AbstractID: 13794 Title: The Effect of Vessel Material on Fricke Dosimeter Yield

***Purpose:*** To investigate the effect of solid water vessel in contact with the fricke dosimeter yield in terms of surface to volume ratio and storage time.
***Material and methods:*** Fricke solution was made up with the highest pure commercial available chemicals. The optical density was measured using the Varian Cary 400 UV-Vis spectrophotometer provided with a temperature controller. Three set of ten cylindrical containers (internal radius of 0.5 cm and height 3.5 cm) were made of solid water, polystyrene, and PMMA. Containers have been filled with fricke solution of 4.3, 4.5, and 5 $cm^{-1}$ surface to volume ration, and sealed with Mylar material. Optical density readings at 304 nm were performed in 120 minutes time interval, 30 minute step. The effects of solid water material on the Fricke dosimeter yield (surface to volume ratio and storage time) were compared against those values obtained for polystyrene and PMMA materials.
***Results:*** The deviation of the optical density for a surface to volume ratio ranging from 4.3 to 5 $cm^{-1}$ was 0.01%, 0.01%, and 0.02% for PMMA, Polystyrene, and solid water, respectively. The maximum deviation among the different materials in the same surface to volume ratio range did not exceed 0.04%. Within the uncertainty of measurement (0.06%) no effect of solid water, polystyrene, and PMMA containers was observed on the Fricke dosimeter yield during the storage time interval of 120 minutes.
***Conclusion:*** Solid water plastic can be used to store Fricke solution and can still be comparable to polystyrene and PMMA. It has the advantage to have physical properties very close to water.

Keywords: Surface to volume ratio, PMMA, Fricke dosimeter yield, solid water