

## C017257 : MAJOR NUCLEAR TECHNOLOGY

KEY WORD : PROMPT GAMMA/NEUTRON ACTIVATION/NITROGEN CONTENT

KANIT THONGPISISOMBAT : DETERMINATION OF NITROGEN BY PROMPT GAMMA ANALYSIS TECHNIQUE. THESIS ADVISOR : ASST. PROF. NARES CHANKOW, M.ENG. 70 PP. ISBN 974-581-050-9

Determination of nitrogen by measurement of 10.82 MeV prompt gamma-rays from  $^{14}\text{N}(n, \gamma)^{15}\text{N}$  reaction was investigated. A neutron irradiation system using 185 GBq (5 Ci)  $^{238}\text{Pu}/\text{Be}$  source was designed and constructed. The source was installed in a 110 cm  $\phi$ , 110 cm height steel tank filled with water to produce thermal neutrons. Thermal neutron beam was extracted from the top of the tank to irradiate the sample while a 5"×5" NaI(Tl) detector was positioned on either side of the sample. Factors that affect the measurement of 10.82 MeV gamma-rays were also studied i.e. source position, detector position and sample volume. Urea solutions with concentration ranging from 0.5 to 8 mole/l were used to calibrate the system. It was found that the net nitrogen peak intensity increased linearly with increasing nitrogen concentration. The detection limit ( $2\sigma$ ) was found to be about 1% of nitrogen for 4000 second counting time and 7 liters of sample volume. To simulate the detection of explosives using this technique, the system was used to detect the presence of nitrogen packed inside a briefcase. The detection sensitivity was found to be about 0.1 cps per 100 grams of nitrogen.