



**Workshop on Understanding and Evaluating Radioanalytical  
Measurement Uncertainty**

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**Uncertainty in Gamma Spectrometry.  
Exercise 2**

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Symbol	Quantity	Value	Unit	Standard Uncertainty	Relative Standard Uncertainty (%)
b	background count rate	200	1/s	14.00	7.00
n <sub>1</sub>	gross count rate sample 1	230	1/s	13.80	6.00
n <sub>2</sub>	gross count rate sample 2	300	1/s	15.00	5.00
A <sub>1</sub>	net count rate sample 1	30	1/s	19.66	65.53
A <sub>2</sub>	net count rate sample 2	100	1/s	20.52	20.52
<b>D</b>	<b>Difference of net count rates</b>	<b>70</b>	1/s		

<b>D: Uncertainty budget</b>		<b>D=A<sub>2</sub>-A<sub>1</sub></b>		<b>D=n<sub>2</sub>-n<sub>1</sub></b>		
Source of uncertainty	Expression	Value	Value (%)		Value	Value (%)
A <sub>1</sub> or n <sub>1</sub>	$\frac{\partial D}{\partial A_1} u(A_1) = u(A_1)$	19.66	28.08	$\frac{\partial D}{\partial n_1} u(n_1) = u(n_1)$	13.80	19.71
A <sub>2</sub> or n <sub>2</sub>	$\frac{\partial D}{\partial A_2} u(A_2) = u(A_2)$	20.52	29.31	$\frac{\partial D}{\partial n_2} u(n_2) = -u(n_2)$	15.00	21.43
<b>SUB TOTAL</b>		<b>28.42</b>	<b>40.59</b>		<b>20.38</b>	<b>29.12</b>
Correlations between A <sub>1</sub> and A <sub>2</sub>	$2 \frac{\partial D}{\partial A_1} \frac{\partial D}{\partial A_2} \text{cov}(A_1, A_2) = -2u(s_b)^2$	-392.00				
<b>Combined standard uncertainty</b>		<b>20.38</b>	<b>29.12</b>			