Identification of the Gaseous Zone Origins in Talkhab Area, Markazi Province, Iran

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Abstract: This paper aims to determine the emission gaseous the Talkhab fault in Farahan (the Iranian village zone locating in (35 Km) north of Arak city). This area is situated at the boundary of the central Iran and Sanandaj–Sirjan zones. A method is described for the analysis of sulphur dioxide, a major contributor to air pollution on absorbing bottle equipped with a fritted glass bubler. The sample is collected in a dilute solution of H2O2 and analyzed as sulphate. The resultant acid is determined by acid-base titration. Base on chemical and geological studies liberated gas is SO2.This gas liberated by dissolution of litho logic units containing SO42 – ions by groundwater near the Talkhab fault.
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1. Introduction

Sulfur dioxide (also sulphur dioxide) is the chemical compound with the formula SO_2. It is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain sulfur compounds, their combustion generates sulfur dioxide unless the sulfur compounds are removed before burning the fuel. Further oxidation of SO_2, usually in the presence of a catalyst such as NO_2, forms H_2SO_4, and thus acid rain.[2] Sulfur dioxide emissions are also a precursor to particulates in the atmosphere. Both of these impacts are cause for concern over the environmental impact of these fuels. Sulphur dioxide is a major atmospheric pollutant and contributor to acid rain. Sulfur dioxide is a noticeable component in the atmosphere, especially following volcanic eruptions. Sulfur dioxide is a major air pollutant and has significant impacts upon human health. In addition the concentration of sulfur dioxide in the atmosphere can influence the habitat suitability for plant communities as well as animal life. Sulfur dioxide emissions are a precursor to acid rain and atmospheric particulates. Due largely to the US EPA's Acid Rain Program, the U.S. has witnessed a 33 percent decrease in emissions between 1983 and 2002. This improvement resulted in part from flue gas desulfurization, a technology that enables SO_2 to be chemically bound in power plants burning sulfur-containing coal or oil. In particular, calcium oxide (lime) reacts with sulfur dioxide to form calcium sulfite:

$CaO + SO_2 \rightarrow CaSO_3$

Aerobic oxidation of the $CaSO_3$ gives $CaSO_4$, anhydrite. Most gypsum sold in Europe comes from flue gas desulfurization. Sulfur can be removed from coal during the burning process by using limestone as a bed material in Fluidized bed combustion. Sulfur can also be removed from fuels prior to burning the fuel. This prevents the formation of SO_2 because there is no sulfur in the fuel from which SO_2 can be formed. The Claus process is used in refineries to produce sulfur as a byproduct. The Stretford process has also been used to remove sulfur from fuel. Re-Dox processes using iron oxides can also be used, for example, Lo-Cat or Sulferox. Fuel additives, such as calcium additives and magnesium oxide, are being used in gasoline and diesel engines in order to lower the emission of sulfur dioxide gases into the atmosphere.

Sulphur dioxide also gives Intervenial and blade damage in vegetation. It causes broncho constriction in both asthmatic And normal individuals of SO_2 are significantly associated with hospital admissions for respiratory conditions and asthma. The presence of SO_2 in polluted air has an enormous impact on acid rain and acidification of water resources. The standard method to measure SO_2 Is absorption in hydrogen peroxide (H_2O_2) solution to form sulphuric acid the resultant acid. The resultant acid is determined by acid-base titration. However, the result is subject to interference from other gaseous, acidic or basic compounds such as nitric acid and ammonia, respectively [1].

This paper describes a method for determination of gaseous sulphur dioxide concentration is adsorbed in dilute H_2O_2 and

recognize the reasons of subjest presence by accesses information.

