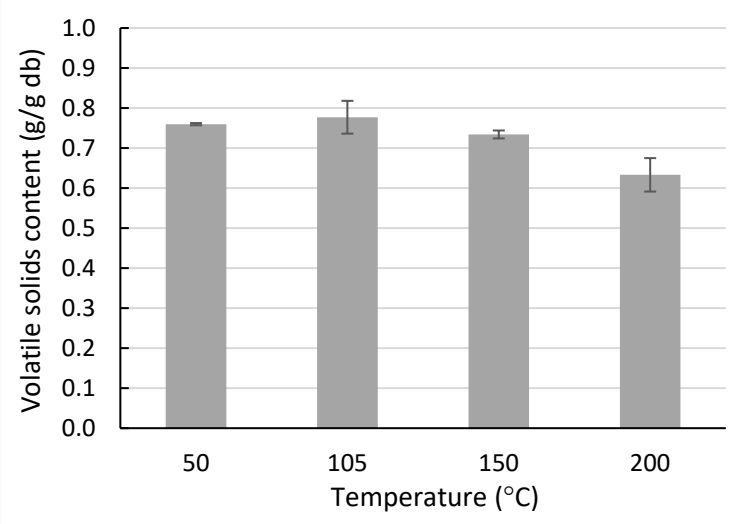
General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018-2019
Feedstock	
Type of faecal material	Faecal sludge from anaerobic baffled reactor (ABR) from a decentralised wastewater treatment plant (DEWAT)
Location of collection	Durban, South Africa
Age before collection	Unknown
Moisture content	~ 90%wt
Total solids content	~ 10%wt
Volatile solids content	~ 75%db
Ash content	~ 25%db
Presence of trash?	Yes (mainly small pieces of paper after pre-screening during pit emptying)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until completely dry
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Volatile solids
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Data source files
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Volatile solids content as a function of temperature



Observations:

- No effect of temperature
- Lower volatile solid content at 200°C (possible thermal degradation)

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal, South Africa
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from anaerobic baffled reactor (ABR) from a decentralised wastewater treatment plant (DEWAT)
Location of collection	Durban, South Africa
Age before collection	Unknown
Moisture content	~ 90%wt
Total solids content	~ 10%wt
Volatile solids content	~ 75%db
Ash content	~ 25%db
Presence of trash?	Yes (mainly small pieces of paper after pre-screening during pit emptying)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Volatile solids
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

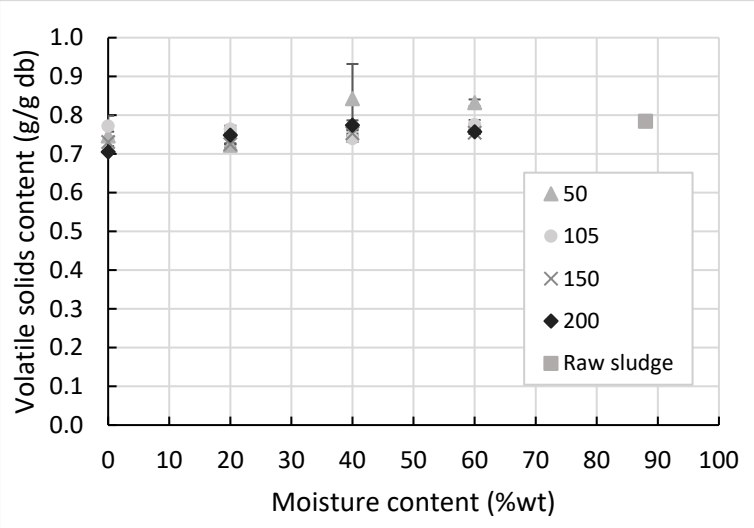
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

-

Description of Data

Volatile solids content as a function of moisture content and temperature



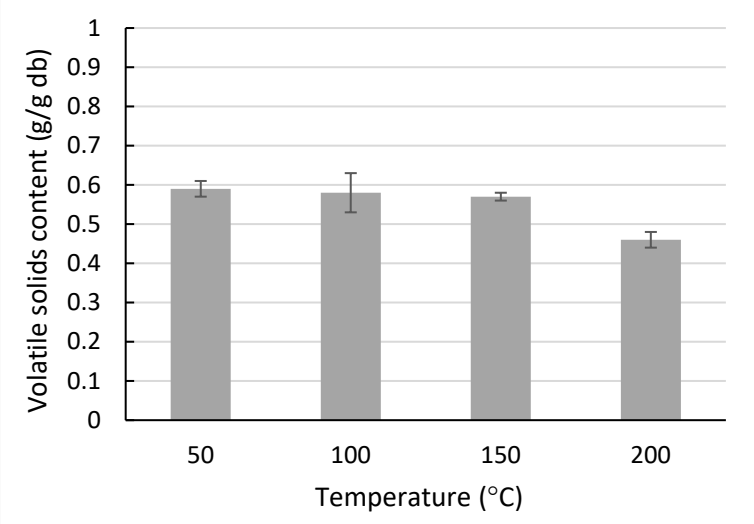
Observations:

- Volatile solid content constant as sludge dried
- No effect of drying temperature

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal, South Africa
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from a urine diversion dry toilet (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until completely dry
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Volatile solids
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Data source files
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Volatile solids content as a function of temperature



Observations:

- Volatile solids constant between 50 and 150°C
- Lower volatile solid content at 200°C (possible thermal degradation)

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018-2019
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilets (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Volatile solids
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

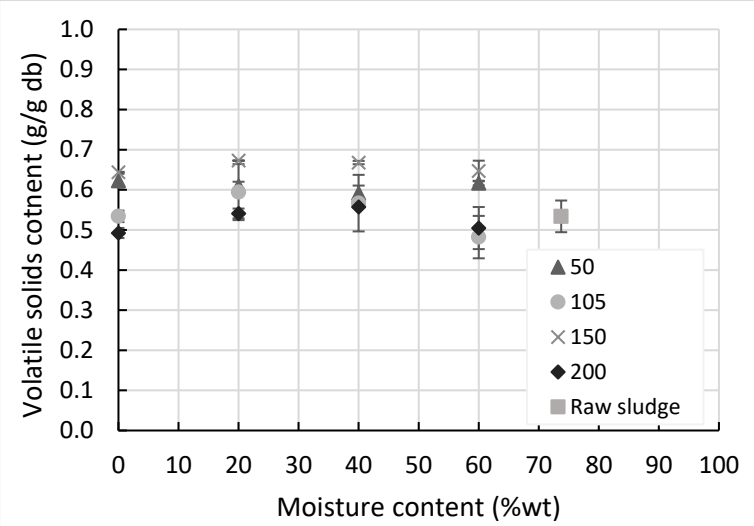
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

-

Description of Data

Volatile solids content as a function of moisture content and temperature



Observations:

- Volatile solid content constant as sludge dried
- No effect of drying temperature

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal, Durban South Africa
Dates of the experiments	2014-2015
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 70% db
Ash content	~ 30% db
Presence of trash?	Yes
Pre-treatment	○ Screening to remove the large pieces of trash ○ Addition of 3%wt of sawdust for pellets formation
Experimental Procedure	
Drying experimental setup	Laboratory-scale medium infrared (MIR) dryer ('LaDePa')
Drying time	0, 4, 9, 13, 17, 25, 40 min
Operating conditions	○ MIR emitters power: 3, 5 and 6.5 kW (corresponding to ~ 85, 135 and 215°C respectively) ○ Distance between the emitters and the sample: 115 mm ○ Air stream flowrate: 18.3 m^3/min ○ Air humidity: ambient (70-80%)
Sample form in the dryer	Pellets of 8, 10, 12 and 14 mm diameter
Analysed parameters	Volatile solids/ash content
Employed methods	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
Mirara, S.W. (2017). Drying and Pasteurisation of VIP Latrine Faecal Sludge using a Bench Scale Medium Infrared Machine. Master thesis. University of KwaZulu-Natal, Durban, South Africa.	

Septien, S., Mirara, S.W., Singh, A., Velkushanova, K., & Buckley, C. (2018). Characterisation of On-Site Sanitation Material and Products: VIP Latrines and Pour-Flush Toilets. WRC project final report. South Africa.

