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## T L Study of Ceramic Mineral Ukraine Clay

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**Abstract**

The present paper reports the thermoluminescence characteristics of Ukraine clay mineral collected from Bhor Ghats near Sangamalner, Nasik District, Maharastra. The TL of as received minerals at various heat treatments was recorded and also 15Gy beta dose was given to each sample prior to TL recording. TL of as received specimen (NTL) annealed for 1 hour and quenched from 200, 400, 600, and 800°C. The Ukraine clay mineral displayed a well-resolved broad peak around 129°C for AQ from 600 and 800°C. XRD and TGA of Ukraine clay mineral were reported.

**Keywords:** Ukraine clay, Thermoluminescence; minerals, NTL, TGA, XRD, etc.

**Introduction:**

The physical and chemical properties of Ukraine clay have led to its extensive use as filler, extender, paper coater, ceramic raw material, and pigment, and also it is an important raw material for the refractory, catalyst, cement, and fiberglass industries[1–4].

**Experimental:**

The natural minerals are collected Bhor Ghats near Sangamalner, Nasik District, Maharastra. In the present paper the TL set-up manufactured by Nucleonics Systems, Hyderabad was used /5/. Irradiation was carried out using a Sr-90 beta source. Every time 5mg of weighed irradiated samples were taken.

**Results and Discussions:**

TL of Ukraine Clay mineral annealed and quenched (AQ) from 200, 600, and 800°C. The TL was recorded for 5mg weighed powder by giving 15Gy beta dose from Sr-90 beta source.

In Fig.1 curve-1 is the TL of 25Gy beta irradiated Ukraine Clay annealed and quenched from 200°C. It shows a small peak around 100°C and a broad one at131°C followed by a small hump at 166°C. Curves 2 and 3 are the TL of 25Gy beta irradiated Ukraine Clay annealed and quenched from 600 and 800°C. It displays a Broad well-resolved peak at 129°C, curve-3 has little high intensity when compared to curve-2. From the figure, it is also observed that as the annealing temperature increases from 200 to 800°C, the entire TL pattern changes and finally resolved as a single well-defined isolated peak. This may be due to various phase changes that occurred while annealing the mineral from 200-800°C temperatures.

Fig. 2 is the XRD pattern of Ukraine Clay, it is clearly observed that the maximum peak obtained at 26.6°. The Crystallite size of Ukraine clay is calculated using Scherrer's formula and is found around 56.86 nm.

Fig. 3 is the TGA of Ukraine Clay. From the figure, it is found that there are many phase changes in the temperature range of 178°C - 800°C. It is also confirmed that the TL intensity

increased between the temperature range of 178°C- 800°C due to the changes in the phase of the mineral.

Fig-1: TL of Ukraine Clay-Beta Irradiation

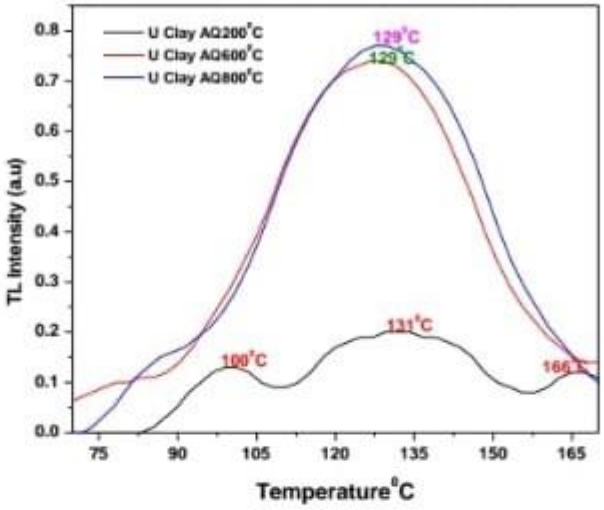
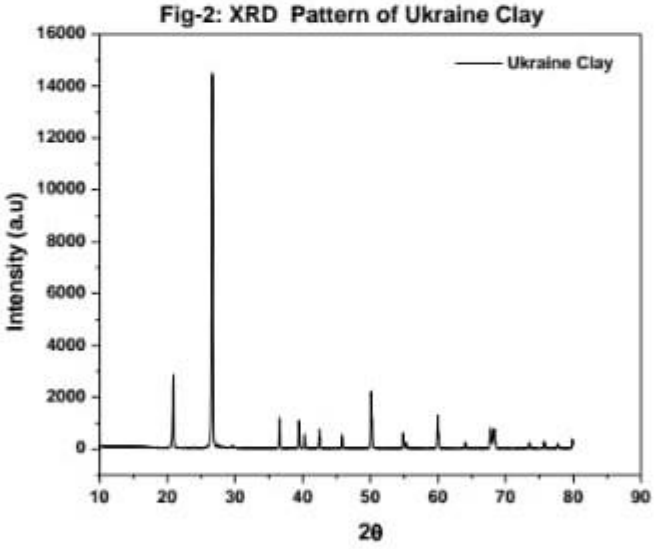



Fig-2: XRD Pattern of Ukraine Clay

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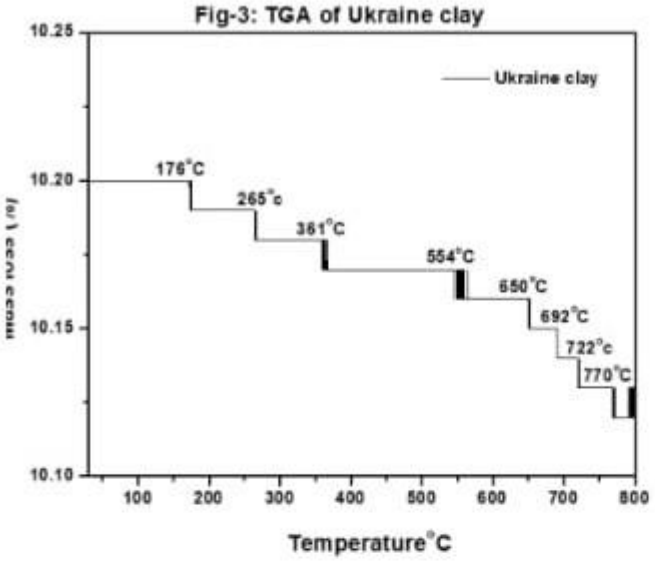


**Conclusion:**

It is also concluded that the mixed peaks or overlapped peaks observed in many minerals under study when annealed and quenched from 600 and 800°C are also due to the presence of $SiO_2$ and $Al_2O_3$ in individual forms.It is interesting to note the crystallite size is less than 100nm.From TGA studies it is concluded that various phase transitions were observed in the minerals while heating from room temperature to 800°C, this may be due to the release of structural water.

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