How temperature affects measurement results

Problem

The air and sample temperature can affect the analysis result. Results may come out too high or too low.

Solution

Observe the notes in the user instructions. Use a thermostat if required to achieve the correct temperature.

Benefits

Sticking to the correct temperature as precisely as possible improves the accuracy of your measurement results!

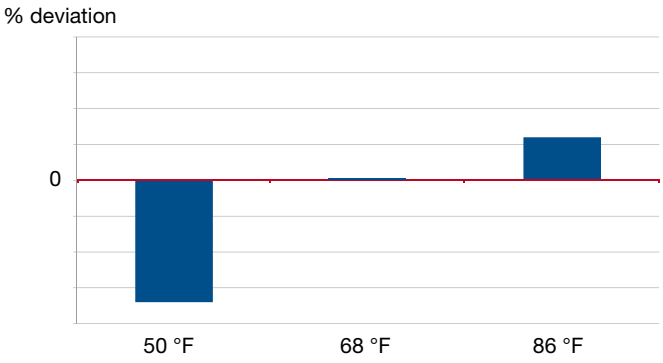
Background

Laboratory equipment that is used to measure volumes, such as pipettes or volumetric flasks, is calibrated to a temperature of 68 °F. This means that any solution that you want to measure must be as close to this temperature as possible. Any sample that has just been removed from cold receiving waters must be brought up to temperature before being pipetted. The same applies to hot electroplating baths. All Hach vial tests are also calibrated at 68 °F.

The temperature affects not only the volume but also the speed of the chemical reaction. In some cases, lower temperatures produce results that are too low; higher temperatures, in contrast, may produce results that are too high. The solution in the vial should therefore ideally be at 68 °F when it is measured in the photometer.

Digestion is carried out beforehand for some parameters. Before a COD cuvette, for example, is placed in the photometer for analysis, it should be cooled to room temperature. But what is "room temperature"? Room temperature is commonly defined as the temperature range 59 to 77 °F. Depending on the region and time of year, the temperatures in some companies may actually fall outside this temperature range. The sample must be brought to the correct temperature in these situations to achieve accurate results.

Typical effect of temperature when determining ammonium using the salicylate method



Temperature of reagents, sample and/or environment

50 °F: fresh from the refrigerator
68 °F: optimum
86 °F: summer heat in measuring rooms without air conditioning

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How do I get the correct results?

For parameters that do not require digestion (e. g. ammonium or nitrate), both the water sample and the reagents for the vial test must be at room temperature. For example, you should not use reagents and samples taken straight from the refrigerator (too cold = results may be too low) or any that have just been exposed to heat or direct sunlight (too warm = results may be too high).

With COD, the vial should be shaken after digestion in the reactor (2 h at 302 °F) while it is still hot, in order to accelerate the formation of precipitation and to prevent any streaks from forming due to water vapour condensation. Then allow the cuvettes to cool down to room temperature and do not analyse them too soon (i. e. too warm = results may be too high) in the photometer. This also applies to other parameters after digestion, e. g. for total P.

You should ideally temper all cuvettes using a water bath or a thermostat that is set to 68 °F.

Directions regarding handling and temperatures are found in every package of reagents.

DRB200 reactor for digestion at 212, 221 or 302 °F

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HACH COMPANY World Headquarters: Loveland, Colorado USA

United States:	800-227-4224 tel	970-669-2932 fax	orders@hach.com
Outside United States:	970-669-3050 tel	970-461-3939 fax	int@hach.com

hach.com

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