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

https://www.dropbox.com/s/qbqkf45sx5ysk25/2014-2015%20VIP%20composition%20analysis.xlsx?dl=0

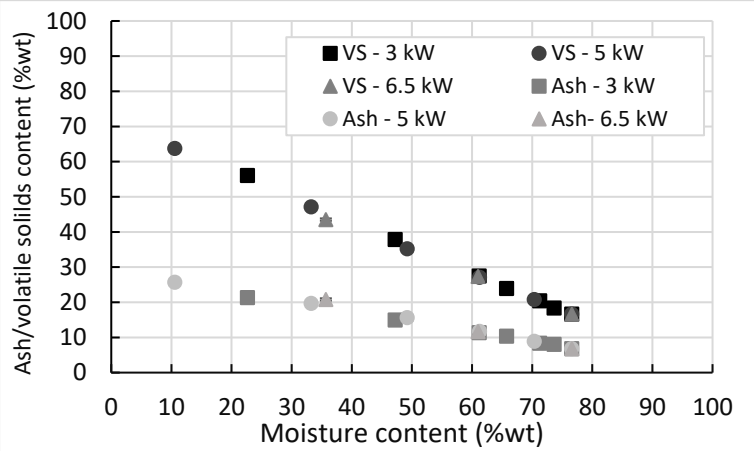
Additional Notes

- Volatile solids content + Ash content = 1

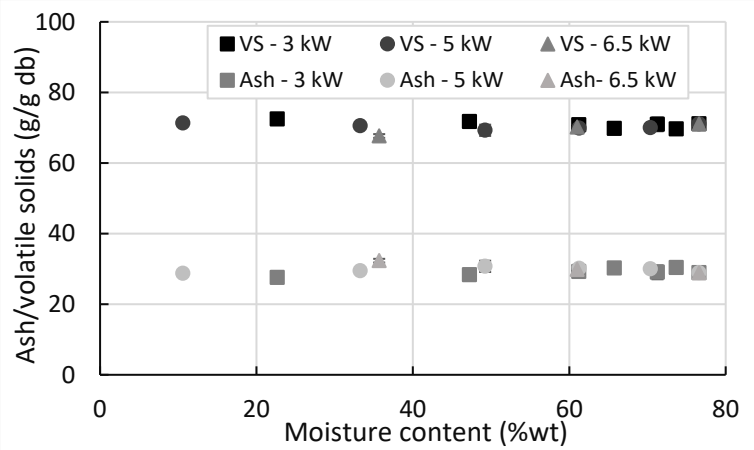
Description of Data

Ash and volatile solids (VS) content versus moisture content as a function of the MIR emitter power

Wet basis



Dry basis

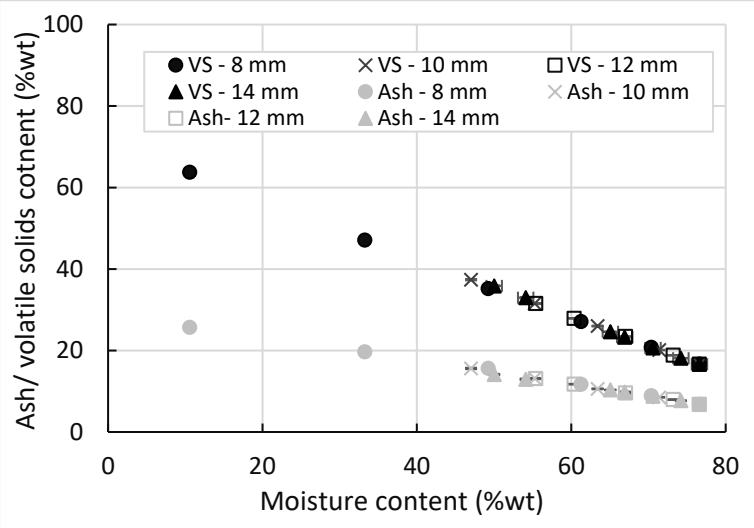


Observations:

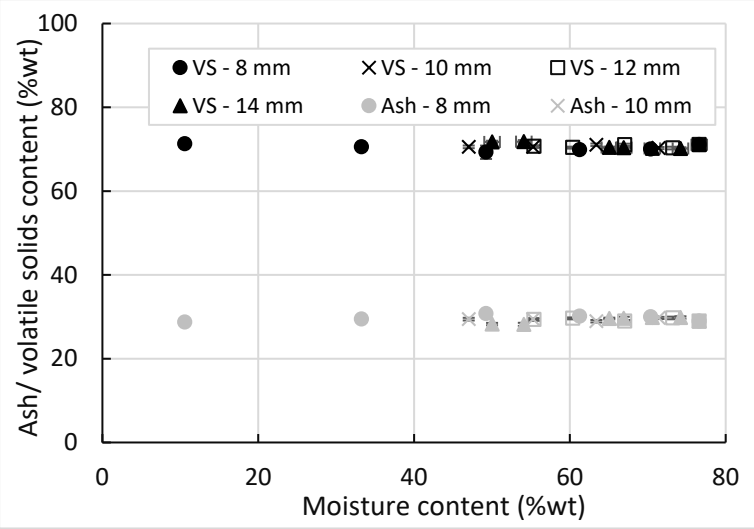
- Increase of ash and volatile solids content in wet basis as sludge dried
- Constant ash and volatile solids content in dry basis during drying
- No effect of MIR emitter power on the volatile solids / ash content

Ash and volatile solids (VS) content versus moisture content as a function of the pellet diameter

Wet basis



Dry basis



Observations:

- Increase of ash and volatile solids content in wet basis as sludge dried
- Constant ash and volatile solids content in dry basis during drying
- No effect of MIR emitter power on the volatile solids / ash content

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2014 - 2015
Feedstock	
Type of faecal material	Faecal sludge collected from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 50% db
Ash content	~ 50% db
Presence of trash?	Yes
Pre-treatment	Screening to remove the large pieces of trash
Experimental Procedure	
Drying experimental setup	Custom design convective drying rig
Drying time	Until mass stabilisation
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 0% ○ Air velocity: 0.06 cm/s
Sample form in the dryer	Pellets of 8 mm diameter
Analysed parameters	(1) Moisture/total solids (2) Volatile solids/ash content
Employed methods	(1) Weighing the sample before and after drying at 105°C for 24 h (SOP 8.7.1.1) (2) Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)

Publications

Makununika, B. S. N. (2016). Thermal drying of faecal sludge from VIP latrines and characterisation of dried faecal material. Master thesis. University of KwaZulu-Natal, Durban, South Africa.

Data source files

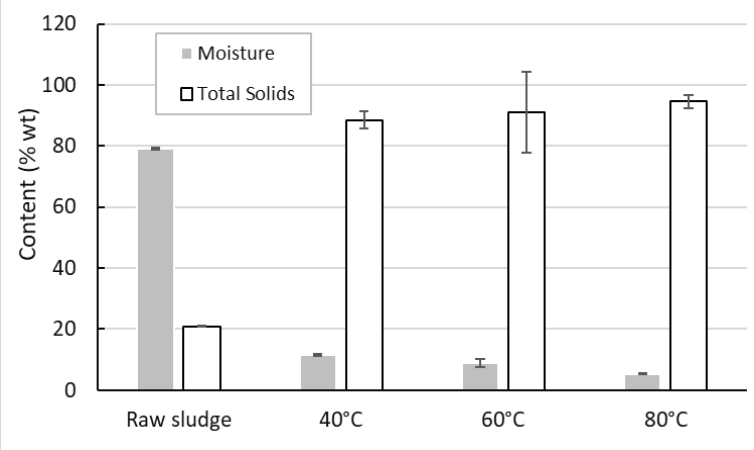
https://www.dropbox.com/s/2dg6xp8s0m5pfse/2014-2015%20VIP%20Physicochemical%20properties.xlsx?dl=0

Additional Notes

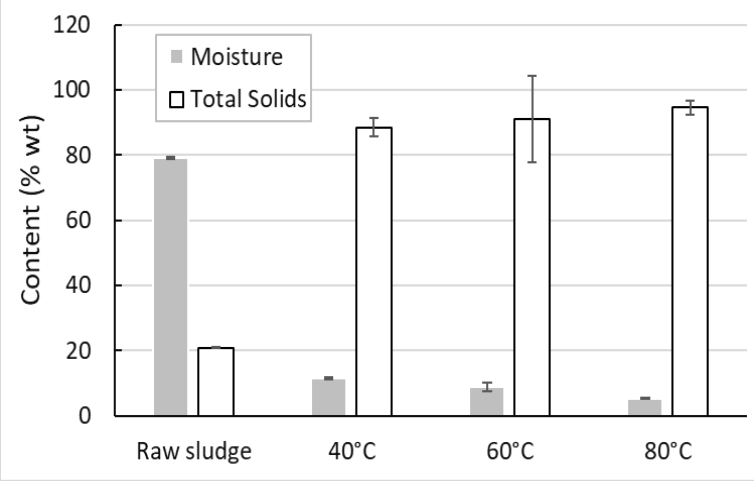
- Moisture content + Total Solids content = 1
- Volatile Solids content + Ash content = 1

Description of Data

Moisture and total solids content as a function of temperature



Ash and volatile solids content as a function of temperature



Observations:

- Lower moisture content achieved after drying at the highest temperature (80°C)
- Not complete drying achieved
- No effect of drying temperature on the volatile solid and ash content

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018-2019
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 40%db
Ash content	~ 60%db
Presence of trash?	Yes (mainly hair extensions, plastic and rocks)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Volatile solids
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

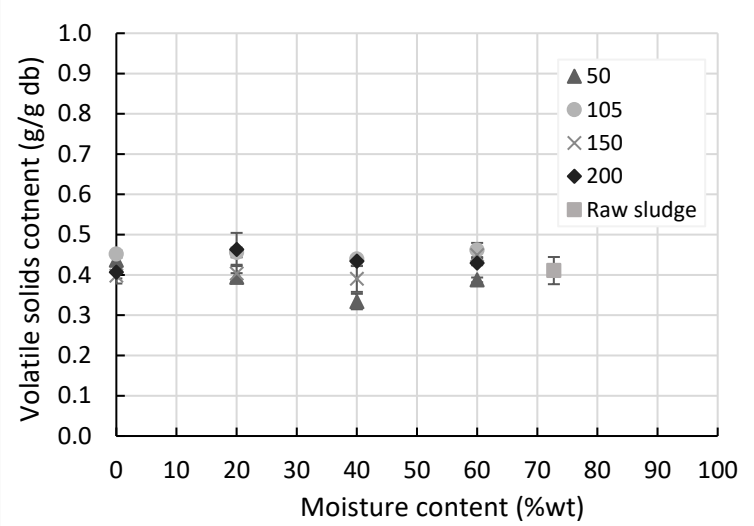
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

