

# Use of "High Sensitivity" Beta-Ram Radio Detector In Active Counting Mode

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## INTRODUCTION

Sensitivity of the Radio-Detector is very crucial in shortening some of the processing procedures in wide varieties of <sup>14</sup>C studies. For example, direct injection is favorable to analyze low sample count. A  $\beta$ -Ram 5 Radio-Detector (From LabLogic) equipped with liquid cell is used to achieve this objective



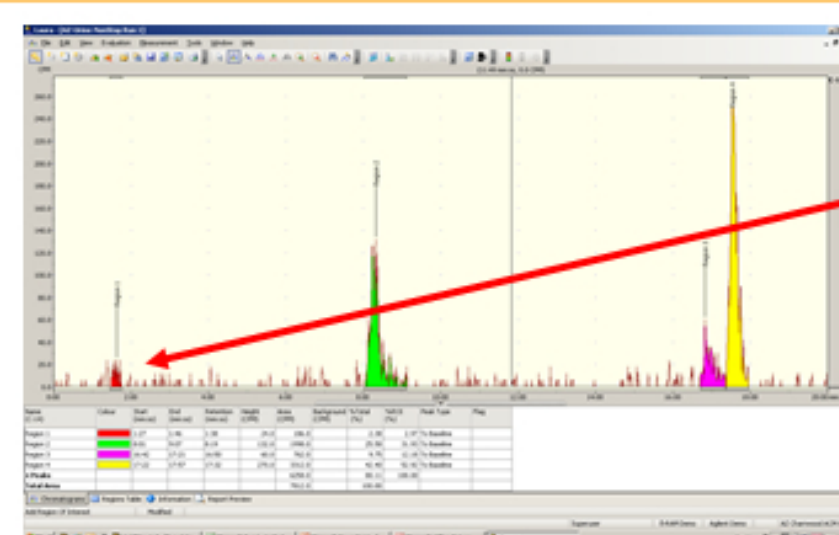
Liquid Cell

$\beta$ -Ram 5 Radio-Detector From LabLogic

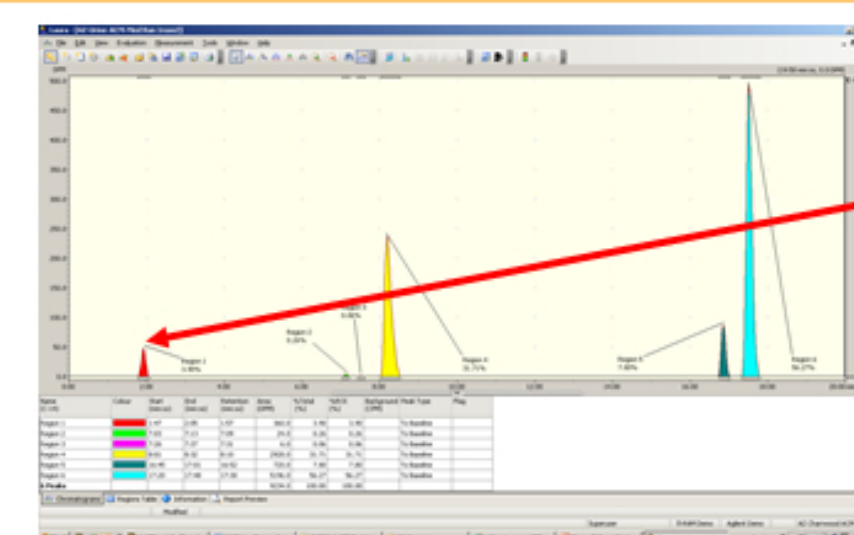
$\beta$ -Ram 5 operates in three different modes:

- Standard Mode (Dry Cell or Liquid Cell)
- ACM™ Mode (Liquid Cell)
- Stop Flow (Liquid Cell)

Active Counting Mode (ACM™) was developed to provide better sensitivity (signal to noise), resolution and peak definition for radio-chromatography. The ACM™ system actively monitors and adjusts run conditions in real time (e.g. scintillation flow, dwell time, etc.) and applies to the most appropriate settings dynamically.



