



ACTIVITY OF ADSORBENTS DETERMINED WITH THE TEMPERATURE RISE TEST KIT

1. Principle of Measurement

Activated molecular sieves (zeolites) develop heat when contacted with water, The amount of this heat is an indicator for the activity of the adsorbent tested, and can be determined simply and quickly with the test kit.

Adsorbents which do not develop a sufficient amount of heat in this test are preloaded with water (e.g. by contact with humid air) and cannot fulfil their function properly. They must be reactivated, or must be replaced with fresh, active adsorbent.

2. Test Procedure

The test kit has to be completely dry before each test in order to get correct test results. The dry adsorbent has to be stored in a tightly closed container, and must not be allowed to come into contact with humid air more than absolutely necessary.

A small beaker with water of room temperature (between 18 and 25°C) is prepared. The temperature of this water is determined with the thermometer of the test kit and written down. The thermometer is then dried carefully.

A sample of 10 grams of the desiccant to be tested should be weighed out in a dry beaker. The desiccant should be at the same temperature as the water.

The weighed adsorbent sample (10 grams) is transferred into the reaction cup, which is then closed by the cover with the thermometer.

Weighing of adsorbents and its transfer into the reaction cup has to be carried out as quickly as possible in order to avoid misleading results due to adsorption of humidity from the air.

The plastic syringe is then filled with 10 millilitres of water:

- Put tip of syringe into the water and fill with water until almost full.
- Turn syringe with tip upwards and completely press out any air.
Adjust piston exactly to the 10 millilitre graduation marks.

The whole amount of 10 millilitres of water in the prepared syringe is now injected as fast as possible – with strong pressure on the piston – through the hole in the cover into the reaction cup.

The temperature in the reaction cup will now rise quickly. The highest temperature reached on the thermometer has to be observed and written down.

The temperature difference (Delta T) between the highest value reached on the thermometer in the reaction cup, and temperature of the water in the beaker is the indicator for the activity of the adsorbent.

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| Example 1. | Highest temperature reached in reaction cup | 65°C |
| | Temperature of water in beaker | <u>19°C</u> |
| | Temperature difference (Delta T) | 46°C |

Result: the adsorbent is highly active

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| Example 2. | Highest temperature reached in reaction cup | 46°C |
| | Temperature of water in beaker | <u>19°C</u> |
| | Temperature difference (Delta T) | 27°C |

Result: This adsorbent is preloaded with water not fully active.
Its adsorption capacity is reduced.

A minimum temperature rise (Delta T) of 30°C must be reached. The product is then fully active.

This test kit has been recognised and recommended by different national testing institutes as a standard test system for adsorbents.

List of items for kit:

- Plastic syringe 10ml
- Reaction cup with cover and calibrated thermometer