

the requirements of the Bureau of Food and Drugs (now Food and Drug Administration), as far as radioactivity is concerned.

- Vinegar analysis to detect synthetic acetic acid adulteration – Chemical tests cannot distinguish the natural vinegar from their synthetic counterparts. The detection of fake vinegar is possible through the use of liquid scintillation counting. Natural vinegar is plant-derived and has a measurable radioactivity while synthetic vinegar has fossilized petroleum-based carbons which do not show radioactivity.
- Mean residence time determination of water using tritium analysis – Through this technique, the age (in years) of a water sample can be determined.

3. X-ray Fluorescence (XRF)

Analysis – XRF is a non destructive, nuclear-related analytical technique which is capable of analyzing all the elements present in a sample in less than 15 minutes.



4. Stable isotope-ratio mass spectrometry (IR-MS) –

differences in the stable isotope ratios of matter can be used to obtain the following information on the samples analyzed:

geographical origin (e.g. cucumber from Spain vs cucumber from the Philippines), botanical origin (e.g. real orange juice from orange flavored corn syrup), method of production, and mechanism of production.



For more information on Nuclear and Isotopic Analytical Techniques, please write or call:

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**The Philippine Nuclear
Research Institute:**

**Using Nuclear
Analytical
Techniques to
Serve *You***

The Philippine Nuclear Research Institute: Using Nuclear Analytical Techniques to Serve You

Using nuclear and isotopic analytical techniques, the Philippine Nuclear Research Institute (PNRI), through its Nuclear Analytical Techniques Section, provides analytical services to clients for radioactivity and stable isotopes measurements and elemental determinations of various samples. The PNRI has been serving the food and other industries in the country since the 1970s.

Nuclear analytical techniques (NATs) are developed based on the utilization of certain properties of the nucleus and associated with the phenomena of ionizing radiation. Techniques that use nuclear instrumentation are also called NATs

Nuclear and Isotopic Analytical Techniques Offered by PNRI

1. Gamma spectrometry – This technique determines the presence, energy, and activity of possible radioactive nuclides (radionuclides) present in the sample. It uses the High Purity Germanium Detector (HPGe) for the detection and quantification of radioactive nuclides in the sample.

Samples analyzed by gamma spectrometry include:

Imported/exported food products – service analysis is offered to food exporters so they could comply with regulatory requirements prior to export. (This service is ISO 17025 accredited)

Environmental and biological samples – sludge, soil, etc are analyzed for possible radioactive contamination.



2. Liquid scintillation counting (LSC) – This technique can simultaneously count alpha and beta radiation in the sample.

The service analysis offered by PNRI using the LSC technique are:

- Total alpha and gross beta analysis of drinking water (ISO 17025 accredited) for regulatory purposes –PNRI offers gross alpha-beta measurement in drinking water samples to water providers, especially bottled water providers, to be able to assure the safety of the consumers and to comply with

| SERVICE ANALYSIS OFFERED AND SAMPLE REQUIREMENTS | | | |
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| SERVICE ANALYSIS OFFERED | SAMPLE | REQUIREMENTS | RELEASE OF RESULTS OF ANALYSIS |
| GAMMA SPECTROMETRY | Food | <ul style="list-style-type: none"> ■ 2 kilos for solid samples ■ 2 liters for liquid samples | <ul style="list-style-type: none"> ■ 5 working days for 3 radionuclides (Cs-137, Cs-134, I-131) for 3 samples ■ Additional of 1 day for every 3 additional samples |
| | Environmental samples (ore, sludge, and solid waste) | <ul style="list-style-type: none"> ■ Should be in a PET container ■ 250 ml but supplied by the lab ■ with instructions on sample preparation | Maximum of 45 days or as agreed upon |
| | Other Samples | With prior consultation | As agreed upon |
| GROSS ALPHA-BETA ACTIVITY (LIQUID SCINTILLATION COUNTING) | Water | 1 liter freshly collected sample, preferably in plastic container | After 45 days |
| AUTHENTICATION OF VINEGAR (LIQUID SCINTILLATION COUNTING) | Vinegar | 2 liters of vinegar sample | After 7 working days per sample |
| MULTIELEMENT ANALYSIS FROM SODIUM (NA) TO URANIUM (U) BY ENERGY DISPERSIVE X-RAY FLUORESCENCE (EDXRF) SPECTROMETRY | Solids in powdered form | At least 5 grams 80 mesh size | As agreed upon |
| | Solid form | <ul style="list-style-type: none"> ■ Less than 50 mm diameter ■ Less than 20 grams | As agreed upon |
| | Air filters | Submit with appropriate blank filter | As agreed upon |
| ANALYSIS FOR STABLE ISOTOPES | Water, food, etc. | Prior consultation with analyst | |