2. Geologic setting

Determination of emission gaseous the Talkhab of village zone Farahan in 35 Km north of Arak in the Iran. The area of study is a part of Arak watershed located in the two Central-Iran and Sanandaj-Sirjan Zones. A simplified geological map of Arak area is shown in Fig. 1. The presence of folded mountains and pressure ridges are the main characteristics of this region. Two parallel faults named Talkhab and Tabarteh Faults pass through the region and divide it in to three blocks. These blocks are "Ashtian-Naragh" (ANB), "Haftad-Gholeh" (HGB) and "Sanandaj-Sirjan" Blocks (SSB). The Talkhab Fault separates ANB from HGB while Tabarteh Fault separates HGB from SSB. The amount of water discharge in HGB, SSB and ANB are different and decrease respectively. Talkhab and Tabarteh Faults control the seismicity of the region. [4].

Talkhab spring, travertine and the emanation of gas from some wells are the reasons indicating the activity of Talkhab Fault in Quternary. Statistical analysis regarding the hypocenters of earthquakes shows that most of the events are located near Talkhab Fault. The oldest block in this region is SSB which involves crystallized limestones, slates from the Jurassic to cretaceous period that underwent faulting and metamorphism without any volcanic activity. The HGB contains shale, Jurassic sandstones and cretaceous limestone with no metamorphism but severely folded and has a sequence of anticline and syncline without any volcanism. [5]

This area is located at the boundary of the central Iran and Sanandaj–Sirjan zones. The Thalkhab and Tabarteh Faults are in the study area (Emami, 1991). The Meighan depression is divided into three subzones by the Thalkhab and Tabarteh Faults: the Sanandaj–Sirjan, Haftedgolleh, and Urmia–Bazman subzones (Fig. 2). Almost of geologic units are Mesozoic and Cenozoic (Fig.1).

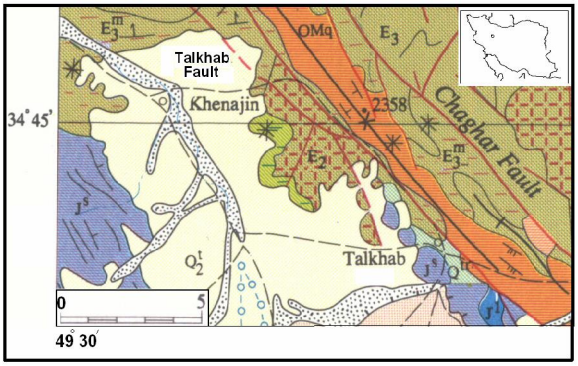


Fig 1a: Geologic setting of study area [3].

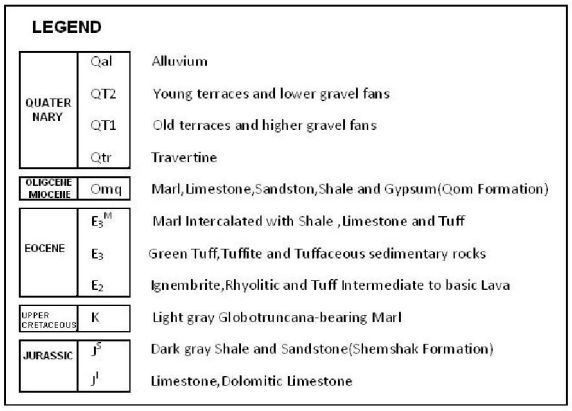


Fig.1b) A simplified geological map of Arak and adjacent areas illustrating the major geologic and tectonic features. Location of the MT sites and Talkhab and Tabarteh faults are also shown on the map. [6]

