SERVICE OFFER

Current as of July 15, 2023

Centre for Biomass Energy Research and Education

Our offer currently includes the following analyses:

Cost of services / Questions:

Questions regarding services and prices should be emailed to the director of the Centre
Iwona Jelonek at iwona.jelonek@us.edu.pl

Weight of sample material needed for analysis:

Petrographic analysis: min. 0.5 kg
Emission analysis: 10-15 kg
Technical analysis: 10-15 kg

Shipment of samples:

Samples for analysis should be sent to:

Iwona Jelonek
Centre for Biomass Energy Research and Education
Uniwersytet Śląski w Katowicach
Wydział Nauk Przyrodniczych
ul. Będzińska 60, 41-200 Sosnowiec
+48 (32) 3689-498

1. Petrographic analysis of solid biomass

Weight of the representative sample needed for the analysis: min 0.5 kg

The Centre offers petrographic analysis in white reflected light to identify components and contaminants of solid biomass, including:

- wood pellets and briquettes
- pellets and briquettes from herbaceous biomass
- charcoal
- charcoal briquettes
- biomass-based fuel mixtures

Identified fuel components and impurities:

- biomass
- bark
- charcoal
- coal
- coke
- slag
- metal
- rust
- ash
- paint
- tar
- mineral matter
  - thermally unchanged (sand, quartz, soil, stone powder)
  - thermally changed (ceramic, glass, sand/clay products)
- petroleum products
  - plastic
  - rubber
  - grease
  - glue
  - polymer resin
  - liquid petroleum fuels (oil)
- other (binders and preservatives)

The analysis is performed in accordance with ISO 7404-2:2009 (sample preparation), ISO 6344-3:2013 (grinding and polishing) and EN 1860-2:2005 (petrographic analysis). Classification of impurities and a detailed description of the analytical method are available in the articles Drobniak et al., 2022a & Drobniak et al., 2023. More information on using petrographic analysis in quality testing of biomass fuels can be found in the articles: Drobniak et al., 2022b, 2021ab and Jelonek et al., 2021a, 2020ab (see reference list below).

2. Analysis of combustion emissions of solid biomass fuels

Weight of the representative sample needed to perform the analysis: 10-15 kg

The Centre offers emissions analysis of solid biomass fuels using a boiler and a furnace for burning wood, "eco-pea", briquette, pellet, etc. (V class devices, eco-design) and exhaust gas analyzers Testo 380, Testo 2LL, Testo 350, Testo 140, Testo I20 and ATMON FL S.M.O.K.

Combustion temperature: up to 900 ^{o}C

Identified emission parameters:

- H_2S
- HCl
- HCHO
- NH_3
- SO_2
- NO
- NO_2
- CO
- CO_2
- RI (respiratory tract irritants: NO_2+O_3+ Cl_2+HC)
- particulate matter $PM_{2.5}$ and PM_{10}
- particulate matter PM_1 (average)
- temperature of emitted gases
- furnace temperature

More information on emissions from biomass fuels can be found in the articles: Drobniak et al., 2022b and Jelonek and others: 2021a, 2020b (see reference list below).

3. Technical analysis of solid biomass fuels

Weight of the representative sample needed to perform the analysis: 10-15 kg

The Center offers an analysis of the physical parameters of solid biomass fuels as follows:

- moisture content of solid fuels using MA 50.R Moisture Analyzer - 0,001 % / 1 mg, drying temperature up to 160 ^{o}C
- determination of the weight fractions of pellets using laboratory sieves
- determination of bulk density using a bulk density cylinder with dimensions 30cmx18cm and capacity of 5 l +/- 2%
- determination of the mechanical strength of pellets using a professional device [SIHER] for the mechanical strength test
- determination of the length and diameter of pellets using certified measuring instruments

4. Educational presentations on biomass energy

The Center offers educational presentations on energy from biomass. Presentations in Polish or English can be thematically adapted to the requester's needs and time frame. The presentations can be related to a wide range of scientific research and activities of the Centre.

