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Thermo luminescence Study of Minerals

Abstract

The present paper reports the thermo luminescence characteristics of Quartz and Feldspar minerals collected from the ceramic tiles manufacturing unit, Morbi. The as received minerals TL was recorded (NTL), 100Gy beta dose, and annealed and quenched from 520oC followed by 100Gy beta dose given from Sr-90 beta source. The TGA (thermo gravimetric analysis) of both the minerals are also done for better understanding of the physical property of the mineral. Fig-1.and Fig-2 are the NTL, NTL+ATL, and 520oC ATL of quartz and Feldspar. Fig. -3 and Fig-4 are the results of TGA. The results are interesting and further studies are on.

Introduction

Many flooring materials most of them are in natural form are used to manufacture floor tiles for household flooring purpose. The peoples demand for variety of flooring material leads to develop various types of ceramic tiles. In India ceramic industry is fast growing one, more than 200 units of manufacturing ceramic tiles, vitrified tiles and sanitary ware, situated around Morbi, Rajkot, Gujarat, India. Many natural minerals are used as the raw materials required for the manufacturing ceramic ware. The following minerals are used to manufacturing the ceramic tiles i.e quartz, feldspar, zircon, talc, Frito, Frit-t, alumina oxide, Sodium Trypolyphosphat China clay Bikaner clay etc. Most of the minerals are from Indian mines of Gujarat and Rajasthan states, some are imported from Russian subcontinent. The phenomenon of TL has been studied by many investigators. The study of TL is important field of fundamental researcher. The TL study of ceramic tiles materials like feldspar and Quartz gives better understanding about its properties. The study of TL of such materials helpful to solve problem in research and industrial area particularly in tiles industries.

Experiment Method: Two or three gram as received sample of feldspar and Quartz taken in powder form and taken NTL Without any radiation dose. Then after two or three gram sample of Feldspar and Quartz taken and irradiated by beta source (strontium-90) by dose 100Gy and taken TL. TL characteristic examined for temperature range 0-400^oC by heating sample. And in last two or three gram preheated sample at 520^oC of feldspar and Quartz irradiated by beta source (strontium-90) and taken TL. TL characteristic examined for temperature range 0-400^oC by heating sample. The TL output measured by Nucleonix TL system.

