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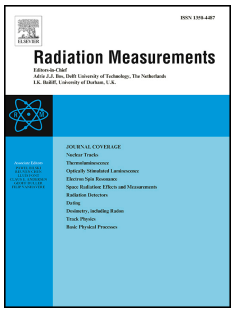

Gas gain in low pressures proportional counters filled with TEG mixtures

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Gas gain in low pressures proportional counters filled with TEG mixtures

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ABSTRACT: Gas gain in the range from 1 to 2×10^5 has been measured for both methane- and propane-based tissue equivalent gas mixtures in the pressure range of 9 to 60 hPa. The Diethorn and Williams&Sara models of the first Townsend coefficient have been used to determine the basic gas properties. Effective ionisation potentials of the mixtures, mean electron ionisation free paths, increase in the average electron kinetic energy between two successive ionising collisions and the values for the reduced electric field strength at which multiplication starts have been determined as a function of mixtures pressure. It was found that both Diethorn and Williams&Sara plots of the measured gas gain data have to be fitted to a double linear relation, for low and high gas gains, separately. It has also been obtained that the volume of the avalanche multiplication zone for the pressure p~10hPa accounts for 10% of the volume of the whole detector so the proportionality of the counter is strongly reduced.

KEYWORDS: Proportional counters; Gas gain; Low pressure mixtures; Microdosimetry.