-

Description of Data

Volatile solids content as a function of moisture content and temperature



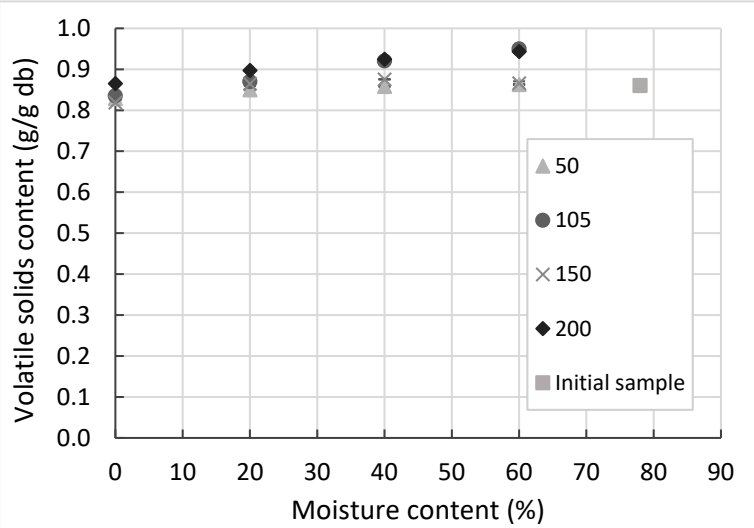
Observations:

- Volatile solid content constant as sludge dried
- No effect of drying temperature

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 85%db
Ash content	~ 15%db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until complete drying
Operating conditions	Temperature: 0, 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Volatile solids
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
-	

Data source files
https://www.dropbox.com/s/vpa68hptk81v4e4/2019%20Fresh%20faeces%20tests_PRG.xlsx?dl=0
Additional Notes
Fresh faeces collected from voluntary and anonymous donations
Description of Data

Volatile solids as a function of moisture content of the faeces and temperature



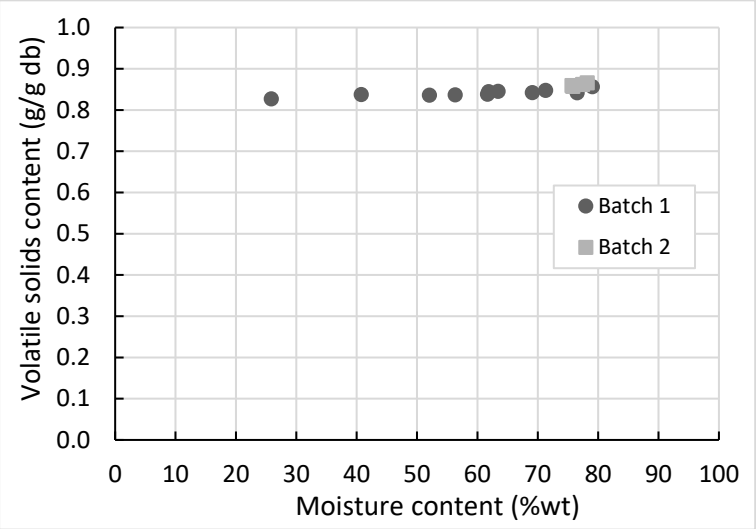
Observations:

- Lower volatile solid content of dried sludge compared to raw material
- No effect of temperature

General information	
Type of data	Composition
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 85%db
Ash content	~ 15%db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Natural drying (in the open-air)
Drying time	16 weeks
Operating conditions	○ Temperature: ambient (~ 20°C) ○ Relative humidity: ambient (~ 60%)
Sample form in the dryer	900 g of sample placed in 1 L plastic bucket
Analysed parameters	Volatile solids content
Employed method	Weighing the sample before and after calcination at 550°C (SOP 8.7.1.2)
Publications	
-	

Data source files
https://www.dropbox.com/s/xbv6su0jxsipiok/2019-2020%20Natural%20drying%20of%20fresh%20faeces%20in%20the%20open%20air_UKZN%20PRG.xlsx?dl=0
Additional Notes
○ Fresh faeces collected from voluntary and anonymous donations ○ Containers with sample placed in a ventilated area ○ Mesh placed at the opening of the container to avoid the development of maggots ○ Samples from batch 1 analysed in a weekly basis for 16 weeks ○ Samples from batch 2 analysed at days 0, 3, 5 and 7 during one week
Description of Data

Volatile solids content as a function of moisture content for the samples from batch 1 and 2



Observations:

- Constant volatile solid content during drying

General information	
Type of data	Elemental nutrient content
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2014 - 2015
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 70% db
Ash content	~ 30% db
Presence of trash?	Yes
Pre-treatment	o Screening to remove the large pieces of trash o Addition of 3%wt of sawdust for pellets formation
Experimental Procedure	
Drying experimental setup	Laboratory-scale medium infrared (MIR) dryer ('LaDePa')
Drying time	0, 4, 9, 13, 17, 25, 40 min
Operating conditions	o MIR emitters power: 3, 5 and 6.5 kW (corresponding to ~ 85, 135 and 215°C respectively) o Distance between the emitters and the sample: 115 mm o Air stream flowrate: 18.3 m^3/min o Air humidity: ambient (70-80%)
Sample form in the dryer	Pellets of 8 and 14 mm diameter
Analysed parameters	Carbon (C), nitrogen (N), sulphur (S), Phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg)
Employed methods	(1) Use of CNS analyzer (SOP 8.7.7.2) (2) Use of microwave plasma – atomic emission spectroscopy (SOP 8.7.7.1)

Publications

Mirara, S.W. (2017). Drying and Pasteurisation of VIP Latrine Faecal Sludge using a Bench Scale Medium Infrared Machine. Master thesis. University of KwaZulu-Natal, Durban, South Africa.

Septien, S., Mirara, S.W., Singh, A., Velkushanova, K., & Buckley, C. (2018). Characterisation of On-Site Sanitation Material and Products: VIP Latrines and Pour-Flush Toilets. WRC project final report. South Africa.

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

https://www.dropbox.com/s/qbqkf45sx5ysk25/2014-2015%20VIP%20composition%20analysis.xlsx?dl=0

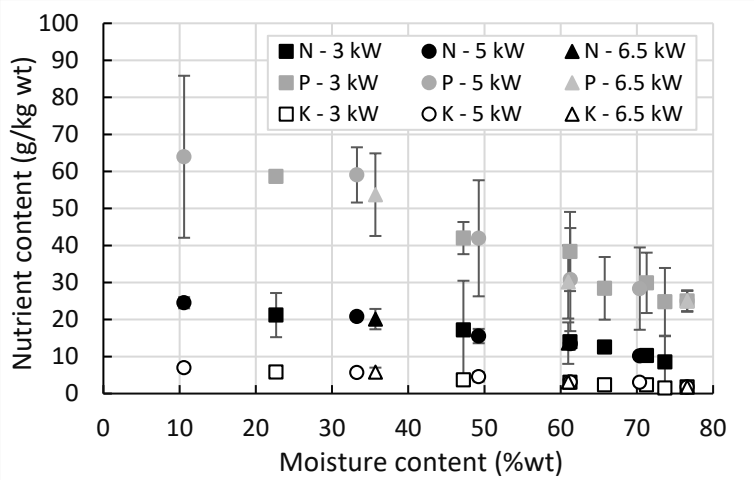
Additional Notes

-

Description of Data

Nitrogen (N), phosphorous (P) and potassium (K) content versus moisture content as a function of the MIR emitter power

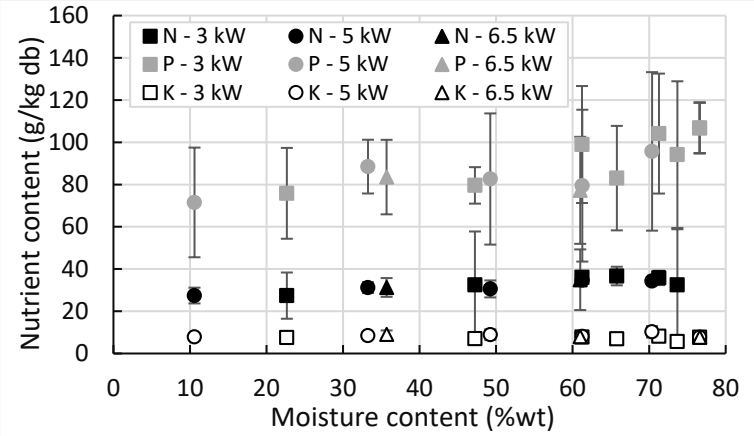
Wet basis



Observations:

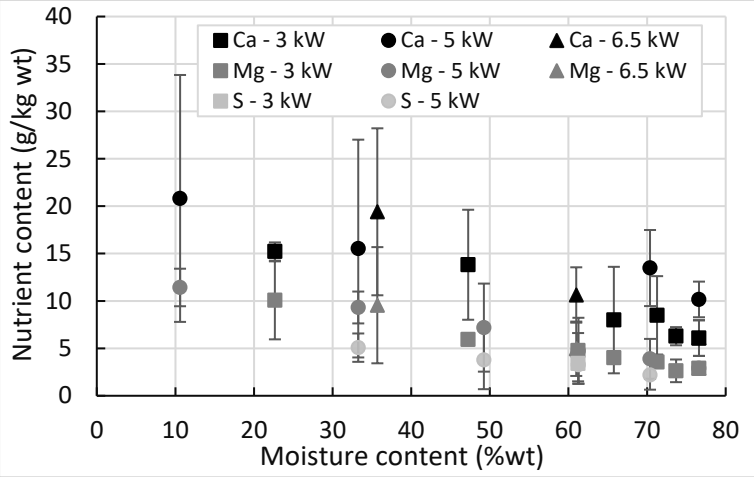
- Increase of nutrient content in wet basis as sludge dried
- Constant nutrient content in dry basis during drying
- No effect of MIR emitter power on the nutrient content

