2. QUALITY OF STATISTICAL DATA

2.1. Determination of distribution function

The decay of a radioactive source has totally randomness character and it is not possible to know how many nuclides will be decayed in a specified time of period but the number decayed nuclides is expected to be around an average value. Because of this reason the statistical analysis of the distribution of the counts obtained from the sequential measurements provides the best expected value. In this experiment, it will be investigated as follows:

If N of independent measurements are performed with using a specific radiation source in the same conditions, the mean count rate can simply be calculated as follows:

$$\overline{R} = \frac{R_1 + R_2 + ... + R_N}{N}$$

Where R_1, R_2,…R_N are the measurement results of N independent measurements in the same measurement time of period. The deviation from the mean value is called standard deviation and can be calculated as follows:

$\sigma = \sqrt{\overline{R}}$

The real count can be written with its standard deviation as follows:

$R_{real} = R_{observed} \pm \sigma$

PROCEDURE

1. Set up the experiment geometry.
2. Adjust the following settings on ST7 counting system.
   - Count type : Integral
   - Window :0,0
   - Threshold :0,50
   - Count :500000
   - Time :10 s
   - High Voltage: : Set the value which is found in the first experiment.
3. Place the ^{204}Tl source the second shelf of the detector.
4. Fill the Table 5 without changing anything.

Table 5

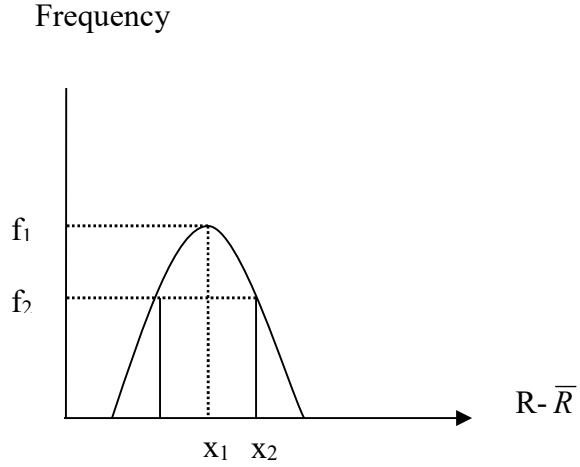
No	N (Count)	R (count rate) (count/s)	σ	R- $\overline{R}$	R- $\overline{R}$ (rounded)
1					
2					

3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					

51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					

EVALUATION

1. Calculate σ and R-$\overline{R}$ values and fill the Table 5. Round R-$\overline{R}$ values to integers. (For example: -0,45→ 0 ; +0,63→+1 ; -0,95→-1 ; 1,36→1 ; 1,55→ 2 vb.)
2. Plot a graph of the rounded R-$\overline{R}$ values versus their frequency. For example, in the following graph every x_1 value corresponds to a f_1 event.



1. Show the calculated standard deviation on the graph.