

Purpose: To measure dose rates in water and obtain percent depth dose (PDD) curves in phosphate-buffered saline (PBS) solution for low-energy (< 20 keV) characteristic x-rays emitted from various metals. Dose-rate data obtained here will be used to support measurements of RBE in human glioma and other cells. **Method and Materials:** Characteristic x-rays were produced by irradiation of metal targets with a 55 kVp x-ray spectrum from an Ag anode at constant mA. Dosimetry was performed using an extrapolation chamber. The chamber was oriented with its window parallel to the target surface at a distance of 65 mm from the target such that the charge produced in the chamber was due to the characteristic x-ray emissions from the metal target. Dose rate to water at the position of the chamber window was determined using Burlin cavity theory, by varying the chamber electrode spacing and window thickness, while measuring the resulting change in the charge collected. Dose rates were used to create a calibration curve relating the optical density of Gafchromic EBT film to the dose to water. Percent depth dose was measured by sequentially irradiating pieces of film submerged in a PBS-filled cell culture dish at a range of distances from the bottom of the dish. **Results:** Dose rates to water for this experimental arrangement were found to be approximately 4.17 cGy/min for Mo, 10.75 cGy/min for Ti, and 12.55 cGy/min for Zn. As expected, the slopes of the PDD curves were dependent on the characteristic x-ray energies of each metal. **Conclusion:** The PDD curves may prove useful in assessing the trade-off between RBE and depth of penetration in, for example, electronic brachytherapy devices that could make use of characteristic x-rays produced by an apparatus similar to that in the present experiment.