Dry basis

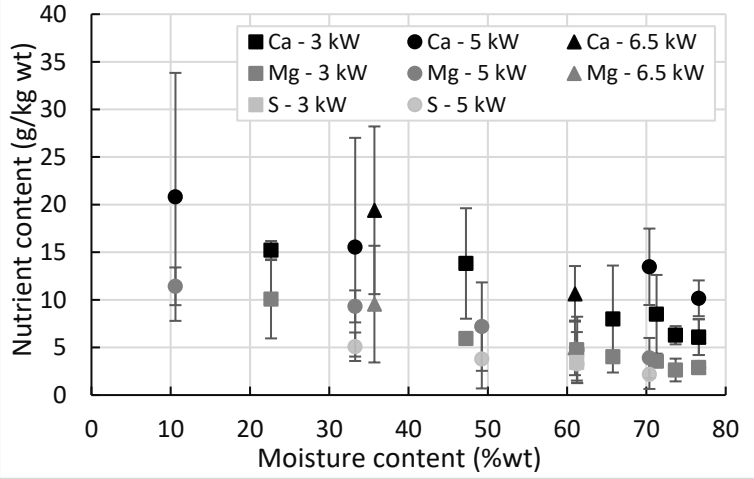


Calcium (Ca), magnesium (Mg) and sulphur (S) content versus moisture content as a function of the MIR emitter power

Wet basis



Dry basis

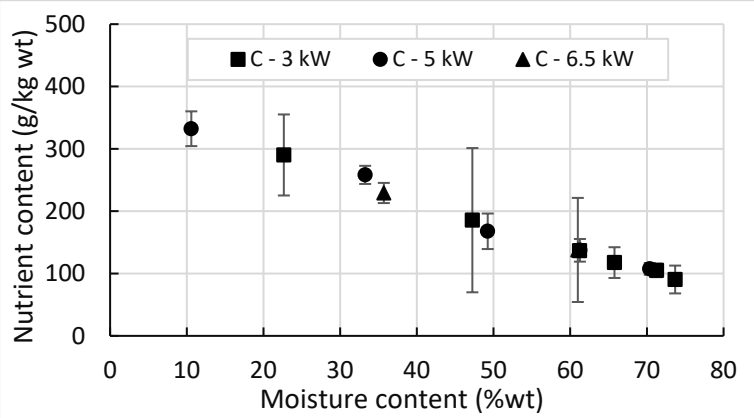


Observations:

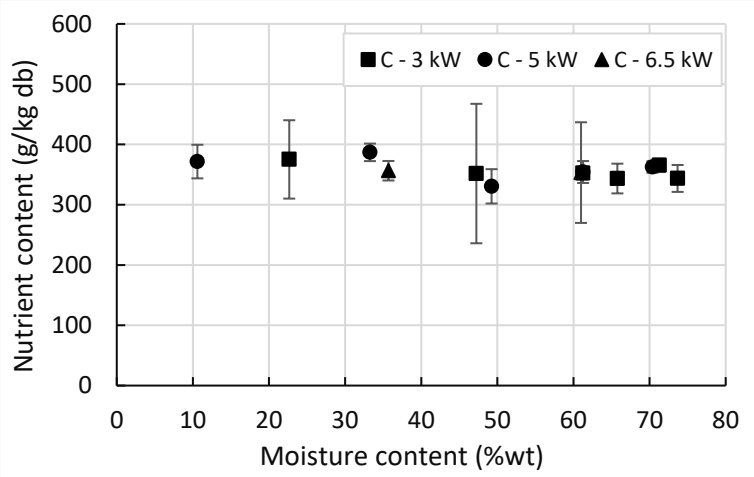
- Increase of nutrient content in wet basis as sludge dried
- Constant nutrient content in dry basis during drying
- No effect of MIR emitter power on the nutrient content

Carbon (C) content versus moisture content as a function of the MIR emitter power

Wet basis

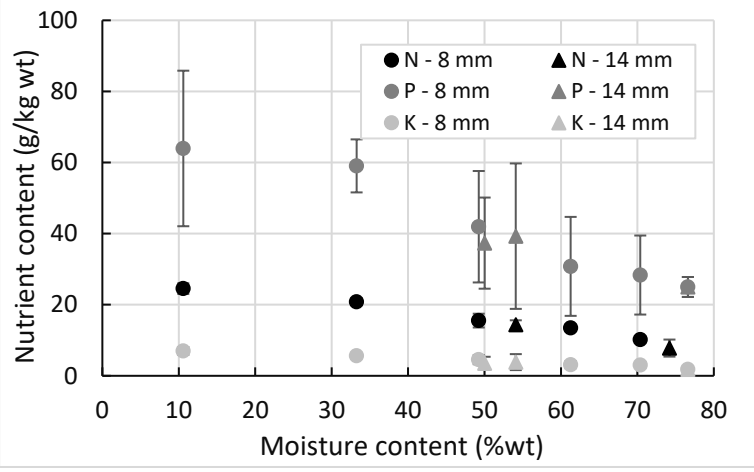


Dry basis



Nitrogen (N), phosphorous (P) and potassium (K) content versus moisture content as a function of the pellet diameter

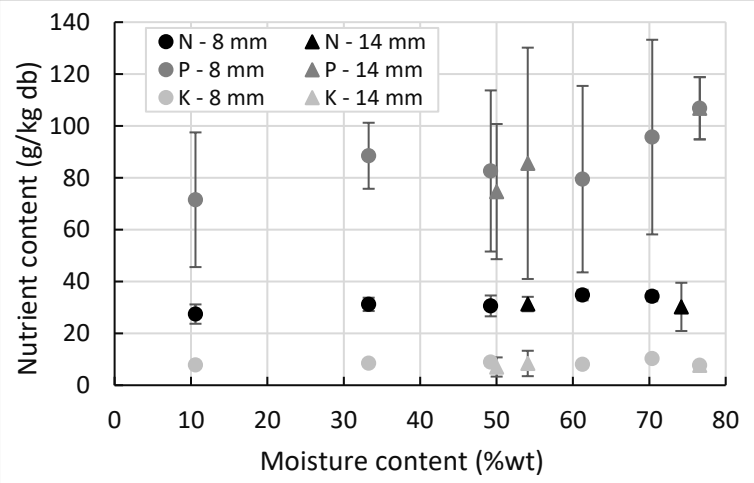
Wet basis



Observations:

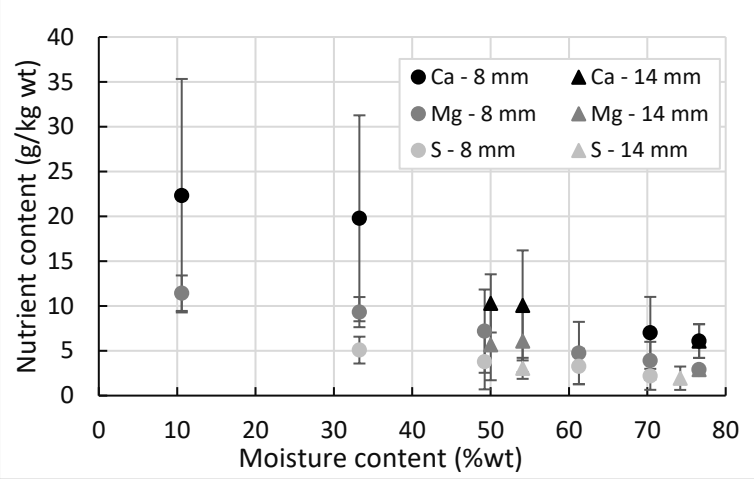
- Increase of nutrient content in wet basis as sludge dried
- Constant nutrient content in dry basis during drying
- No effect of pellet size on the nutrient content

Dry basis

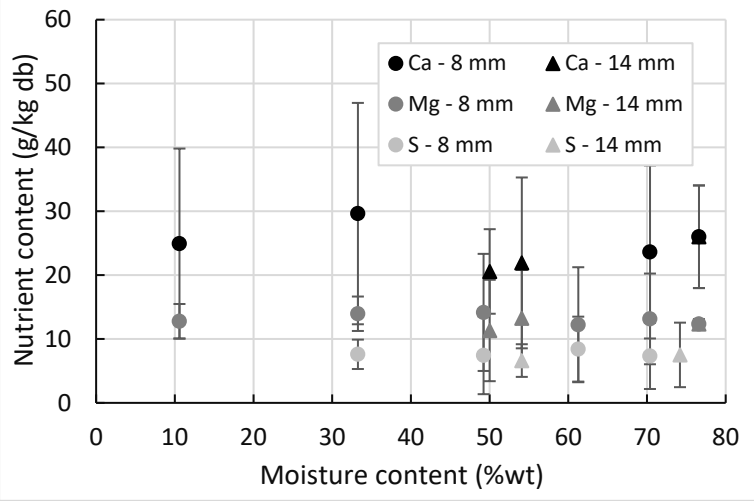


Calcium (Ca), magnesium (Mg) and sulphur (S) content (versus moisture content as a function of the pellet diameter

