



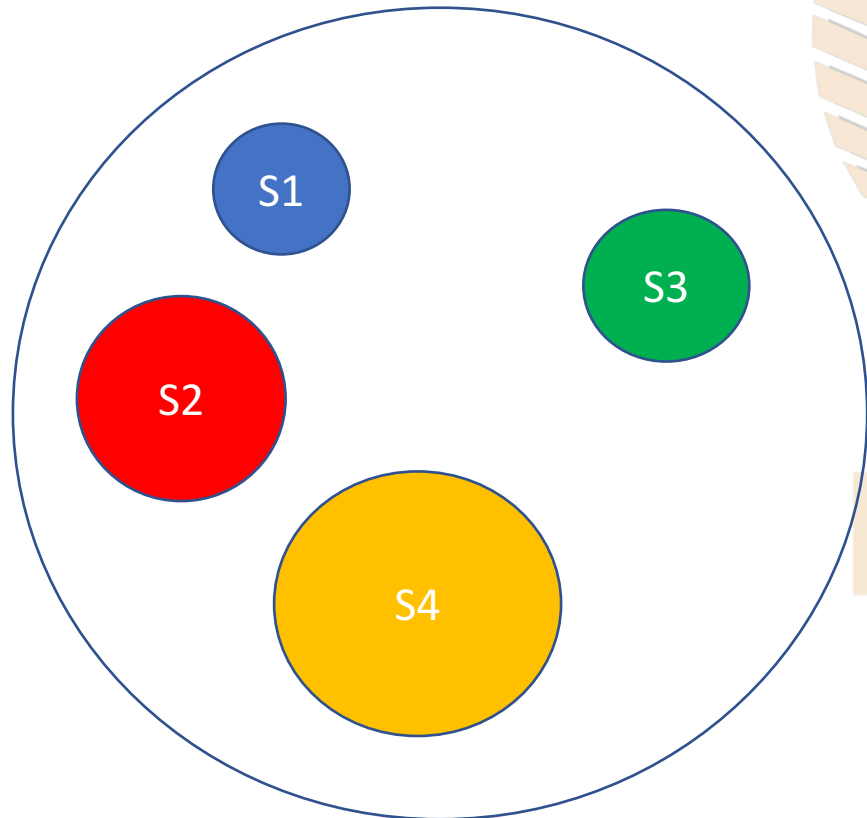
# Quantitative Methods in Chemistry

Week 3, Lecture 3

NPTEL

## The concept of pooling data for enhancing the predictability

For samples collected from the same population can be pooled to improve reliability of predictions and obtain better estimates about the population.



Pooling all the four samples give a better estimate of the population  
And improve reliability of the standard deviation estimated thus.

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## Paired t-test for comparing two different Methods applied on the same data set

Suppose **two different methods** are employed on the **same** sample, then the differences in their results can be compared using the paired t-test

Sample #	Method 1	Method 2
1	500	480
2	292	305
3	343	325
4	445	460
5	480	500
6	395	370

Note:

1. Both Method 1 and Method 2 are being applied on the same sample.
2. There can be difference between the samples

Q. At 95% confidence, can we say that Method 1 gives different results than Method 2?

**t Distribution: Critical Values of t**

<i>Degrees of freedom</i>	<i>Two-tailed test: One-tailed test:</i>	<i>Significance level</i>					
		10% 5%	5% 2.5%	2% 1%	1% 0.5%	0.2% 0.1%	0.1% 0.05%
1		6.314	12.706	31.821	63.657	318.309	636.619
2		2.920	4.303	6.965	9.925	22.327	31.599
3		2.353	3.182	4.541	5.841	10.215	12.924
4		2.132	2.776	3.747	4.604	7.173	8.610
5		2.015	2.571	3.365	4.032	5.893	6.869
6		1.943	2.447	3.143	3.707	5.208	5.959
7		1.894	2.365	2.998	3.499	4.785	5.408
8		1.860	2.306	2.896	3.355	4.501	5.041
9		1.833	2.262	2.821	3.250	4.297	4.781
10		1.812	2.228	2.764	3.169	4.144	4.587
11		1.796	2.201	2.718	3.106	4.025	4.437
12		1.782	2.179	2.681	3.055	3.930	4.318
13		1.771	2.160	2.650	3.012	3.852	4.221
14		1.761	2.145	2.624	2.977	3.787	4.140
15		1.753	2.131	2.602	2.947	3.733	4.073
16		1.746	2.120	2.583	2.921	3.686	4.015
17		1.740	2.110	2.567	2.898	3.646	3.965
18		1.734	2.101	2.552	2.878	3.610	3.922
19		1.729	2.093	2.539	2.861	3.579	3.883
20		1.725	2.086	2.528	2.845	3.552	3.850
21		1.721	2.080	2.518	2.831	3.527	3.819
22		1.717	2.074	2.508	2.819	3.505	3.792
23		1.714	2.069	2.500	2.807	3.485	3.768
24		1.711	2.064	2.492	2.797	3.467	3.745
25		1.708	2.060	2.485	2.787	3.450	3.725
26		1.706	2.056	2.479	2.779	3.435	3.707
27		1.703	2.052	2.473	2.771	3.421	3.690
28		1.701	2.048	2.467	2.763	3.408	3.674

Q1. A company warrants its batteries for 48 months so that only 0.5% of its batteries fail during the warranty period. However, in 54 months, 2.5% of the batteries fail. What is the average life of the batteries manufactured by this company?

Q2. A medical test data is presumed to be in normal range if it lies in 95% Confidence Interval in a two tailed test. If a sample registers a **low** “out of range” value, how likely is the sample to indicate a disease that inflicts 0.1% population?

The NPTEL logo is a circular emblem. It features a central stylized flower or star shape with eight petals, rendered in orange and red. This central motif is surrounded by a ring of alternating orange and red rectangular segments, creating a circular border. Below the emblem, the word "NPTEL" is written in a bold, orange, sans-serif font.

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