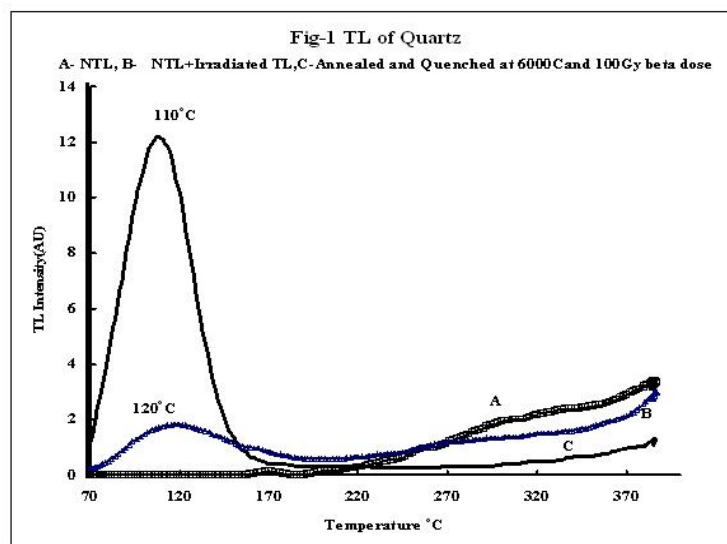


Figure 1

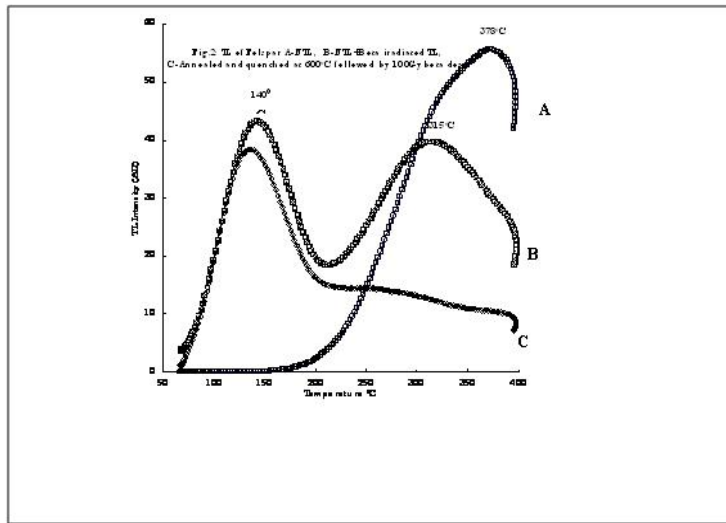


Figure 2

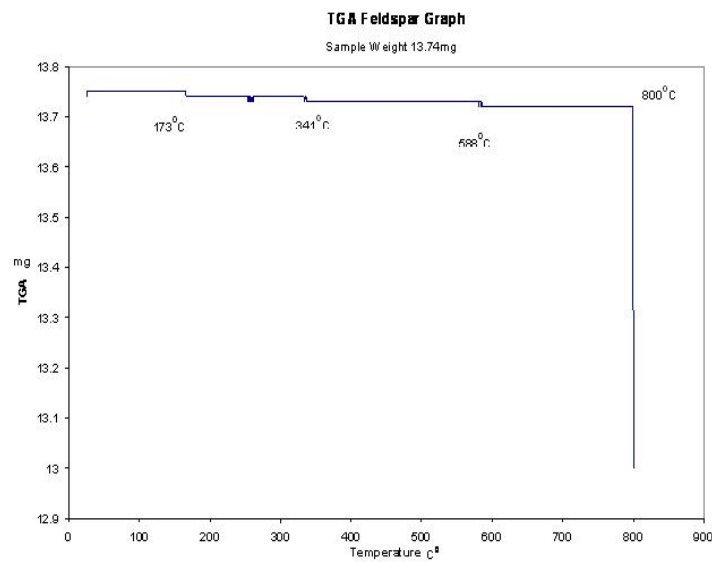


Figure 3

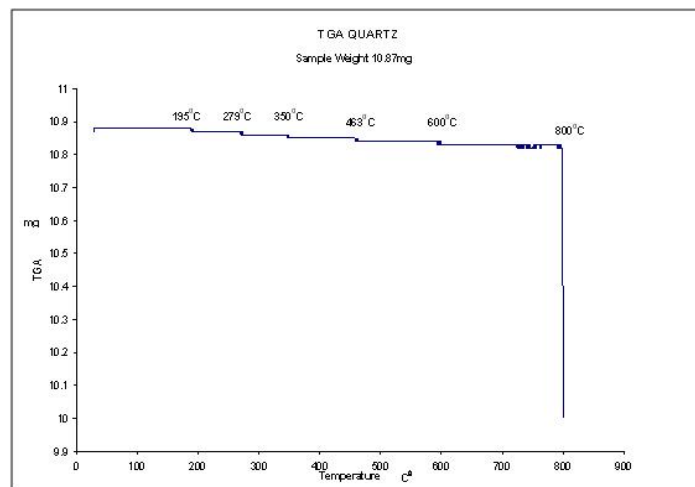


Figure 4

Result and Discussion:

Fig.-1 shows that the comparative TL- characteristic of Quartz .Curve-A indicate that natural TL of as received sample of Quartz. Curve -B indicate TL characteristic of beta irradiated sample with dose 100Gy. Here one peak is observed at 120°C temperature and intensity is 1.8(AU). Curve-c indicates TL Characteristic of preheated sample at 520°C and irradiated by beta source with dose 100Gy. It show well resolve peak at 110°C temperature and intensity 12.7(AU).The result are remarkable here the intensity is seven times higher then result B. Fig.-2 shows that the comparative TL- characteristic of Feldspar. Curve-A indicate that natural TL of as received sample of Feldspar. Here

broad peak is observed at 3780C temperature and intensity 55.58(AU). Curve -B indicate TL characteristic of beta irradiated sample of Feldspar with dose 100Gy. Here two well resolve peak are observed at temperature 140⁰C and 315⁰C and intensity 40.5(AU) and 39.8(AU) respectively. Curve-c indicate TL Characteristic of preheated sample of Feldspar at 6000C and irradiated by beta source with dose 100Gy it exhibit one well resolve peak at 1400C temperature and intensity 38.5(AU). The result are interesting here after heat treatment the intensity of peak temperature 140⁰C is decreased and also one peak of temperature 315⁰C is vanishes. Fig-3&4 shows the TGA (Thermal Gravimetric Analysis) of Feldspar and Quartz it is clearly indicate that in both the materials the TG is slightly decrease with rising of temperature it means that low sublimation occur at particular temperature and both the material have high temperature stability and low thermal fatigue. Which are basic properties of refractories materials.

Conclusion:

The study of thermo luminescence (TL) characteristic and thermal gravimetric analysis (TGA) natural minerals feldspar and quartz indicate important properties and give more information about the materials which are more useful in improving the quality of tiles in ceramic tiles industries. Further studies are continuing.

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