Wet basis



Dry basis

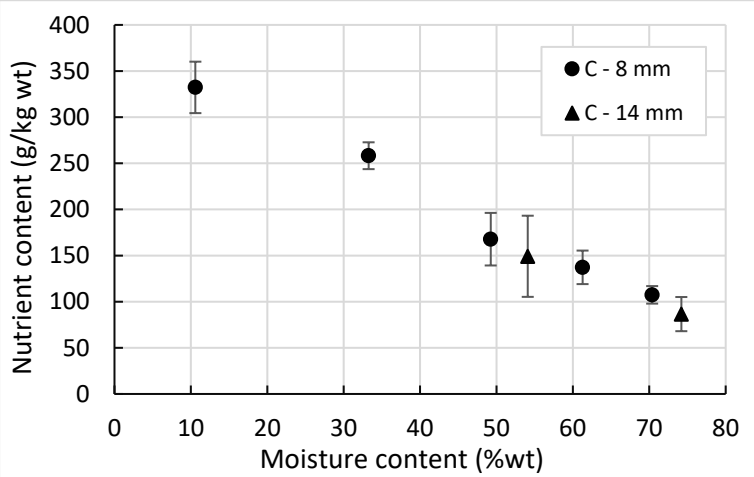


Observations:

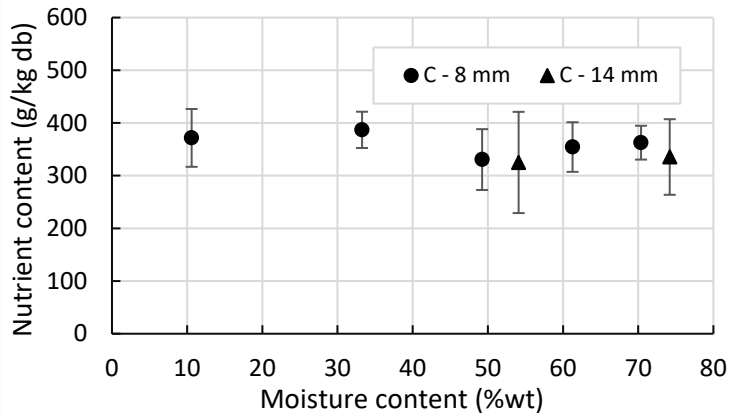
- Increase of nutrient content in wet basis as sludge dried
- Constant nutrient content in dry basis during drying
- No effect of pellet size on the nutrient content

Carbon (C) content versus moisture content as a function of the pellet diameter

Wet basis



Dry basis



General information	
Type of data	Elemental nutrient content
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2014 - 2015
Feedstock	
Type of faecal material	Faecal sludge collected from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 50% db
Ash content	~ 50% db
Presence of trash?	Yes
Pre-treatment	Screening to remove the large pieces of trash
Experimental Procedure	
Drying experimental setup	Custom design convective drying rig
Drying time	Until mass stabilisation
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 0% ○ Air velocity: 0.06 cm/s
Sample form in the dryer	Pellets of 8, 10 and 14 mm diameter
Analysed parameters	Carbon (C), nitrogen (N), sulphur (S), Phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg)
Employed methods	(1) Use of CNS analyzer (SOP 8.7.7.2) (2) Use of microwave plasma – atomic emission spectroscopy (SOP 8.7.7.1)
Publications	
Makununika, B. S. N. (2016). Thermal drying of faecal sludge from vip latrines and characterisation of dried faecal material. Master thesis. University of KwaZulu-Natal, Durban, South Africa.	

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

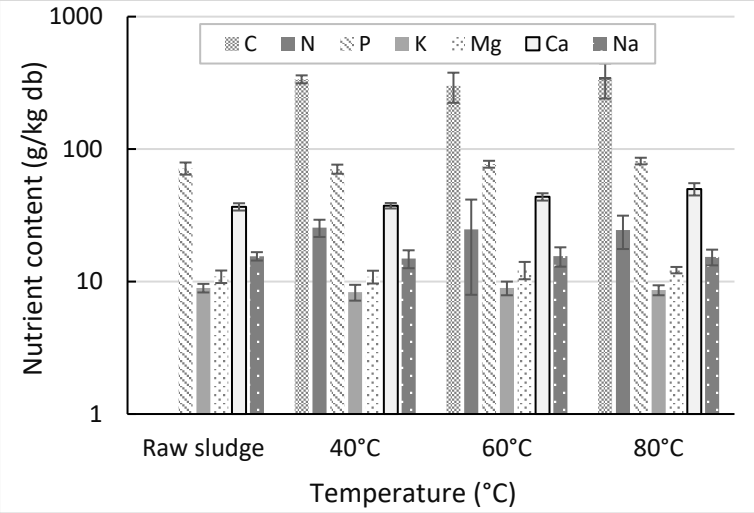
https://www.dropbox.com/s/2dg6xp8s0m5pfse/2014-2015%20VIP%20Physicochemical%20properties.xlsx?dl=0

Additional Notes

-

Description of Data

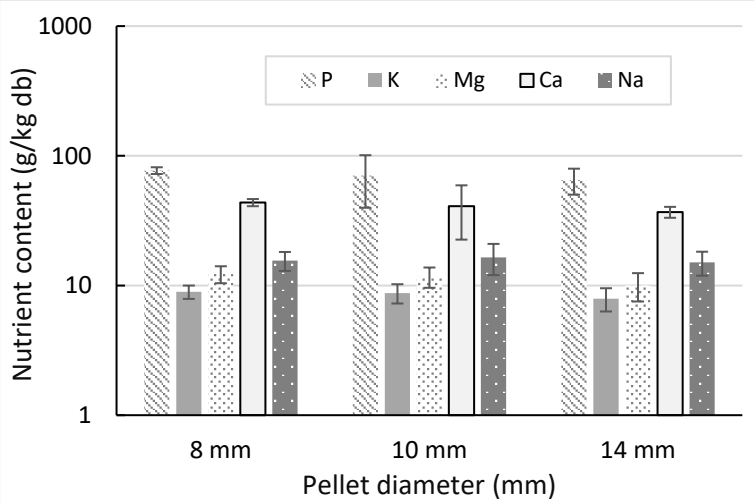
Nutrient content (in dry basis) as a function of temperature



Observations:

- Same nutrient content in dry basis between the raw and dried sludge
- No effect of drying temperature on the nutrient content

Nutrient content (in dry basis) as a function of pellet diameter



Observations:

- Same nutrient content in dry basis between the raw and dried sludge
- No effect of pellet size on the nutrient content

General information	
Type of data	Elemental nutrient content
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal, Durban South Africa
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 85% db
Ash content	~ 15% db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Natural drying (in the open-air)
Drying time	16 weeks
Operating conditions	○ Temperature: ambient (~ 20°C) ○ Relative humidity: ambient (~ 60%)
Sample form in the dryer	900 g of sample placed in 1 L plastic bucket
Analysed parameters	Carbon (C), nitrogen (N), sulphur (S)
Employed methods	Use of CNS analyzer (SOP 8.7.7.2)
Publications	
-	

Data source files

https://www.dropbox.com/s/xbv6su0jxsipiok/2019-2020%20Natural%20drying%20of%20fresh%20faeces%20in%20the%20open%20air_UKZN%20PRG.xlsx?dl=0

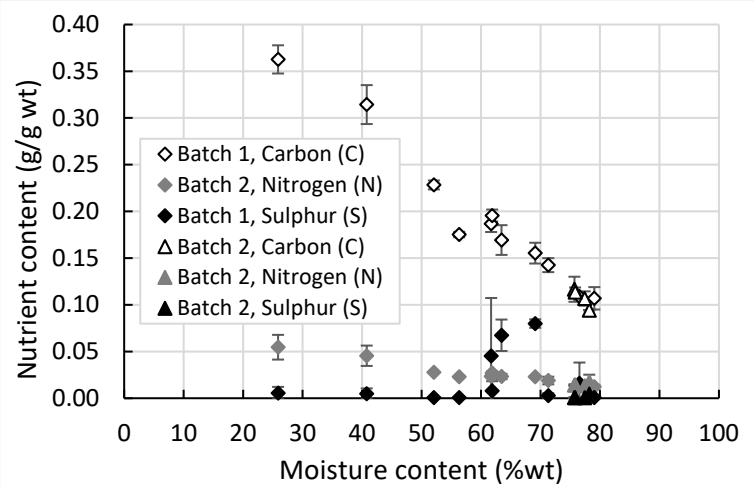
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations
- Containers with sample placed in a ventilated area
- Mesh placed at the opening of the container to avoid the development of maggots
- Samples from batch 1 analysed in a weekly basis for 16 weeks
- Samples from batch 2 analysed at days 0, 3, 5 and 7 during one week

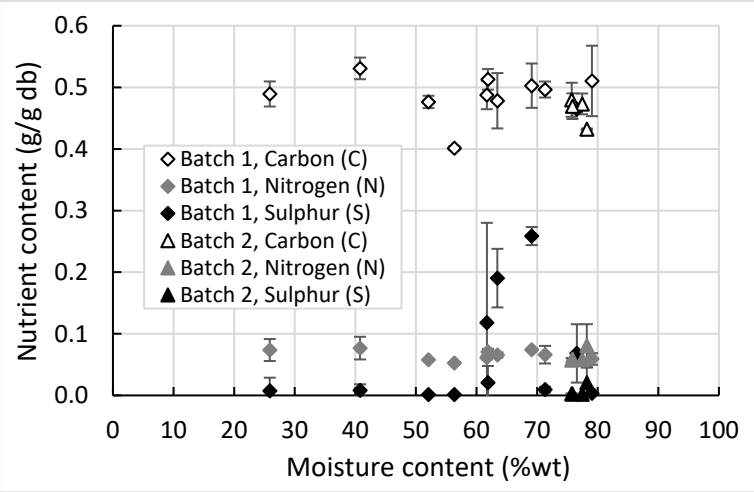
Description of Data

Nutrient content as a function of moisture content for the samples from batch 1 and 2