Standard Chromatogram Without ACM (Liquid Cell)  
Peak not well defined against surrounding noise= poor signal to noise ratio  
=Poor Limit Of Detection (LOD)



Chromatogram With ACM™ Mode  
Peak well defined against surrounding noise= Good signal to noise ratio=Good LOD

Stop flow delivers detection limits potentially comparable to off-line counting (LSC) without having to fraction collect and count off-line

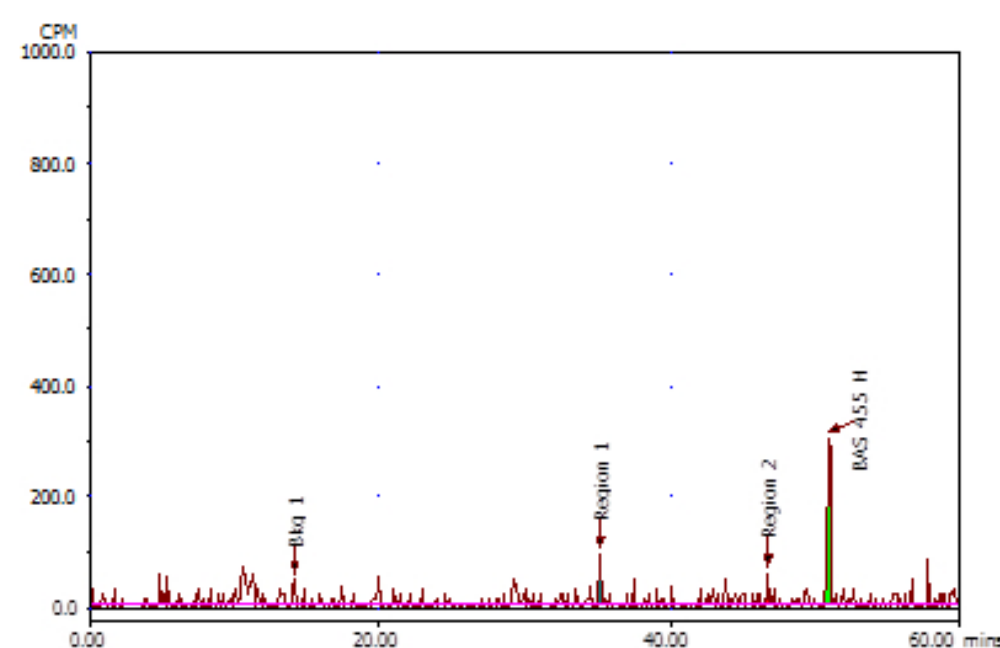


Chromatogram in Stop Flow Mode

## Experiments

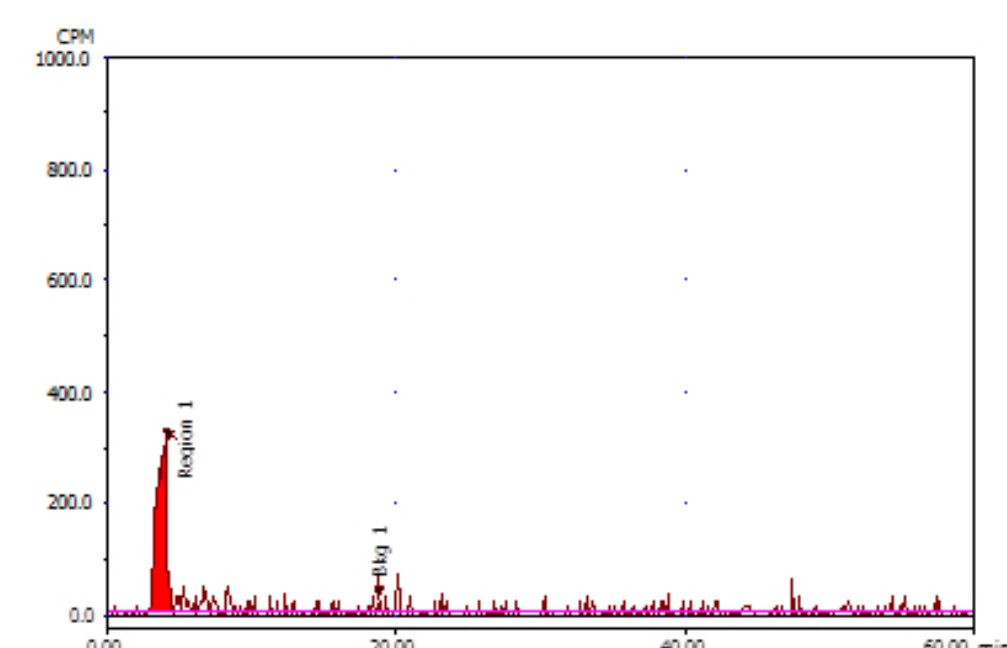
BAS xxxx, study 371632: Soil Sample xxxxx

- ACM™ Mode
- Direct injection (1109 dpm onto column)



