



designed for scientists

SUCCESS STORIES

Determining the gross calorific value of sludge

/// Calorimeter C 200 provides accurate results



"We decided to work with an IKA calorimeter as they are easier to operate and provide faster and more accurate results. Especially the C 200, which is robust and low-maintenance. Therefore, it is a reliable companion in our lab where we do not always work under easy conditions."

– Mr. Ramesh Nair, CDD Society

IKA CALORIMETERS

As the population of India grows exponentially, cities, such as Bengaluru, are affected by pollution and increased water wastages. The release of untreated liquids and solid waste pollutants in the environment causes an imbalance of the entire ecosystem that impairs the population's health and hygiene. Especially slums and emergency settlements, areas that are densely populated, produce large volumes of sludge in their onsite sanitation systems.

OUR CUSTOMER

Consortium for DEWATS Dissemination (CDD) Society, a non-profit organization founded in 2005, provides solutions for sanitary issues, which include faecal sludge management and wastewater treatment of communities and remediation plans for drains and lakes across the country.

In collaboration with the town of Devanahalli located in Bengaluru, India, ITC factories, Flipkart and other organizations, CDD Society set up India's first dedicated faecal sludge management plant to provide robust and sustainable post-toilet infrastructure with the aim of improving health and hygiene, preserving the environment and securing water resources. This plant treats wastewater generated by 150,000 people every day.

THE CHALLENGE

Conversion of waste materials into reusable products

Onsite sanitation technologies, particularly portable toilets, pit latrines, septic tanks are common and highly used in densely populated areas. Conventional wastewater treatment plants (WWTP) are also sources of high sludge quantities. These large volumes of sludge attract a large number of pathogens and vector attraction, which is a major concern as it can lead to disease outbreaks.

Rapid sludge generation limits the application of traditional alternatives for sludge treatment and/or disposal. Other alternatives for sewage sludge treatment and/or disposal, such as anaerobic digestion, composting, etc. with relatively low conversion rates may not be viable for rapid sludge processing.

Therefore, CDD Society set up a laboratory to do research on the value of waste and how it can be utilized further.

In order to get reproducible and reliable measurement results, sample preparation is most important. Sludge is an inhomogeneous mixture of solid and liquid waste, containing mostly excreta and water in combination with sand, grit, metals, trash and/or various chemical compounds. Therefore, samples have to be thoroughly mixed and weighted into batches. Furthermore, it is important to reduce the moisture level by using a drying oven before testing the sample in the calorimeter. Post the drying procedure, the sample needs to be pelletized in order to facilitate the measurement process.

Trial No.	Sample name	Weight (g)	Sample form	Temp. rise (K)	Result (J/g)	Remarks
1	Benzoic acid	1.0082	Pellet	2.9442	26461	Complete combustion
2	Final compost	1.0762	Pellet	1.3522	11325	Complete combustion
3	SBD sludge	1.0188	Pellet	1.5216	13476	Complete combustion

The below pictures show the final compost and Sludge Belt Dryer (SBD) sludge.



Final Compost



SBD Sludge

THE SOLUTION

Reproducible and reliable gross calorific value determination

CDD Society uses an IKA calorimeter (model C 200) to determine the gross calorific value of waste samples.

The ultimate goal of measuring the gross calorific value of the waste samples is the conversion of waste materials into reusable products (e.g. vermicomposting, organic manures or alternate fuels) that finally lead to a healthier and more hygienic environment.

Before starting the measurements, the calorimeter has to be calibrated. CDD society calibrated its C 200 with C 723 benzoic acid using the operation mode 'dynamic' at 25 °C and achieved the following results: C-value of 9102 J/K; reference gross calorific value (GCV): 26,460 J/g.

Afterwards sample measurements can be started. Some exemplary results are shown in the table below.

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