

**DETERMINATION OF POLONIUM 210 IN CIGARETTES USING
RADIOCHEMICAL SEPARATION AND
ALPHA SPECTROSCOPY**

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ABSTRACT

MEASUREMENT OF POLONIUM-210 IN CIGARETTES USING RADIOCHEMICAL SEPARATION AND ALPHA SPECTROSCOPY

Seven brands of cigarettes sold in Malaysia were selected from a market in Shah Alam to study Po-210 concentration and dose equivalent to smoker. Effect of Po-210 to lung cancer is an important problem in many countries with very high cigarette consumption. The objective of this thesis is to determine the activity Po-210 in each cigarettes brand, to estimate annual dose inhalation and annual committed effective dose via smoking, and compared with recommended value. In this study, Po-210 was determined by alpha spectrometry using a silicon surface barrier detector after radiochemical procedure and spontaneous deposition of polonium on a silver disk. The polonium content in cigarette smoke was estimated based on its activity in fresh tobaccos, ash, filters before and after smoking and wrapping paper. The annual committed effective doses were calculated basis on 50% of the total smoke is inhaled. The results indicated that Po-210 content in each cigarette brand was from 6.84-13.38 mBq/cigarette and the results of this study are in the range of values measured elsewhere in the world (2.64 to 24.88 mBq/cigarette). Besides, Malaysian smokers who smoke one pack (20 cigarettes) per day, inhaled from 25.05 to 32.85 Bq/year of Po-210. The mean value of the annual committed effective dose for smokers was estimated to be 85.16 μSv . A person who smokes two packs of cigarettes, the annual committed effective dose was 170.32 $\mu\text{Sv yr}^{-1}$ and about 7 times higher than for non-smokers living in the mid-latitudes of the northern hemisphere.