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Thermoluminescence Study of Salt Crystals

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Abstract: *Indian pickles are an essential part of any traditional meal. They are unique in that they are pickled in oil instead of vinegar. The present paper reports the Thermoluminescence (TL) dosimetry characteristics of salt crystals formed during storage on the surface of the home made pickle. Around 2.5 mm Crystals are formed on the surface of the red chili and goungura pickles are collected from the home made pickles and TL was recorded after giving a beta dose of 10Gy from Sr-90 sources. The salt used for preparing of these pickles is from sea water. The heating rate of the TL instrument is 30^0/Second. The salt crystal from the pickles is collected and cleaned with a tissue to remove excess water and oil before irradiation with beta source. The crystals look like brown because of burning of oil trapped in the crystal matrix and or minerals present in the crystals segregated during the storage for more than a year from the basic ingredients of the Pickle.*

INTRODUCTION

They come in a wide variety of flavors and combinations and their tastes range from fiery hot to sweet and sour and everything possible in between. The possibilities are endless. These family recipes have been passed down through generations and enjoyed by all. They are easy to make and very delicious. Pickled items include mango, lemon, Cauliflower, Carrot, Radish, Tomato, Onion, Pumpkin, Palm heart, lotus stem, rose petals, ginger,, Indian gooseberry, Garlic, green or Red chili, Goungurn (Hibiscus leaves),

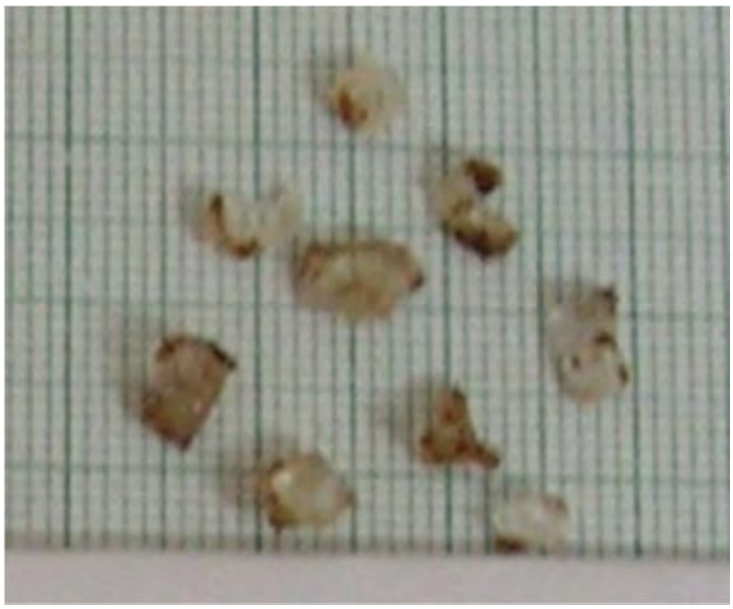
Kohlrabi, Gunda, Kerda, Zimikand (Purple Yam), Karonda, Karela (Bitter Onion), Jack Fruit, Mushroom, eggplant and turnip.

EXPERIMENTAL

Salt crystals of size 2.5 mm formed on the surface of the red chili and goungura pickles are collected from the home made pickles and TL was recorded after giving a beta dose of 10Gy from Sr-90 sources. The salt used for preparing these pickles is from sea water. The heating rate of the TL instrument is 30^0C/Second. The salt crystal from the pickles collected and cleaned with a tissue to remove excess water and oil before irradiation with beta source.

RESULTS AND DISCUSSION

The crystals look like brown because of burning of oil trapped in the crystal matrix and or minerals present in the crystals are segregated during the storage for more than a year from the basic ingredients of the Pickle. The salt was received after giving a beta dose of 10 Gy displays two well defined peaks at 107 and 210^oC. The salt crystal from red chilli pickle weighing 25 mg of size 2X 4mm approximately from after giving a beta dose of 10Gy displays two well defined peaks are 147 and 270^oC. The peaks intensity of 270^oC is less than the peak intensity of 147^oC. The salt crystal from gougura pickle weighing 33mg of size 3X5 mm approximately from after giving a beta dose of 10 Gy displays a well defined 255^o C. The TL dosimetry studies are underway. As such the salt in any form is accepted as a universal dosimeter. Therefore it is proposed that the present material can be used in accidental dosimetry for the Dose range 1Gy and above.