Example topics of presentation:

- Biomass energy 101
- Using optical microscopy to identify contaminants in biomass fuels

5. "PL-US BIO" solid biofuel certification program

The proprietary certification program of the Centre for Biomass Energy Research and Education, University of Silesia in Katowice designed for quality assessment of solid biomass fuels manufactured for energy generation in non-industrial settings in Poland. For more information please visit: https://www.biomass.edu.pl/certification.

REFERENCES

Drobniak, A. Mastalerz, M., Jelonek, Z., Jelonek, I., Adsul, T., Andolšek, N.M., Ardakani, O.M., Congo, T., Demberelsuren, B., Donohoe, B.S., Douds, A., Flores, D., Ganzorig, R., Ghosh, S., Gize, A. Goncalves, P.A., Hackley, P., Hatcherian, J., Hower, J.C., Kalaitzidis, S., Kędzior, S., Knowles, W., Kus, J., Lis, K., Lis, G., Liu, B., Luo, Q., Meili, D., Mishra, D., Misz-Kennan, M., Mugerwa, T., Nedzweckas, J.L., O'Keefe, J.K.M., Park, J., Pearson, R., [26], Petersen, H.I., Reyes, J., Ribeiro, J., de la Rosa-Rodriguez, G., Sosnowski, P., Valentine, B., Varma, A.K., Wojtaszek-Kalaitzidi, M., Xu, Z., Zdravkov, A., Ziemianin, K., 2023, Interlaboratory study: Testing reproducibility of solid biofuels component identification using reflected light microscopy – in the review.

Drobniak, A., Jelonek, Z., Mastalerz, M., Jelonek, I., 2022a, Developing methodology for petrographic analysis of solid biomass in reflected light, International Journal of Coal Geology 253. https://doi.org/10.1016/j.coal.2022.103959.

Drobniak, A., Jelonek, Z., Mastalerz, M., Jelonek, I., 2022b, Residential gasification of solid biomass: Influence of raw material on emissions, International Journal of Coal Geology 104247. https://doi.org/10.1016/j.coal.2023.104247.

Drobniak, A., Jelonek, Z., Mastalerz, M., Jelonek, I., 2021a, Atlas of Wood Pellet Components: Indiana Geological and Water Survey, Indiana Journal of Earth Sciences, v. 3, https://doi.org/10.14434/ijes.v3i1.31905.

Drobniak, A., Jelonek, Z., Mastalerz, M., Jelonek, I., 2021b, Atlas of Charcoal-Based Grilling Fuel Components: Indiana Geological and Water Survey, Indiana Journal of Earth Sciences, v. 3, https://doi.org/10.14434/ijes.v3i1.32559.

EN 1860-2:2005. Appliances, solid fuels and firelighters for barbecueing - Part 2: Barbecue charcoal and barbecue charcoal briquettes - Requirements and test methods. https://www.techstreet.com/searches/27126501.

ISO 6344-3:2013. Coated abrasives – Grain size analysis – Part 3: Determination of grain size distribution of microgrits P240 to P2500: 1–25. https://www.iso.org/standard/56010.html.

ISO 7404-2:2009. Methods for the petrographic analysis of bituminous coals – Part 2: Methods of preparing coal samples. https://www.iso.org/standard/42798.html.

Jelonek, Z., Drobniak, A., Mastalerz, M., Jelonek, I., 2021a. Environmental and human health implications of grilling with wood pellets and chips. Atmospheric Environment: X 12, 100140. https://doi.org/10.1016/j.aeaoa.2021.100140.

Jelonek, Z., Fabiańska, M., Jelonek, I., 2021b, Quantitative assessment of organic and inorganic contaminants in charcoal. Resources 2021, 10, 69. https://doi.org/10.3390/resources10070069.

Jelonek, Z., Drobniak, A., Mastalerz, M., Jelonek, 2020a, Assessing pellet fuels quality: A novel application for reflected light microscopy, International Journal of Coal Geology 222, 103433, https://doi.org/10.1016/j.coal.2020.103433.

Jelonek, Z., Drobniak, A., Mastalerz, M., Jelonek, I., 2020b, Environmental implications of the quality of charcoal briquettes and lump charcoal used for grilling. Science of Total Environment 747. https://doi.org/10.1016/j.scitotenv.2020.141267.