

The composition of ferrous sulphate, sulphuric acid, agarose or gelatin gel and xylenol orange dye in distilled water (known as FAX/FGX gel) are tissue-equivalent chemical dosimeters. The sensitivity of the gels, defined as the optical density change per unit of dose, depends on the concentration of sulphuric acid, mixing temperature, and gelation agent. Carbohydrates are known to increase the sensitivity of the gel dosimeters. Their effect on sensitivity was studied along with the effects of oxygenation, nitrogenation (deoxygenation) and mixing temperature. Addition of carbohydrates to the FAX gel dosimeter led to an increase in the sensitivity of the resultant dosimeters by up to 222 %, 155 %, 143 % and 122 % for sucrose, glucose, starch and locust bean gum respectively. Aeration and oxygenation increased the sensitivity of the FAX gel (up to 176 %) and the FAX gel plus carbohydrate dosimeters (up to 158 %). Changes to the mixing temperature of the gel had no significant effect on the sensitivity of the FAX gel plus carbohydrate dosimeter. In FGX gel, sensitivity decreased as the gelatin concentration increased. Carbohydrates increased the sensitivity for gelatin concentrations less than 5 %. Sensitivity was optimized with acid concentration of 50 mM. As the xylenol orange concentration was increased from 0.1 to 0.7 mM the sensitivity decreased by 38 %. Ferrous sulphate concentrations above 0.1 mM had negligible effect on the sensitivity. Oxygenation did not affect the sensitivity but nitrogenation reduced it by 15 %. An increase in mixing temperature from 30 °C to 60 °C resulted in a 29 % decrease in sensitivity.