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Thermal Glow of Some Commercial Glasses Irradiated by Ultra-violet, X- and γ-Rays

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By radio-activity measurement with liquid scintillator, phosphorescence of glass vials is a possible cause of background counting.[1] It was reported that background increased after exposing vials to fluorescent lamp or to sun light[1] and that with 96% silica glass vials background was relatively high.[2] It seems natural to suppose that phosphorescence may correspond to low temperature branch of thermal glow curve. Moreover, thermal glow of Terex glass damaged by ultra-violet irradiation was found by one of the authors.[3] Silica glass (transparent: Toshiba Denko Co.), 96% silica glass (Toshiba Kasei Co.), Terex glass, lead borosilicate glass and plate glass were irradiated by Co^{60} γ-ray (1.3×10^5 r/hr, 4hrs), *X*-ray (Mo target, 40 kV, 20 mA, 1min) and ultra-violet ray in shorter (5 W silica glass germicidal lamp, 4hrs) and longer (100 W super pressure Hg lamp with protection bulb, 4hrs) wavelengths. Luminescence was measured with PM-50 photomultiplier (1100 V) with heating-up rate of 20°C/min. Current caused by thermal radiation of furnace was about 0.01 μA at 250°C and 10 μA at 400°C. Results are shown in Fig. 1.

Thermal glow curves are sensitive not only to conditions of manufacture or of measurement,[4,5] impurity[6] and history of samples[4] but also to photon energy of radiation.

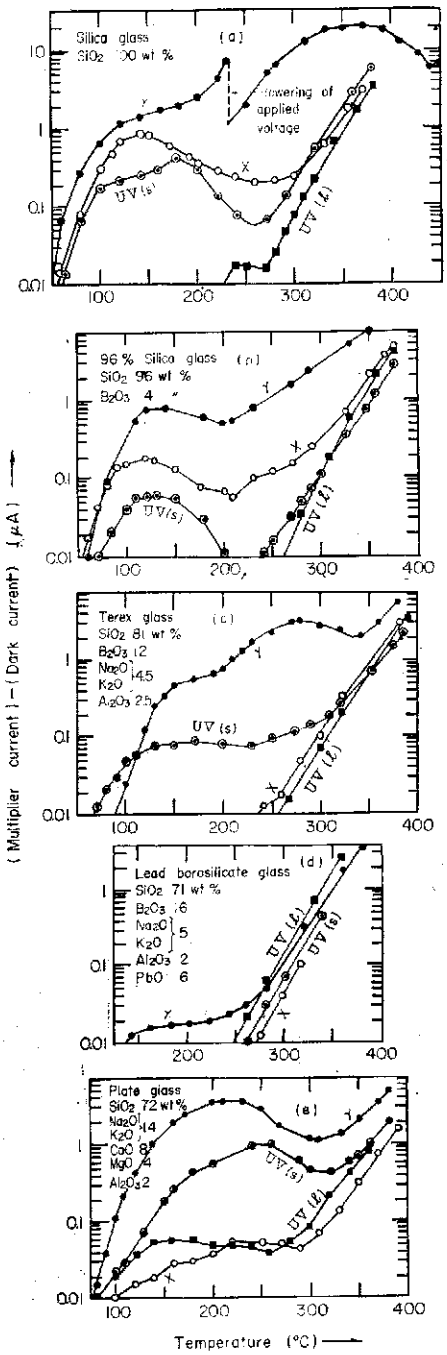

Fig. 1. Thermal glow curves of commercial glasses irradiated by γ-, *X*- and ultra-violet ray in shorter (UV(*s*)) and longer (UV(*l*)) wavelengths.

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