Wet basis



Dry basis



Observations:

- Increase of the C and N content in wet basis by decreasing the moisture content during drying
- Fairly constant C and N content in dry basis during drying
- No significant variation of the S content during drying

General information	
Type of data	Molecular nutrient content
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2014 - 2015
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	A few years ago
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 70% db
Ash content	~ 30% db
Presence of trash?	Yes
Pre-treatment	○ Screening to remove the large pieces of trash ○ Addition of 3%wt of sawdust for pellets formation
Experimental Procedure	
Drying experimental setup	Laboratory-scale medium infrared (MIR) dryer ('LaDePa')
Drying time	0, 4, 9, 13, 17, 25, 40 min
Operating conditions	○ MIR emitters power: 3, 5 and 6.5 kW (corresponding to ~ 85, 135 and 215°C respectively) ○ Distance between the emitters and the sample: 115 mm ○ Air stream flowrate: 18.3 m^3/min ○ Air humidity: ambient (70-80%)
Sample form in the dryer	Pellets of 8 and 14 mm diameter
Analysed parameters	Ammonium (NH_4^+), nitrites (NO_2^-), nitrates (NO_3^-), phosphates (PO_4^{-3})
Employed methods	Use of spectrophotometer after blending the sample, centrifugation and recovery of the supernatant for analysis (SOP 8.7.5.1; 8.7.5.4; 8.7.5.10)

Publications

Mirara, S.W. (2017). Drying and Pasteurisation of VIP Latrine Faecal Sludge using a Bench Scale Medium Infrared Machine. Master thesis. University of KwaZulu-Natal, Durban, South Africa.

Septien, S., Mirara, S.W., Singh, A., Velkushanova, K., & Buckley, C. (2018). Characterisation of On-Site Sanitation Material and Products: VIP Latrines and Pour-Flush Toilets. WRC project final report. South Africa.

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

https://www.dropbox.com/s/qbqkf45sx5ysk25/2014-2015%20VIP%20composition%20analysis.xlsx?dl=0

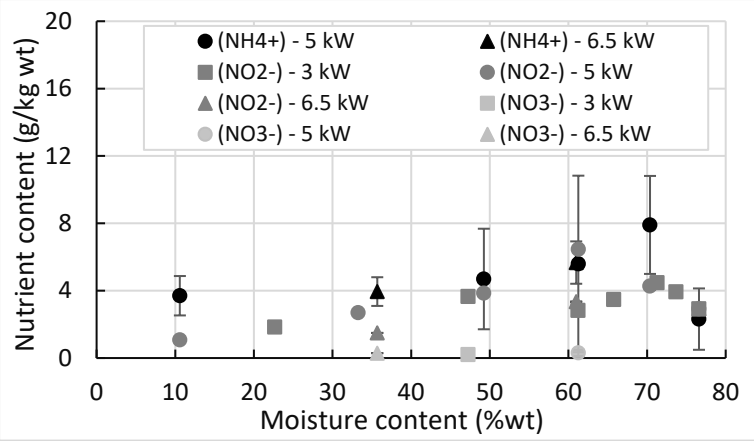
Additional Notes

-

Description of Data

Ammonium (NH_4^+), nitrites (NO_2^-) and nitrates (NO_3^-) content versus moisture content as a function of the MIR emitter power

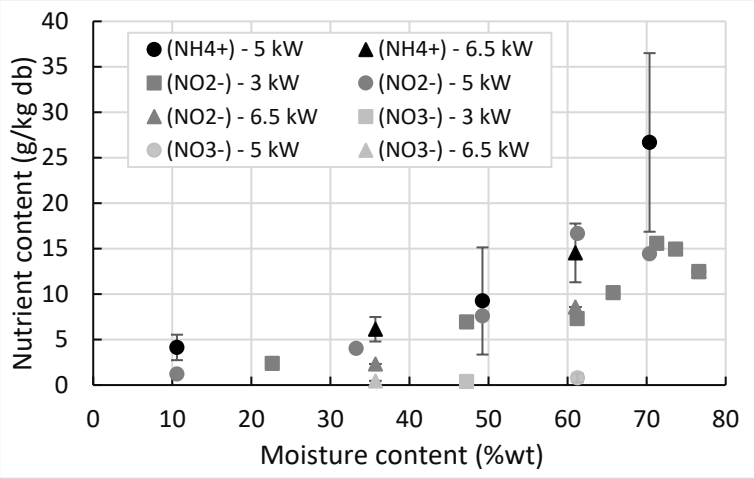
Wet basis



Observations:

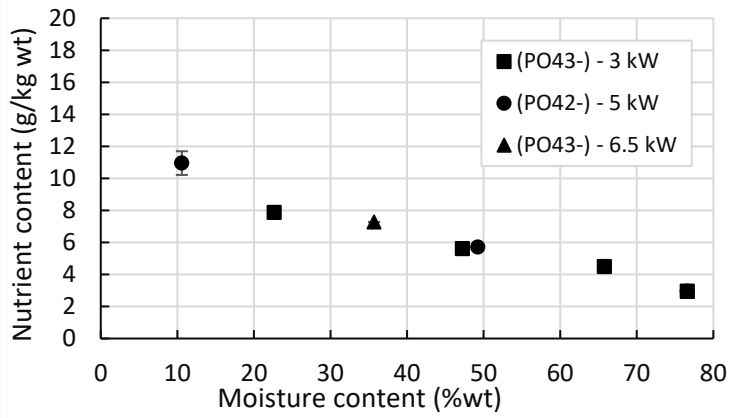
- Decrease of nutrient content as sludge dried (in both wet and dry basis)
- No effect of MIR emitter power on the nutrient content

Dry basis

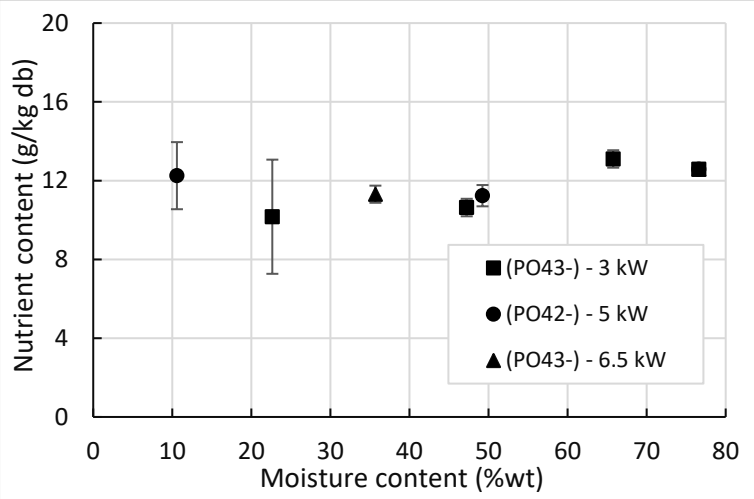


Phosphates (PO_4^{3-}) content versus moisture content as a function of the MIR emitter power

Wet basis



Dry basis



Observations:

- Decrease of nutrient content as sludge dried (in both wet and dry basis)
- No effect of MIR emitter power on the nutrient content

General information	
Type of data	Molecular nutrient content
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2014 - 2015
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 50% db
Ash content	~ 50% db
Presence of trash?	Yes
Pre-treatment	Screening to remove the large pieces of trash
Experimental Procedure	
Drying experimental setup	Custom design convective drying rig
Drying time	Until mass stabilisation
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 0% Air velocity: 0.06 cm/s
Sample form in the dryer	Pellets of 8 mm diameter
Analysed parameters	Ammonium (NH_4^+), nitrites (NO_2^-), nitrates (NO_3^-), phosphates (PO_4^{-3})
Employed methods	Use of spectrophotometer after blending the sample, centrifugation and recovery of the supernatant for analysis (SOP 8.7.5.1; 8.7.5.4; 8.7.5.10)
Publications	
Makununika, B. S. N. (2016). Thermal drying of faecal sludge from VIP latrines and characterisation of dried faecal material. Master thesis. University of KwaZulu-Natal, Durban, South Africa.	

