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# ISOLATION OF FINE GRAINS BY DILUTE AQUA REGIA

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In the fine grain technique of thermoluminescence dating the sample contains several kinds of minerals other than quartz. Hence the glow curve is composite, made up of TL peaks from several different minerals. For such samples, the glow curve often has a flat top as shown in Figure 1. To try and work with a single mineral component, we have devised a new method of sample treatment:

1. A 200 mg sample containing grains less than  $74\ \mu\text{m}$  is obtained by sieving and put in the bottom of a dry 100 ml beaker. Approximately 20 ml of 15% aqua regia is added slowly. The mixture is stirred with a glass rod and then allowed to stand at room temperature for 10 minutes.

2. The sample is then centrifuged for 5-10 minutes. The supernatant liquid is discarded and the sample washed three times with distilled water. It is then washed with acetone and the samples are then prepared in the usual way.

After such treatment, the glow curve is dominated by the  $375^\circ\text{C}$  quartz peak, Figure 2. The change in the glow curve shape is thought to be due to the removal of certain minerals. This will be investigated further.

This method can also be applied to samples which have a low yield of fine grains when they are prepared in the conventional way by washing with acetone after crushing. In these samples, aggregates of quartz grains are formed due to the presence of binding agents such as aluminates, aluminiferous, ferroferric compounds and silicified tuff. This can be observed under a microscope. When aqua regia is applied, the aggregates break up because the binding agents are dissolved. Thus, the fine grains of quartz are released and may be measured in the usual way.

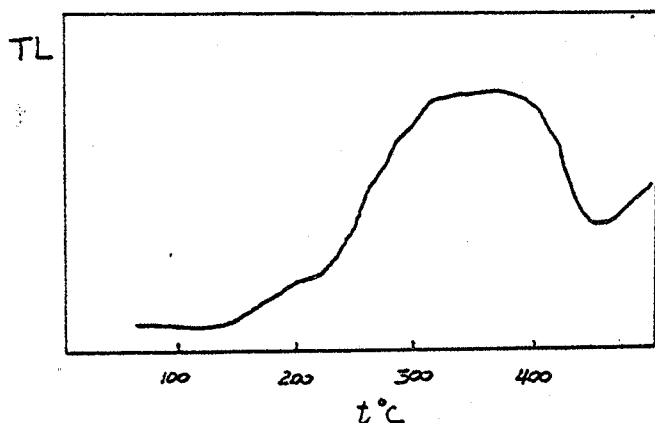


Figure 1. The original glow curve, the sample is prepared without aqua regia.

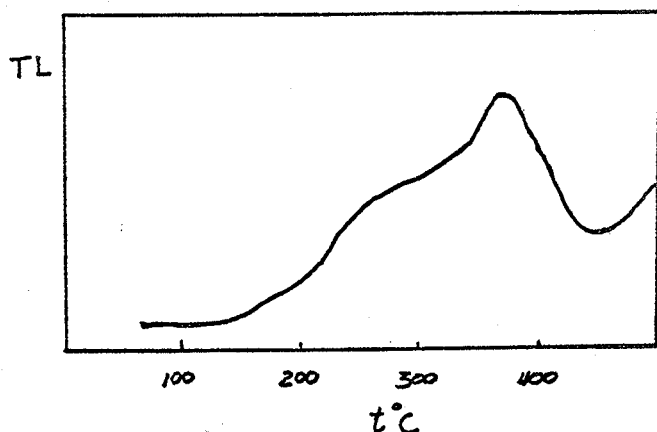


Figure 2. The glow curve, which the sample was treated by the aqua regia.

[Editor's note: Mention should be made here of other proposed acid treatments of fine grain samples. For example: 2% acetic acid to remove  $\text{CaCO}_3$  (Huxtable, J., 1978, "Fine grain dating", PACT, 2, 7-11); Conc. Nitric/Conc. Sulphuric/Perchloric, mixed 1:1:2, used to remove clay grains in fine grain samples (Fleming, S. J., 1979, "Authenticity analysis using thermoluminescence", PACT, 3, 360-361).]