

## Oral 5.1

### FLUXES OF THE $^{238}\text{U}$ SERIES WITHIN THE DICALCIUM PHOSPHATE INDUSTRIAL PRODUCTION AND THE BIOKINETICAL ANALYSIS OF $^{210}\text{Pb}$ AND $^{210}\text{Po}$ IN BROILERS DUE TO ITS INGESTION

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Naturally Occurring Radioactive Materials derived from the wet acid digestion of phosphate rock might represent a serious problem facing the phosphate industry. The aim of this work is to discuss both: a) the fluxes of the  $^{238}\text{U}$  series radionuclides (U and Th isotopes,  $^{226}\text{Ra}$ ,  $^{210}\text{Pb}$  and  $^{210}\text{Po}$ ) during the DCP production process and, b) the accumulation of  $^{210}\text{Pb}$  and  $^{210}\text{Po}$  in chicken tissues due to the ingestion of DCP. Industrial samples were collected from different production steps at a factory in Spain that uses phosphate rock from Morocco. The results showed that whereas uranium is equally distributed within products and by-products, thorium and  $^{210}\text{Po}$  are mainly eliminated through the sludges and  $^{210}\text{Pb}$  is mostly found in the final product (DCP). The  $^{210}\text{Pb}$  and  $^{210}\text{Po}$  results in chicken tissues and feces after animals were bred with different amounts of DCP during 42 days shown that about 95% of the ingested  $^{210}\text{Pb}$  and  $^{210}\text{Po}$  was immediately excreted. From the amount accumulated in tissues it was observed that whereas  $^{210}\text{Pb}$  is mostly found in bones,  $^{210}\text{Po}$  accumulates in liver and kidneys. A one-block non-linear kinetic model has been developed in order to determine the variation of the total activity of  $^{210}\text{Pb}$  and  $^{210}\text{Po}$  accumulated in the chicken body throughout its 6 weeks life. This model correctly reproduces experimental results and also allows calculating of transfer rates for  $^{210}\text{Pb}$  and  $^{210}\text{Po}$ , useful for first-order models, i.e. under stationary metabolic conditions.