Analytical chemistry (5th Edition)

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1 Chapter 2

1.

$$
\begin{aligned}
\sigma &= 0.61\% \\
E &= 0.48\% \\
t_{0.1,7} &= 1.90 \\
n &= \frac{t * \delta^2}{E} = 5.8
\end{aligned}
\tag{1}
$$

So the number of sample is 6

2. The number of experiments is 8

$$
\begin{aligned}
\sigma &= 0.13\% \\
E &= 0.20\% \\
t_{0.05,7} &= 2.36 \\
n &= \frac{2.36 * 0.13^2}{0.20} = 3
\end{aligned}
\tag{2}
$$

3.

$$
\begin{aligned}
\sigma &= 0.40\% \\
E &= 0.50\% \\
t_{0.1,\inf} &= 1.64, t_{0.1,4} = 2.13, t_{0.1,3} = 2.35 \\
n &= \frac{2.35 * 0.40^2}{0.5} = 4
\end{aligned}
\tag{3}
$$

Choose experience value of $n = 5$

4.

$$
Q \geq kd^2 = 0.1 * 30^2 = 90kg
\tag{4}
$$

5.

$$
\begin{aligned}
Q \geq kd^2 &= 0.3 * 2^2 = 1.2kg \\
15 * \frac{1}{2}^3 &= 1.875kg
\end{aligned}
\tag{5}
$$

6. very intuitive solution:
loss of ignition: strongly heating ("igniting") a sample of the material at a specified temperature, allowing volatile substances to escape, until its mass ceases to change.
In the problem it means the sample is already after ignition.
Then we make it try to remove remaining water.

$$w_{LoI} = \frac{16.35\%}{1 - 5.23\%} = 17.25\%$$

$$w_{SiO_2} = \frac{37.92\%}{1 - 5.23\%} = 40.01\%$$

$$w_{Al_2O_3} = \frac{25.91\%}{1 - 5.23\%} = 27.34\%$$

$$w_{Fe_2O_3} = \frac{9.12\%}{1 - 5.23\%} = 9.62\% \tag{6}$$

$$w_{CaO} = \frac{3.24\%}{1 - 5.23\%} = 3.42\%$$

$$w_{MgO} = \frac{1.21\%}{1 - 5.23\%} = 1.28\%$$

$$w_{K_2O+Na_2O} = \frac{1.02\%}{1 - 5.23\%} = 1.08\%$$