

# Atmospheric pollutants and their influence on acidification of rain water at phosphate mining basin of Gafsa, Metlaoui

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## Introduction :

Rain water is the most effective scavenging factor for removing particulate and dissolved organic gaseous pollutants from the atmosphere. The scavenging of the atmospheric pollutants affect the chemical composition and PH of the rain water. At a PH level of 6.0 or below, freshwater shirimp cannot survive (Omar Ali al-khashman,2005). At a PH level of 5.5, bottom-dwelling bacterial decomposers begin to die, causing non-decomposed leaf litter and other organic debris to lie on the bottom and depriving of food supply. At PH level of 4.5 or below, all fish and most fogs and insects die. Acid rain also damages building and historical monuments, leads to the release of harmful chemicals, such as aluminium, from rocks and soils into drinking water sources, and corrodes lead and copper piping (Yoko Nagase et al,2007). The purpose of this study is to characterize the chemical composition of the atmospheric precipitation in mining basin of Gafsa, Metlaoui and to assess the potential environmental consequence of the phosphate mining practices in this area.

## Materials and method :

All samples were analyzed for major anions ( $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$ ) by (Shimadzu Degasser SCL.10ASP) ion chromatography instrument and  $\text{F}^-$  by a potentiometric method. Major cations, ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ) were measured by Atomic spectrometer spectra AA 220 FS. The pH values of the collected samples were measured using pH meter equipped with a combination glass electrode. Calibration was always carried out before measurement using standards buffer solutions.

## Results and discussions:

### 1. PH values

The low PH values in rainwater samples were due to dissolution of  $\text{CO}_2$  and natural  $\text{SO}_2$  source in rainwater samples. The relatively high PH of 6,97 measured in this study was due to neutralization of acidity in precipitation by  $\text{CaCO}_3$ .

Acidity in precipitation depends on the concentration of acid-forming ions, as well as concentration alkaline species which neutralize the acidity and the amount of rainfall as can be seen in Fig.1

## Results and discussions :

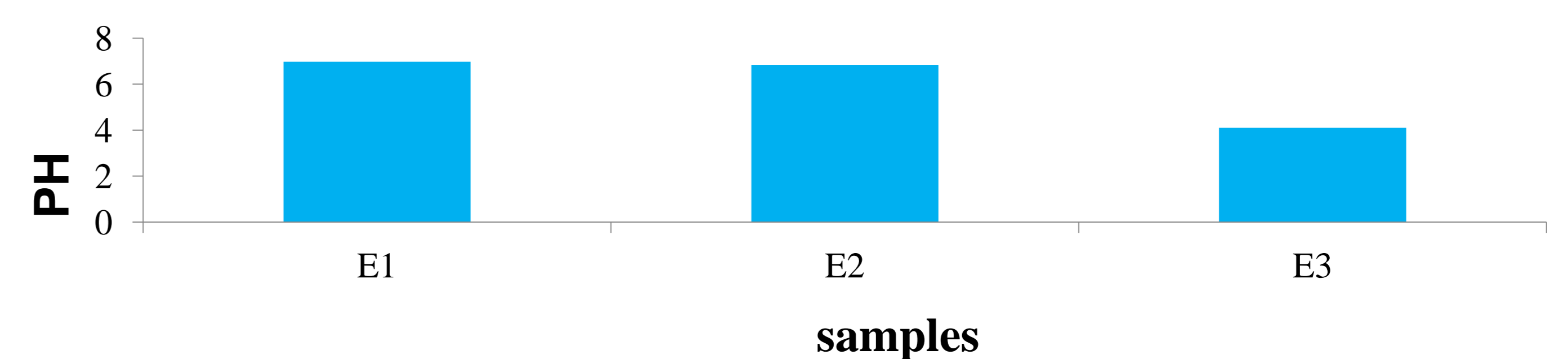


Fig.1. PH values for the different samples

### 2. Chemical composition of the rainwater

The concentration of ions in different samples is shown in table .1 All species presented wide variations from sample to sample. The sample with highest ion content is initial fractions events occurring at the beginning of the rainfall hours when large amounts of dust accumulate in the atmosphere scavenged by rain.

## Results and discussions:

Table.1. Concentrations of major ions (mg/L)

samples	$\text{F}^-$	$\text{SO}_4^{2-}$	$\text{Cl}^-$	$\text{Na}^+$	$\text{K}^+$	$\text{Mg}^{2+}$	$\text{Ca}^{2+}$
E1	0,17	48,56	6	1,27	1,22	1,34	11
E2	0,15	15,22	6	0,93	1,20	1,22	10
E3	0,13	11,52	0,8	0,2	0,25	1,22	10

The ionic abundance in precipitation showed the general trend  $\text{SO}_4^{2-} > \text{Cl}^- > \text{F}^-$  for anions, and  $\text{Ca}^{2+} > \text{Mg}^{2+} > \text{K}^+ > \text{Na}^+$  for cations. The  $\text{SO}_4^{2-}$  ions makes the highest concentration

## Conclusions :

The study presents the first contribution in the area to the knowledge of rainwater chemistry in the mining area. The observed PH values of precipitation ranged from 4, 10 to 6, 97. Among the ions,  $\text{SO}_4^{2-}$  makes the highest contribution followed by  $\text{Ca}^{2+}$ ,  $\text{Cl}^-$ ,  $\text{Mg}^{2+}$ ,  $\text{K}^+$ ,  $\text{Na}^+$  and  $\text{F}^-$ . The results showed that acid rain is one of the foremost examples of air pollution