Protocol for the determination of the kaolinite content in clay

1. Principle and objective

The basic principle of this test is to determine the kaolinite content of clay using simply an oven and a balance.

2. Materials

For this test, 10 g of clay is needed for each crucible. This clay does not need to be dried prior to testing. The clay should not be coarser than 4 mm.

3. Equipment

- Oven able to reach 800°C
- Oven clamp
- Timer
- Alumina crucibles
- Balance with a precision of 0.01 g
- Spatula

4. Procedure

- Put 3 clean alumina crucibles in the oven and heat them up at 800°C for 1 hour to remove any impurities and moisture.
- After cooling down, measure the weight of each crucible on the balance, wt_i.
- Add 10 ± 0,1 g of clay in each crucible using a spatula.
- Put the crucibles in the oven. Use the oven clamp if necessary. Heat the crucibles for 1 hour at 200°C.
- Let the crucibles cool down in the oven and measure the weight of the three crucibles after cooling down using the balance, $wt_{200°C}$.
- Place the crucibles in the oven and heat them at 400°C for 1 hour.
- After cooling down, weigh each crucible using the balance, $wt_{400°C}$.
- Place the crucibles in the oven and heat them at 600°C for 1 hour.
- After cooling down, weigh each crucible using the balance, $wt_{600°C}$.

The kaolinite content for each crucible can be calculated according to the following Equation. The factor "7.17" refers to the ratio of the molecular weight of kaolinite ($M_{kaolinite}$ = 258,16 g.mol^{-1}) and two water molecules (2xM_{water} = 36,03 g.mol^{-1}).

$$wt\%_{kaolinite} = \frac{wt_{400°C} - wt_{600°C}}{wt_{200°C} - wt_i} \times 7,17 \times 100$$

The average kaolinite content in clay can then be calculated from the three crucibles tested, and the standard deviation indicates the error of measurement.

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