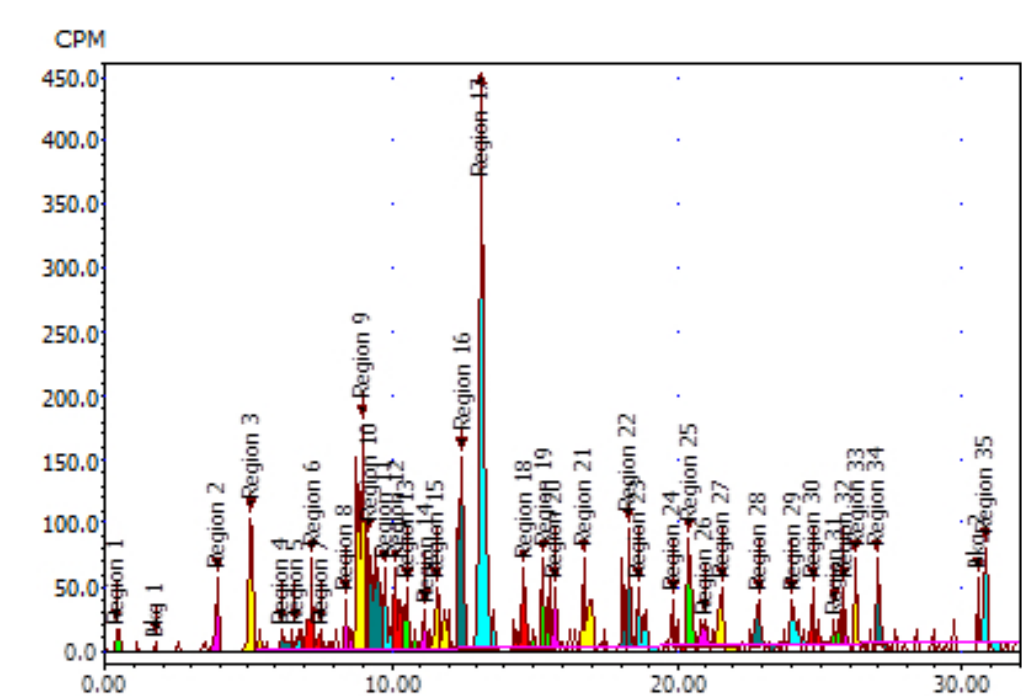
BAS xxxx, study xxxx: Water Sample xxxx

- ACM™ Mode
- Concentrated injection (4480 dpm onto column)



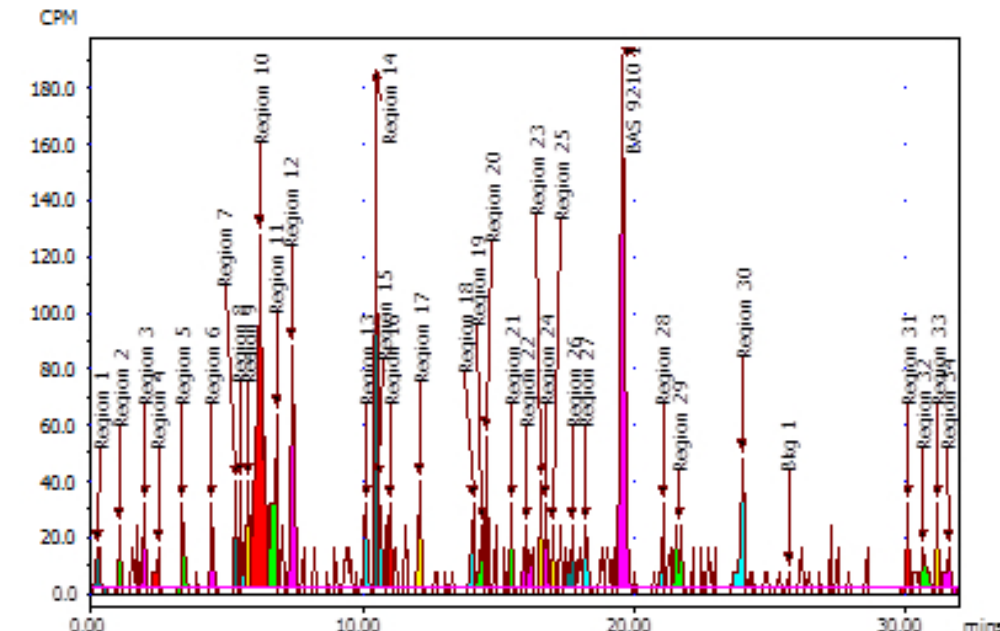
BAS xxxx, study xxxx: Water Sample xxxx

- ACM™ Mode
- Direct injection (4030 dpm onto column)