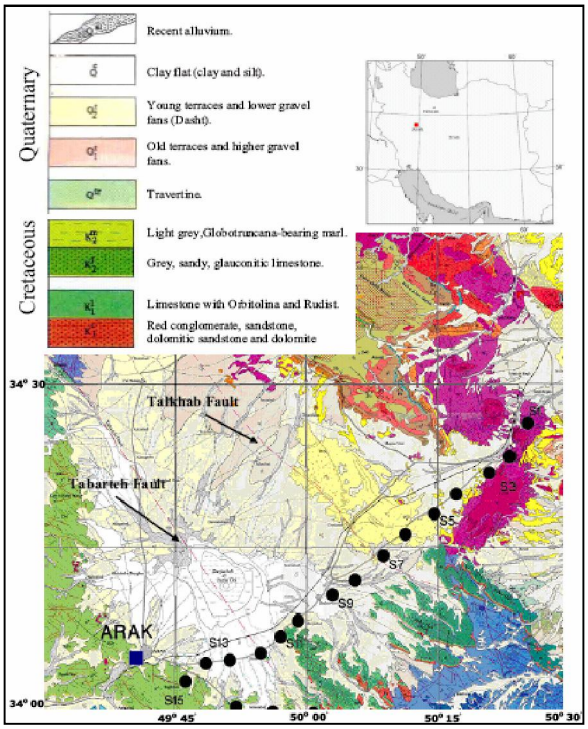
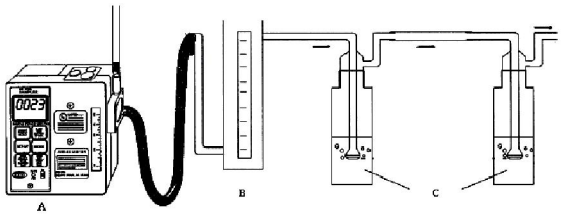


Fig.2. Absorbing bottles sampling system. A) Low flow personal air sampler skc. B) Flow meter. C) Absorbing solutions.

The Thalkhab Fault has a northwest–southeast strike and a northeast dip. Qom and Karaj Formations in Urmia subzone have thrust onto ancient Quaternary terraces. The Jurassic sequence

and Karaj Formation are southwest of the Thalkhab Fault.



3. Methodology

Apparatus

Air samplers were performed using a low flow personal **skc** and a portable electrochemical Emission analyzer (TESTO 350).

Reagents

All chemicals (H_2O_2 and NAOH) were reagent-grade materials, from E.Merck theses chemicals were used without farther purification.

Air sampling

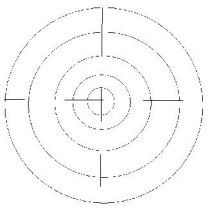
The gases including CO_2, NO_2 and SO_2 were measured directly by a portable electrochemical

Emission analyzer (TESTO 350), in such analyzers, the analytical range for each gas

Component is determined by the electrochemical cell design, while the minimum detectable

Limit depends on the nominal range of the electrochemical cell, calibration driff, and signal – to-noise ratio of the measurement system. No detected gases NO_2 and CO_2 by portable electrochemical

But gas SO_2 is determined, the study area (about 25 m^2).



The first system was based on collecting a gas sample into two serial absorbing bottles (fig.2).

The gas washing bottles were made of glass and equipped with a frittled glass bubbler. Two absorption bottles were used to check the collection efficiency of the system. The flow meter had a rage of 100-200 ml/min.

Sampling was performed using constant flow-rate. Both bottles contained 75 ml of 0.3% (v/v) H_2O_2.no sulphate was found in the second absorption bottles, indicating near 100% absorption. Efficiency in the first absorbing bottles as H_2O_2 was used in the absorbing solution sulphate was detected on the basis of the following reaction.

$$SO_2 + H_2O_2 \longrightarrow SO_4^{2-} + 2H^+$$

4. Results and discussion

High sensitivity is needed system used for the low level atmospheric pollution measurements, Determination of sulphur dioxide by H_2O_2 solution in an absorbing bottle, has been demonstrated. in this study, the emission gases sulphur dioxide released from Talkhab of village zone Farahan in 20 Km north of Arak in the Iran is determined. According to chemical analyses and field geology information, gases origin are present of litho logic units containing SO_4^{2-} ions and the Talkhab fault activities. Groundwaters dissolve litho logic units containing SO_4^{2-} ions and finally liberate SO_2.

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