

SIGMA METRICS IN PRE ANALYTIC





In a private hospital, for KPI the number of hemolyzed sample in one year. In 2014 the number of hemolyzed sample was 418. The total number of samples that was checked for hemolysis was 38933.

HOW TO COUNT THE SIGMA ?

COUNT YOUR SIGMA VALUE



1. Calculate the DPM (Defect Per Million) Rate using the formula:

$$\text{DPM} = (\text{number of errors} / \text{total number of specimen or requests}) \times 1.000.000$$

2. The DPM rate was converted to a sigma value based on tables online (<https://www.westgard.com/sixsigtable.htm>) OR using the six sigma calculator (<https://www.westgard.com/six-sigma-calculators.htm>)

3. Analyze the Sigma values:

- Very good: ≥ 5 sigma
- Good: $4- < 5$ sigma
- Minimum: $3- < 4$ sigma
- Unacceptable: < 3 sigma



The number of hemolyzed sample was 418

The total number of samples was 38933

The DPM = $(418/38933) * 1000000 = 10736$

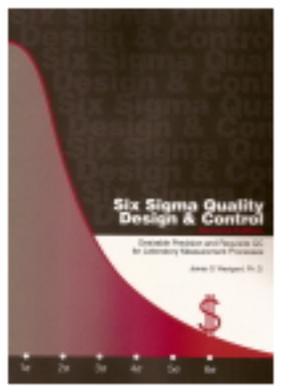
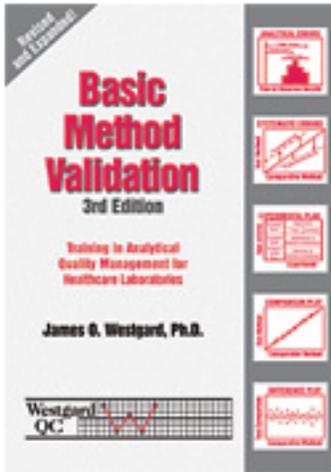
The DPM rate is converted to Sigma value using calculator or table

SIX SIGMA TABLE

| DPM | Sigma Short Term | Sigma Long Term | Yield | Cpk |
|--------|------------------|-----------------|----------|------|
| 3.4 | 6 | 4.5 | 99.99966 | 2 |
| 5 | 5.9 | 4.4 | 99.99954 | 1.97 |
| 9 | 5.8 | 4.3 | 99.99915 | 1.93 |
| 13 | 5.7 | 4.2 | 99.9987 | 1.9 |
| 21 | 5.6 | 4.1 | 99.9979 | 1.87 |
| 32 | 5.5 | 4 | 99.9968 | 1.83 |
| 48 | 5.4 | 3.9 | 99.995 | 1.8 |
| 72 | 5.3 | 3.9 | 99.993 | 1.77 |
| 108 | 5.2 | 3.7 | 99.989 | 1.73 |
| 159 | 5.1 | 3.6 | 99.984 | 1.7 |
| 233 | 5 | 3.5 | 99.98 | 1.67 |
| 337 | 4.9 | 3.4 | 99.97 | 1.63 |
| 483 | 4.8 | 3.3 | 99.95 | 1.6 |
| 687 | 4.7 | 3.2 | 99.93 | 1.57 |
| 968 | 4.6 | 3.1 | 99.90 | 1.53 |
| 1,350 | 4.5 | 3 | 99.87 | 1.5 |
| 1,866 | 4.4 | 2.9 | 99.81 | 1.47 |
| 2,555 | 4.3 | 2.8 | 99.74 | 1.43 |
| 3,467 | 4.2 | 2.7 | 99.65 | 1.4 |
| 4,661 | 4.1 | 2.6 | 99.5 | 1.37 |
| 6,210 | 4 | 2.5 | 99.4 | 1.33 |
| 8,198 | 3.9 | 2.4 | 99.2 | 1.3 |
| 10,724 | 3.8 | 2.3 | 98.9 | 1.27 |
| 13,903 | 3.7 | 2.2 | 98.6 | 1.23 |

The Six Sigma Calculators

NOTE: This page only works on browsers that support Javascript!

| | | |
|---|---|---|
|  | <p><i>[Note: This Six Sigma Calculator is an extension of the lesson From Method Validation to Six Sigma: Translating Method Performance Claims into Sigma Metrics. This article assumes that you have read that lesson first, and that you are also familiar with the concepts of QC Design, Method Validation, and Six Sigma. If you aren't, follow the link provided.]</i></p> |  |
|---|---|---|

DPM (Defects Per Million) Calculator

Here you can calculate the Sigma-metric by counting the number of Defects in a sample. Note that this calculator "rounds up" - to the nearest Sigma-Metric on the [table](#) on this website.

| | |
|---|------------|
| Enter the number of Defects Observed: | 418 |
| Enter the size of the sample: (how many total results were examined) | 38933 |
| <input type="button" value="Calculate Sigma Value"/> | |
| Here are your Defects Per Million: | 10736 |
| Here is your Sigma-Metric: | 3.8 |



- 2015: Hospital was doing the pre analytical audit, and it was found out that the hemolysis is because of:
 - using the small gauge
 - blood forced into the tube from the syringe
 - shaking the tube
 - no 30 minutes of clotting time and high speed centrifuge
- The hospital do the corrective action:
 - Establish the working procedure for phlebotomy and centrifugation
 - Change into close system
 - Phlebotomy training
 - Self assessment in pre analytical



In 2016 the number of hemolyzed sample was 93. The total number of samples that was checked for hemolysis was 35896.

HOW TO COUNT THE SIGMA ?



The number of hemolyzed sample was 93

The total number of samples was 35896

The DPM = $(93/35896) * 1000000 = 2591$

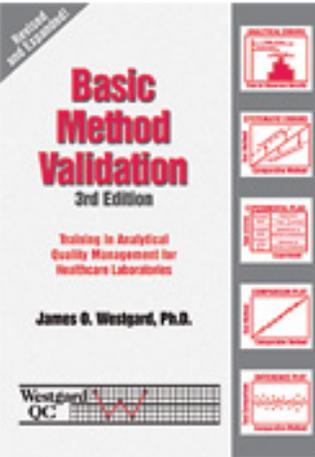
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| Enter the size of the sample: (how many total results were examined) | 35896 |
| <input type="button" value="Calculate Sigma Value"/> | |
| Here are your Defects Per Million: | 2591 |
| Here is your Sigma-Metric | 4.3 |



