

**DEGREE**

Ph.D.

**TITLE**

Identification and characterization of calcium arsenate precipitates leading to and attenuating gross arsenic pollution in a calcareous shallow aquifer

**CONTACT INFO**

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**HYPOTHESIS**

Diagenetic calcium arsenates controlling arsenic mobility in calcareous environments (co)precipitate with gypsum and calcite.

**SUMMARY**

This Ph.D. research would deal with the identification and characterization of calcium arsenate precipitates found in a calcareous aquifer as a result of a natural arsenic attenuation mechanism in a grossly polluted aquifer in Matehuala, San Luis Potosí. The findings reached up in my research group up today represent a substantial advance in the understanding of the geochemical mechanisms of arsenic in aerobic, calcareous environments, however there are still important questions that need to be answered such as: What is the crystal structure of the precipitates that control the mobility of arsenic in this particular environment? Are the calcium arsenate precipitates the result of a homogeneous or heterogeneous precipitation? or Are the precipitates the result of a solid solution between calcium arsenates and calcite or gypsum? Answers to these questions would allow for a better understanding of a highly underreported mechanism of retention of arsenate species likely to dominate in calcium-rich environments, such as those in calcareous sediments and soils, where the commonly reported mechanism of adsorption to iron oxyhydroxides is not the dominant process. Critical information on the on the stability and solubility of pedogenic calcium arsenates would be generated. Furthermore, the results obtained would help environmental scientist to prevent the impacts of chronic arsenic poisoning among populations exposed to arsenic in similar environments. Become an expert studying and modeling phenomena of natural relevance using the most sophisticated analytical techniques and the geochemical code PHREEQC.

**QUALIFICATIONS**

The applicants are expected to hold an Msc degree or equivalent in Chemistry, Environmental Chemistry or any related subject. The student should have a strong interest for and general expertise in chemistry, wet chemistry, and spectroscopic methods. Experience from previous research in the field is a merit. Knowledge of other analytical techniques is valuable. Excellent communication skills orally and writing are required, both in English and Spanish.

## **ACTIVITIES**

- Literature review
- Development of the experimental approach
- Development of the experimental work
- Data analysis
- Writing
- Publishing
- Teaching

## **TIMING**

Four years

## **PROJECT DELIVERABLES**

- Thesis
- One paper in an index international journal
- One oral presentation in an international conference
- Four short communications for general public in nationwide newspapers