

Groundwater quality analysis in the vicinity of brick kilns along the highway road of Rawalpindi and Islamabad

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The research was conducted to determine the effect of 35-40 brick kilns in an area of 4-5sq. m on ground water quality along the highway road of Rawalpindi and Islamabad. Fifty water samples (50) ranging in depth of 50-400m were collected from 7 different residential colonies in the vicinity and surrounding area of brick kilns.

Results of water analysis showed alkaline pH ranging from 7.7-8.9 with the mean value of 8.3. Electrical conductivity (EC) ranges from 546-4750 uS/cm with mean value of 1465 uS/cm. Total Dissolved Solids (TDS) ranges from 410-3563 mg/l with the mean value of 1098 mg/L and turbidity ranges from 2.4-196 NTU with mean value of 8.96 NTU. Alkalinity (as HCO₃⁻) ranges from 317-1293 mg/l with the mean value of 521 mg/L. Total hardness ranges from 312-748 mg/l with the mean value of 505 mg/L. Ca⁺⁺ ranges from 168-652mg/l with the mean value of 383 mg/L while, Mg⁺⁺ ranges from 10-236mg/l with the mean value of 122.2mg/l. Nitrates ranges from 2.5-30.7mg/l with the mean value of 17.4mg/l, Chloride ranges from 12.8-706mg/l with the mean value of 146.3mg/l and Lead ranges from 0.03-0.86mg/l with the mean value of 0.47mg/l. Piper plot shows that water of brick kiln areas is of Ca-HCO₃ type. The relationship between Cl⁻ vs. SO₄²⁻, F⁻ and NO₃⁻ was studied. They all showed positive correlations with Chloride. Positive correlation was also obtained between pH and F⁻. Calcium showed negative correlation with F⁻ and HCO₃⁻. Results of the analysis showed that samples of areas in the proximate neighbourhood of brick kilns were found more contaminated as compared to the samples of distant areas. Low quality fuel such as tyre, sulphur enriched coal etc used during the burning process, are the culprits of contamination. Bio fuels should be used as an alternative to avoid contamination of great underground water reservoir.

During the survey of brick kiln areas, health effects were also noticed. People dwelling in the areas are suffering from various respiratory and dental diseases.

Going beyond the mystery mineral: Extending the use of powder X-ray diffraction in an introductory mineralogy course

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Students at SUNY Geneseo are participating in a new project aimed to improve their sense of connection between their mineralogy course and their personal lives. 'Project Relevancy' provides students with hands-on experience with analytical instrumentation, experimental design, and data interpretation. This project ultimately seeks to make it very clear to students that we live in a world of crystalline materials that are often mineral-based.

'Project Relevancy' builds upon the experience of students identifying unknown minerals with XRD and challenges them to investigate the mineral content (or crystalline character) of a household material of their choosing. The students must prepare it (being conscientious of creating a flat surface for analysis), interpret the results, and share their findings with their colleagues. Since the project's inception, Geneseo students have analyzed materials such as evaporated mouthwash, lip balm, chewing gum, and index cards.

Assessment of 'Project Relevancy' indicates that students have an increased appreciation for the relevance of mineralogical topics. Students indicated in post-project comments that they also better understood the benefits (and also the shortcomings) associated with XRD analysis. Students involved in 'Project Relevancy' also demonstrated an increased sense of confidence and self-efficacy when carrying out search and match procedures to identify their materials. In particular, they were more willing to throw out computer-provided matches compared with students attempting to identify a mystery mineral.