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

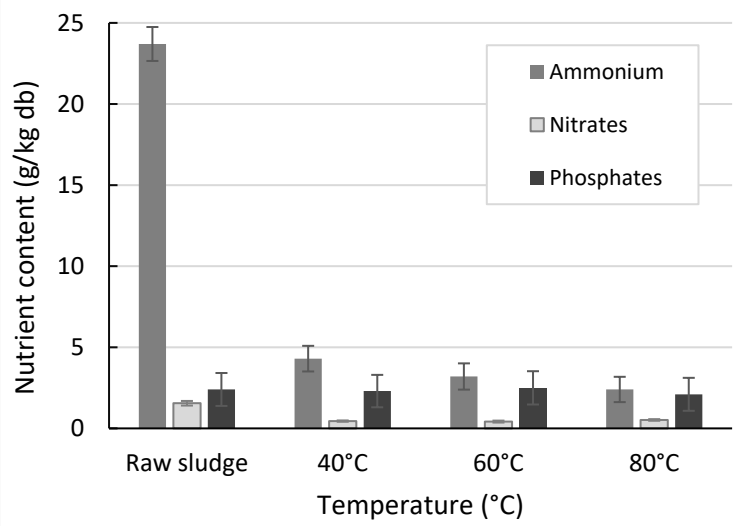
https://www.dropbox.com/s/2dg6xp8s0m5pfse/2014-2015%20VIP%20Physicochemical%20properties.xlsx?dl=0

Additional Notes

-

Description of Data

Ammonium (NH_4^+), nitrites (NO_2^-) and phosphates (PO_4^{3-}) as a function of temperature



Observations:

- Decrease of NH_4^+ and NO_2^- content in the dried sludge with respect to the raw material
- Same PO_4^{-3} content between the raw and dried sludge
- No effect of drying temperature on the nutrient content

General information	
Type of data	Molecular nutrient content
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 85% db
Ash content	~ 15% db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Natural drying (in the open-air)
Drying time	16 weeks
Operating conditions	○ Temperature: ambient (~ 20°C) ○ Relative humidity: ambient (~ 60%)
Sample form in the dryer	900 g sample in 1 L plastic bucket
Analysed parameters	Ammonium (NH_4^+) and nitrates (NO_3^-)
Employed methods	Use of spectrophotometer after blending the sample (SOP 8.7.5.6 and 8.7.5.10)
Publications	
-	

Data source files

https://www.dropbox.com/s/xbv6su0jxsipiok/2019-2020%20Natural%20drying%20of%20fresh%20faeces%20in%20the%20open%20air_UKZN%20PRG.xlsx?dl=0

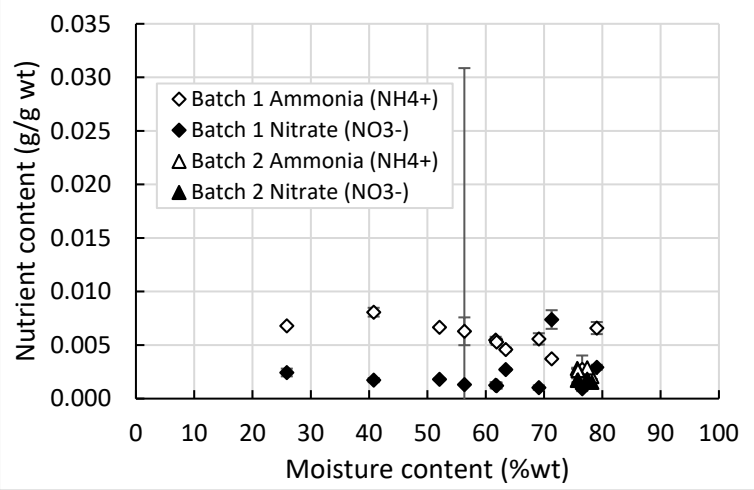
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations
- Containers with sample placed in a ventilated area
- Mesh placed at the opening of the container to avoid the development of maggots
- Samples from batch 1 analysed in a weekly basis for 16 weeks
- Samples from batch 2 analysed at days 0, 3, 5 and 7 within initial week

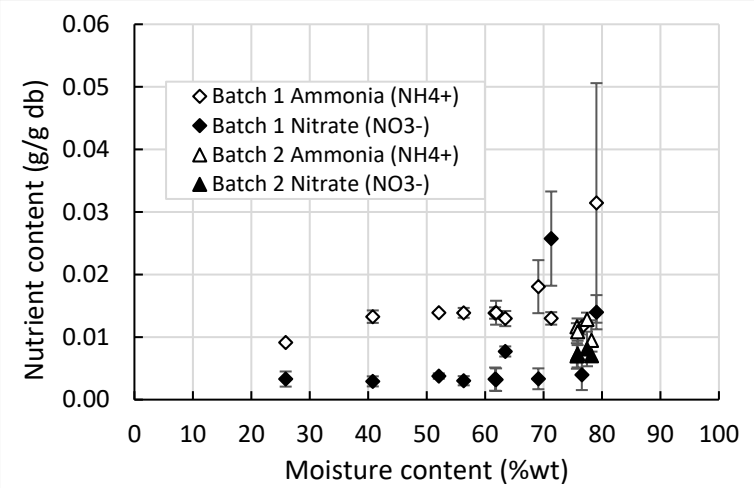
Description of Data

Nutrient content as a function of moisture content for the samples from batch 1 and 2

Wet basis



Dry basis



Observations:

- No significant variation of the nutrient content during drying

General information	
Type of data	Density
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2017 - 2018
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 50%db
Ash content	~ 50%db
Presence of trash?	Yes
Pre-treatment	Screening to remove the large pieces of trash
Experimental Procedure	
Drying experimental setup	Custom-design solar thermal drying rig
Drying time	3 to 5 hours
Operating conditions	○ Irradiance: from 75 to 1000 W/m^2 (from overcast to sunny conditions) ○ Air flowrate: 0.5 m^3/min (corresponding to an air velocity of 0.5 and 1 m/s) ○ Air temperature: ambient (~20°C) ○ Air humidity: ~10%
Sample form in the dryer	Thin layer of 5 and 10 mm thickness, and 60 mm diameter
Analysed parameters	Density and Moisture content
Employed method	(1) Measurement of the volume (through the measurement of dimensions) and weight of the sample (SOP 8.8.2.1) (2) Weighing the sample before and after oven drying at 105°C for 24 h (SOP 8.7.1.1)

Publications

Mugauri, T.R. (2019). *Drying of faecal sludge from ventilated improved pit latrines (VIP latrines) using solar thermal energy*. MSc thesis, University of KwaZulu-Natal, South Africa.

Septien, S., Mugauri, T.R., Singh, A., Inambao, F. (2018). *Solar drying of faecal sludge from on-site sanitation facilities*. 5th Southern Africa Solar Thermal Energy Conference, Durban, South Africa, 25-27 June.

Septien, S., Mugauri, T.R., Singh, A., Inambao, F. (2017). *Drying of Faecal Sludge using Solar Thermal Energy* (final report project K5/2582). Water Research Commission, South Africa.

Data source files

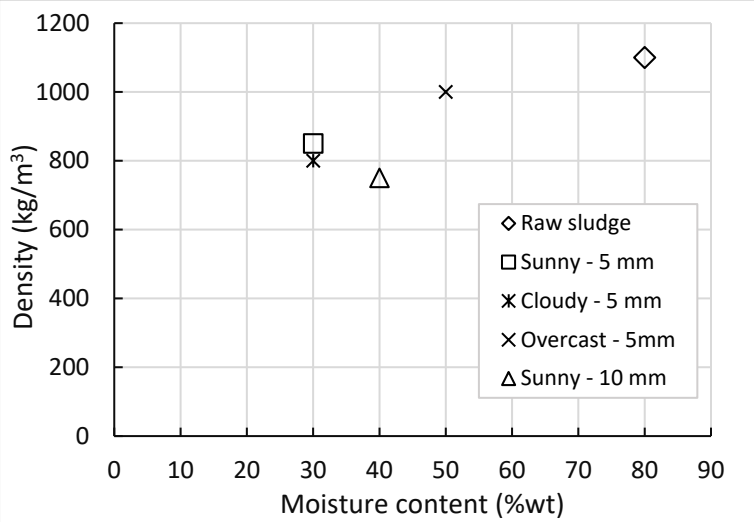
https://www.dropbox.com/s/ssumqzociucjaj2/Shrinkage%20of%20VIP%20sludge%20%282017-2018%29.xlsx?dl=0

Additional Notes

- Low precision of the current method (rough estimation)

Description of Data

Density versus the moisture content obtained after drying at the different conditions



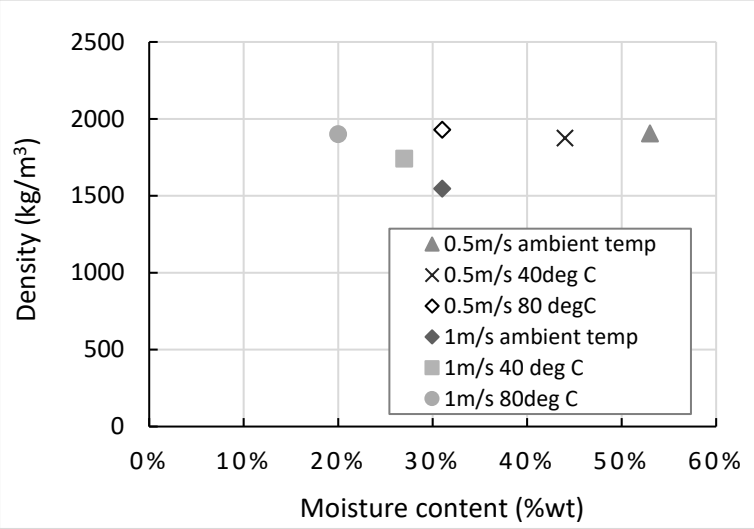
Observations

- Decrease of density as sample dried at lower moisture content

General information	
Type of data	Density
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	Small amounts of trash
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Laboratory scale solar convective drying rig
Drying time	5 hours
Operating conditions	○ Irradiance: 800 – 1300 W/m^2 (sunny conditions) ○ Air flowrate: 0.5 and 1 m^3/min (corresponding to an air velocity of 0.5 and 1 m/s) ○ Air temperature: ambient (~20°C), 40 and 80°C ○ Air humidity: ~10%
Sample form	Thin layer of 5 mm thickness and 110 mm diameter
Analysed parameters	Density
Employed method	Measurement of the volume (through the measurement of dimensions) and weight of the sample (SOP 8.8.2.1)
Publications	
-	

Data source files
https://www.dropbox.com/s/gscuvzvus55zfsr/2019-2020%20VIP%20Shrinkage%20data.xlsx?dl=0
Additional Notes
○ Density measured on the sample obtained at the end of a few experiments ○ Low precision of the current method (rough estimation)
Description of Data

