Know when to discard an outlier data point in HPLC by using the Q Test – How To

For example, if you prepare six replicate samples and obtain the following peak areas for your **analyte**:

106.5
104.2
103.7
107.1
99.2
104.7

The values are fairly close together, but what about 99.2? Should this data point be rejected or kept? i.e. Is it a legitimate data point or an outlier? To answer this, we use a test to determine — at a defined confidence limit — the reliability of the data point, known as the **Q Test**.

We need to compute two values, $Q_{calculated}$ and Q_{table}. $Q_{calculated}$ is obtained as follows: $Q_{calculated}$ = *gap* / *range*

…where *gap* is the absolute difference between the suspect data point and its nearest neighbor and *range* is the difference between the highest and lowest values in the data set.

gap = 103.7 – 99.2 = 4.5
range = 107.1 – 99.2 = 7.9
$Q_{calculated}$ = 4.5 / 7.9 = 0.57

To find Q_{table}, we look it up in the following table:

Number of values:	3	4	5	6	7	8	9	10
$Q_{90\%}$:	0.941	0.77	0.64	0.56	0.507	0.468	0.437	0.412
$Q_{95\%}$:	0.97	0.83	0.71	0.625	0.568	0.526	0.493	0.466
$Q_{99\%}$:	0.994	0.93	0.82	0.74	0.68	0.634	0.598	0.568

We have 6 data points, so at the 95% confidence level, Q_{table}= 0.625. The criteria for acceptance or rejection are as follows:

If $Q_{calculated} < Q_{table}$, accept the data point
If $Q_{calculated} > Q_{table}$, reject the data point

Since 0.57< 0.625, the data point can be kept with confidence.

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