Engineering and Applied Sciences Research Center

Quantative and Qualitative Analysis of Sand in Nefud Desert at Zilfi Province Using XRF,AAS and (LIBS) Spectroscopes .

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ABSTRACT

Silica is most commonly found in nature as sand or quartz Silica sand is a white or colourless crystalline compound, occurring abundantly as quartz, sand, flint, agate and in many minerals .It is used as an essential raw material in the production of glass, foundry, abrasives, filters, ceramics, in chemical and hydraulic fracturing and on oil fields .Silica sand contains Al, Fe, Ti, Ca, Mg, Mn, Na and K as impurities in varying quantities. Iron, aluminum and titanium impurities can alter the colour, chemical, optical and mechanical properties of the product.

So the objectives of this study are as follows:-

1/Studying of the physical properties of sand at Nufed Desert in zilfi province (as presented in the map).

2/Studying the chemical components of this sand quantitatively and qualitatively , so as may be use latter in many industries.

3/Qualification of Saudi teaching assistants in chemistry department, at Zilfi Girls Faculty Of Education.

The concentrations of silicon, in addition to the concentrations of some trace elements (Zn, Al, Fe ,etc….) that may be found in sand, will be determined using XRF,AAS and (LIBS) Spectroscopes .

Research Problem and Motivation

Silicon comprises about 28 % of the lithosphere and is, next to oxygen, the most abundant element. It is found as the oxide in crystalline forms, as in quartz; combined with other oxides and metals in a variety of silicates; and in amorphous forms. Silicon is the most abundant element in igneous rocks and is the characteristic element of all important rocks except the carbonates.

Silica is used primarily in the production of glass for windows, drinking glasses, beverage bottles, and many other uses. The majority of optical for telecommunications are also made from silica. It is a primary raw material for many white ware ceramics such as earthenware,stonware,porcelain , as well as industrial Portland cement .

Silica is a common additive in the production of foods, where it is used primarily as a flow agent in powdered foods, or to absorb water in hygroscopic applications. It is the primary component of diatomaceous earth which has many uses ranging from filtration to insect control. It is also the primary component of rice husk ash which is used, for example, in filtration and cement manufacturing.

For these reasons we want to study chemical components and physical properties the sand found at Nefud dessert in zilfi province using , XRF,AAS and (LIBS) .

Research Objectives

1/Studying of the physical properties of sand at Nufed Desert in zilfi province (as presented in the map).

2/Studying the chemical components of this sand quantitatively and qualitatively , so as may be use latter in many industries.

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Literature Review

Silica is most commonly found in nature as sand or quartz. Silica sand is a white or colorless crystalline compound, occurring abundantly as quartz, sand, flint, agate and in many minerals [1]. It is used as an essential raw material in the production of glass, foundry, abrasives, filters, ceramics, in chemical and hydraulic fracturing and on oil fields[2] Silica sand contains Al, Fe, Ti, Ca, Mg, Mn, Na and K as impurities in varying quantities. Iron, aluminium and titanium impurities can alter the colour, chemical, optical and mechanical properties of the product [3,4]. In common glass and allied materials, Al is associated with moderate to low quantities of Ti and Fe. For such materials, the quantities of these metals are determined separately by complexometric and colorimetric methods In the direct titrations however, Al, Ti and Fe interact with one another.[5,6] .

Recently several instrumental techniques such as inductively coupled plasma (ICP) emission and atomic absorption spectrometry (AAS) in such matrixes, have been adopted for the determination of the trace metallic impurities [7,8] .

METHODS & MATERIALS

The area of study , Nufod Desert in Zilfi Province(Figure (1 a),(1b) and(1c) ,was surfed during March taking 20 samples(Figure 2a) collect from some places of nufud desert (Al sabla, Almatal, Jaway ,Alaaga,Magra, Shlwan,and Althuare .Then the sand samples were sieved through 202 nm sieve (Figure 2b) ,and stored in plastic bags.XRF, and AAS spectrophotometers and laser were used to determine the concentration of silicon, in addition to the concentrations of some trace elements (Zn, Al, Fe ,etc….) that may be found in sand . All reagents are of analytical grade and were checked for possible trace metal contamination.

Experimental procedures

1/digestion method for AAS analysis (Atomic Absorption Spectrophotometer)

3/Sample preparation method for XRF analysis,(X-ray Fluorescence Spectroscopy

4/pH determination method

5/ Standard preparation method .

6/ Laser-induced breakdown spectroscopy (LIBS) .

Figure 1.a Nufod at Alaga

Figure 1.b Nufod at Shalwan

Figure 1c Nufud at Thware

Figure (2a) ,Sand Samples

Figure (2b), sieve

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