoride, and dissolved in the ground water [2]. Human health affects of high fluoride content in water are manifested in the form of 'endemic fluorosis' which has no known treatment other than early detection and limiting the amount of fluoride ingested. High fluoride consumption leads to the fluorosis of the bones which is generally found in Asian region but it is particularly acute in India. Reducing the high fluorine content of groundwater may be done by dilution or by defluorination process. Dilution with the surface water is one very simple technique but not very practical in water scarce India where high fluoride concentration are found. Also the addition of Ca++- ions during experiments to solutions in contact with fluorite in distilled water caused an appreciable decrease in fluoride concentration which appears to be a potential solution to high fluoride problem in an otherwise water scarce India [1].

[1] Deshmukh A.N. & Malpe D.B. (1996) Fluorine in environment, *Special publication, Gondwana geological Society*, Nagpur, pp 1-13. [2] Handa, B.K. (1975) Geochemistry & genesis of fluoride containing ground waters in India, *Groundwater* **13**, 275 – 281.

VOCs and BTX distribution in urban air of Central India

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The concentration of volatile organic compounds (VOCs) in ambient air is increasing with the growing number of mobile and stationary emission sources due to rapid urbanization and industrilization in central region of Indian continent. Many of these compounds behave as precursors to ozone formation and/or have adverse health effects. Raipur city area (capital of Chhattisgarh state, India) is selected for the monitoring of VOCs and BTX. The concentration of nine light VOCs (i.e. C_2H_2, C_2H_4, C_2H_6, C_3H_6, C_3H_8, i-C_4H_{10}, n-C_4H_{10}, i-C_5H_{12} and n-C_5H_{12}) and BTX (C_6H_6, $CH_3.C_6H_5$ and $CH_3.C_6H_4.CH_3$) ranging from C_2 to C_8 were measured at sites: R. S. University campus, Raipur; Charoda and Bhilai (10 km apart from each other). The air monitoring gas chromatography, Buck Scientific, USA equipped with FID and PID detectors was used for monitoring of the VOCs and BTX during period: Jan - Dec., 2006. The sample was collected once in a week on middle day: Thursday. The annual average concentration of the VOCs in the ambient air at University site was ranged from 0.76 – 3.36 ppbv and found in increasing order: $CH_3.C_6H_4.CH_3 < C_3H_8 < C_2H_2 \approx C_6H_6 <$ i-$C_4H_{10} <$ $CH_3.C_6H_5 \approx C_2H_4 <$ n-$C_4H_{10} <$ $C_2H_6 <$ i-$C_5H_{12} <$ n-$C_5H_{12} \approx C_3H_8$. Their highest concentration was found in winter period of a year. Their spatial variations and sources are described. Their concentration in ambient air of other sites of the country and world are discussed.