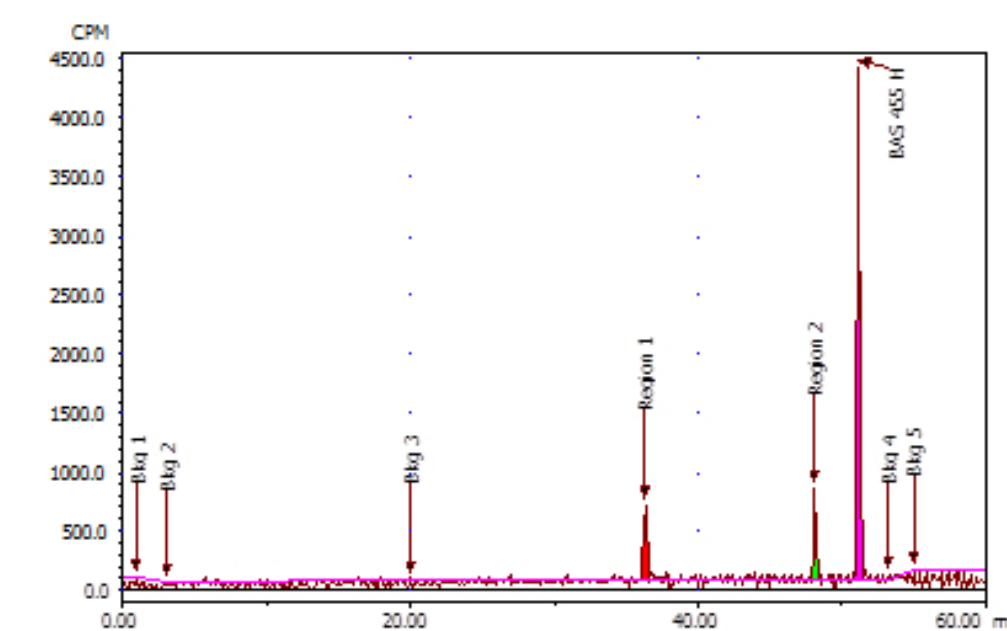
BAS xxxx study xxxx: Water Sample xxxx

- ACM™ Mode
- Direct injection (2931 dpm onto column)



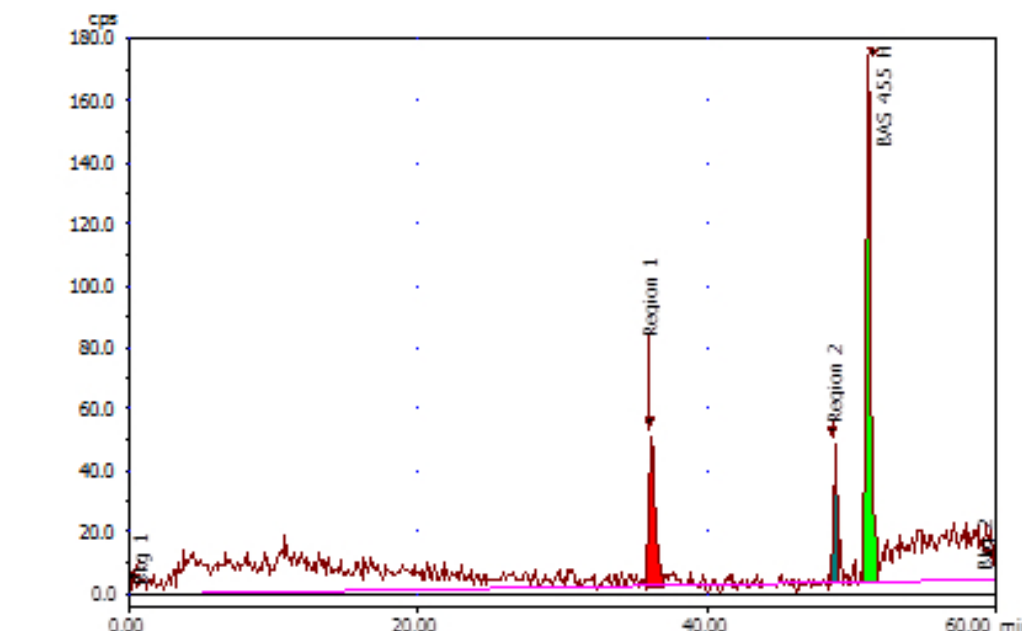
BAS 455 H, study xxxx: Soil Sample

- ACM™ Mode
- Concentrated injection (21077 dpm onto column)



BASxxxx, study 371632: Soil Sample -xxxx

- Standard Mode (Dry Cell)
- Concentrated injection (63231 dpm onto column)



## Results & Conclusions

- Active Counting Mode (ACM™) provides the following advantages over standard radio-chromatography:
- Improved peak shape.
  - Increased resolution between closely eluting peaks.
  - Optimized noise reduction.
  - Superior signal to noise ratio.
  - Enhanced Limit Of Detection (LOD).