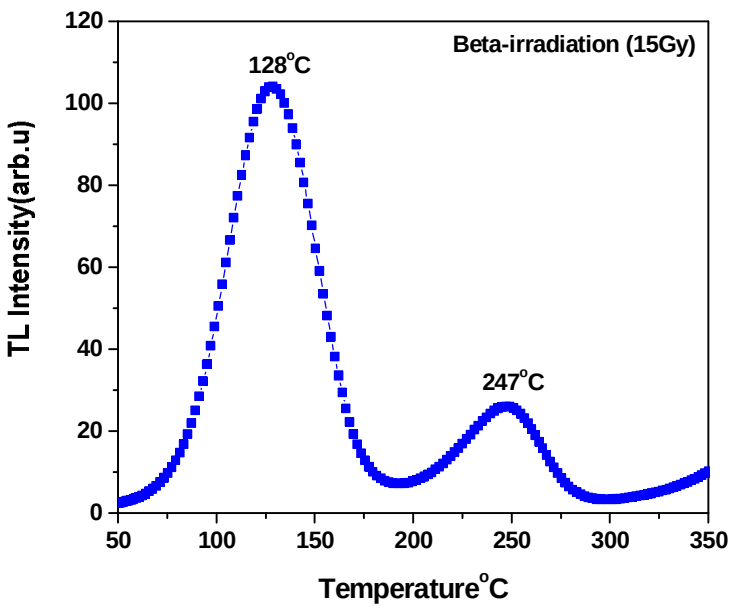


Fig.1 Beta dose of 16Gy

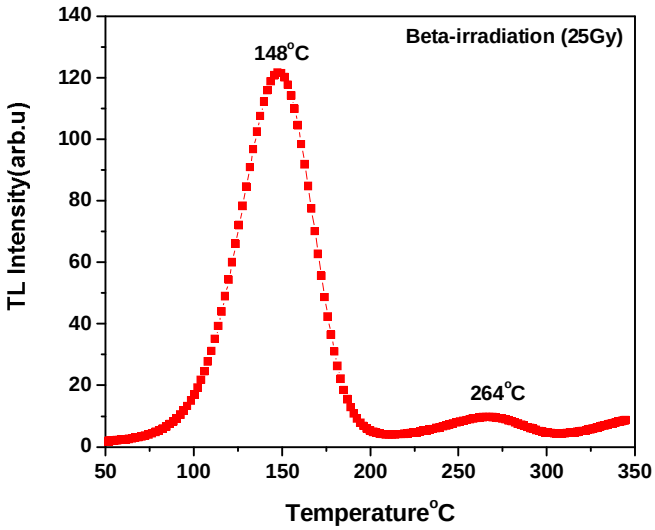
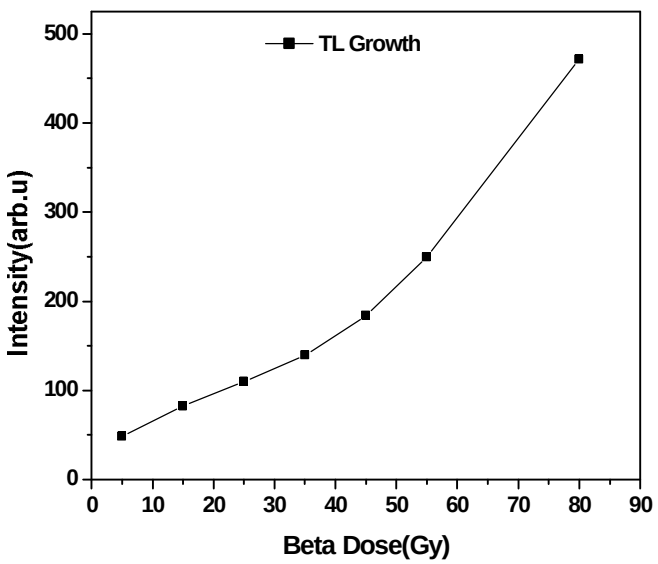


Fig.2 Beta dose of 25Gy

TL Dosimetry



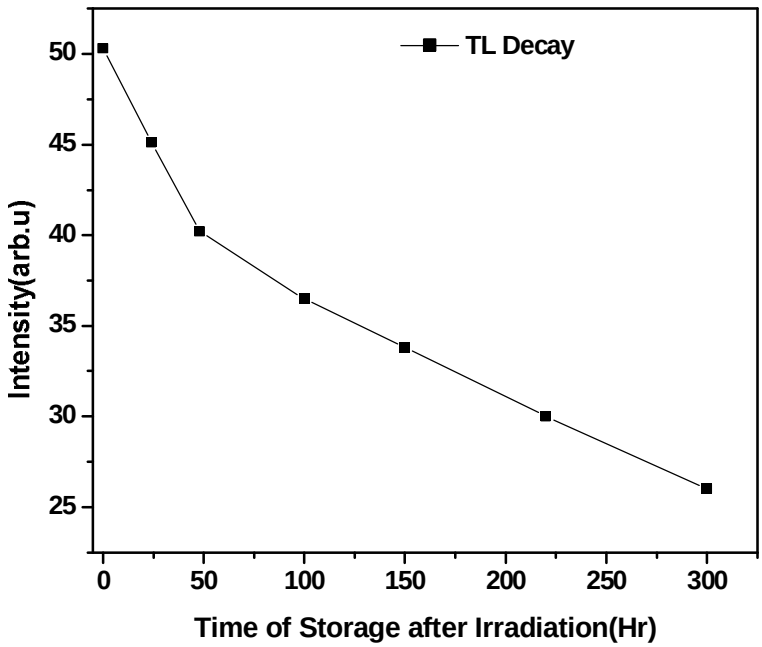


Table shows trap parameters of first peak

	β (Gy)	T_1 (°C)	T_2 (°C)	T_m (°C)	τ	ω	δ	μ = δ/ ω	E_τ	E_ω	E_δ	Activation Energy (eV)
1	15	102	155	128	26	53	27	0.51	0.042	0.058	0.074	0.26
2	25	148	123	171	25	48	23	0.48	0.068	0.085	0.103	0.30
3	35	157	129	185	28	56	28	0.50	0.069	0.086	0.105	0.31
4	45	157	129	187	28	58	30	0.52	0.069	0.088	0.106	0.31
5	55	143	118	167	25	49	24	0.49	0.063	0.079	0.097	0.29

CONCLUSIONS

On the basis of the above experimental results and discussions one can normally conclude the following. The salt crystals collected from Indian pickles can be considered as an accidental dosimeter for a period of 2 -6 weeks. The humidity effect is not there on the studied material since the salt crystals are from Oil based pickles which contains the water molecules. We can suggest the cost effective accidental TL dosimeter for countries.

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