Density versus the moisture content at the end of a few experiments



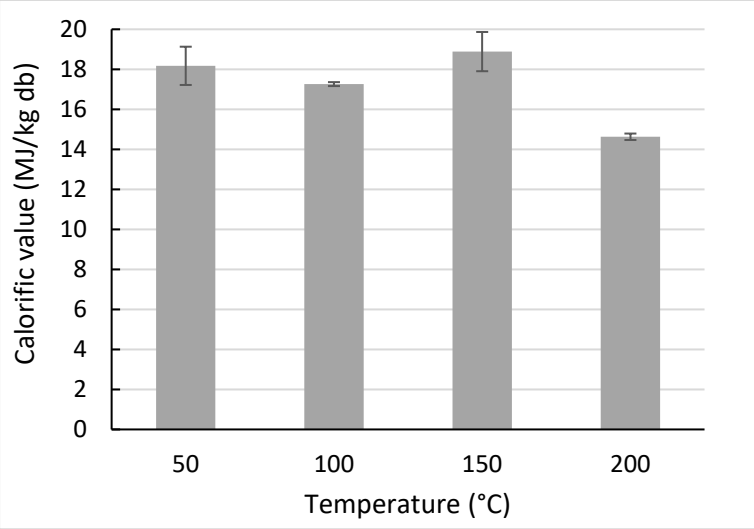
Observations:

- No significant variation of the density

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from anaerobic baffled reactor (ABR) from a decentralised wastewater treatment plant (DEWAT)
Location of collection	Durban, South Africa
Age before collection	Unknown
Moisture content	~ 90%wt
Total solids content	~ 10%wt
Volatile solids content	~ 75%db
Ash content	~ 25%db
Presence of trash?	Yes (mainly small pieces of paper after pre-screening during pit emptying)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until completely dry
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Data source files
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Gross calorific value as a function of temperature



Observations:

- Similar gross calorific value between 50 and 150°C
- Significant decrease at 200°C (possible thermal degradation)

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from anaerobic baffled reactor (ABR) from a decentralised wastewater treatment plant (DEWAT)
Location of collection	Durban, South Africa
Age before collection	Unknown
Moisture content	~ 90%wt
Total solids content	~ 10%wt
Volatile solids content	~ 75%db
Ash content	~ 25%db
Presence of trash?	Yes (mainly small pieces of paper after pre-screening during pit emptying)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

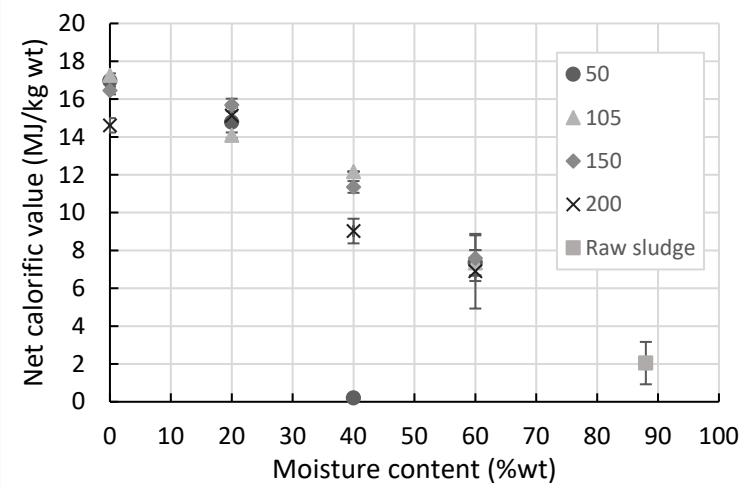
Additional Notes

-

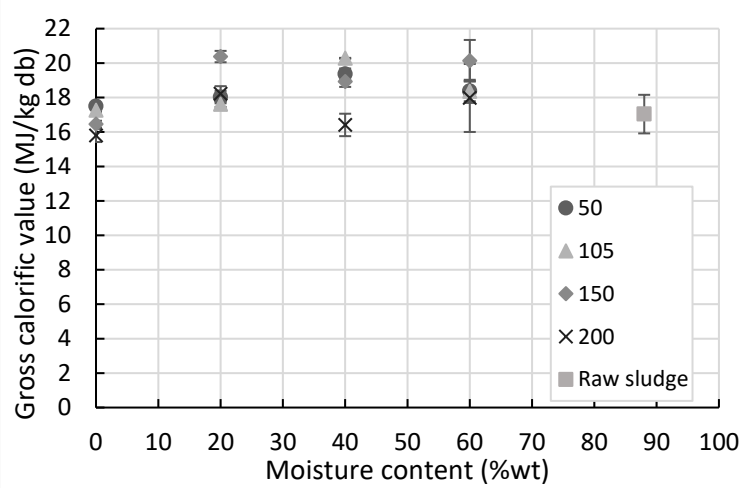
Description of Data

Calorific value as a function of moisture content and temperature

Wet basis



Dry basis



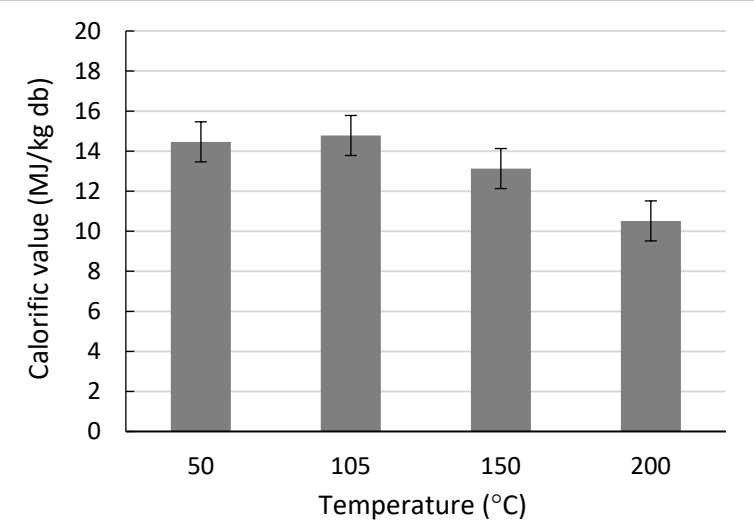
Observations:

- Increase of net calorific value as sludge dried
- Constant gross calorific value as sludge dried
- No effect of temperature

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilets (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until completely dry
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Data source files
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Gross calorific value as a function of temperature



Observations:

- Similar gross calorific value between 50 and 150°C
- Significant decrease at 200°C (possible thermal degradation)

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilets (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

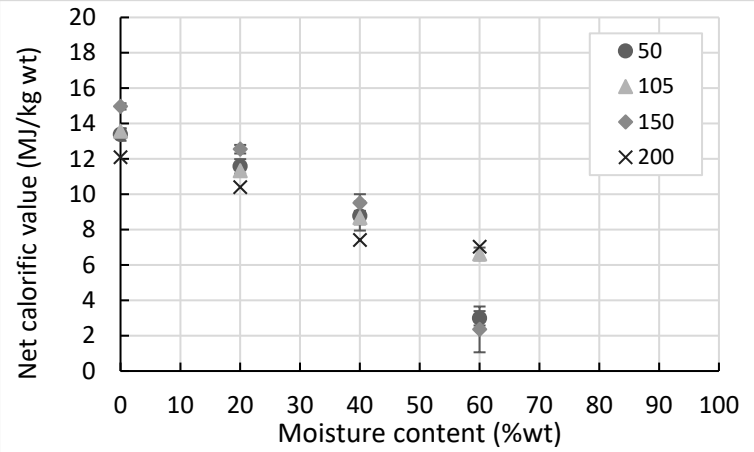
Additional Notes

-

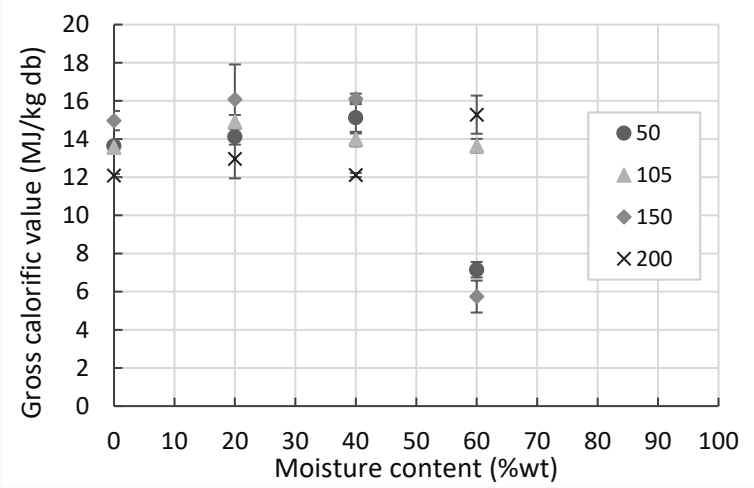
Description of Data

Calorific value as a function of moisture content and temperature

Wet basis



Dry basis



Observations:

- Increase of net calorific value as sludge dried
- Constant gross calorific value as sludge dried
- No effect of temperature
- Possible experimental error for 60%wt sample at 50 and 150°C

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2014 - 2015
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80% wt
Total solids content	~ 20% wt
Volatile solids content	~ 70% db
Ash content	~ 30% db
Presence of trash?	Yes
Pre-treatment	○ Screening to remove the large pieces of trash ○ Addition of 3%wt of sawdust for pellets formation
Experimental Procedure	
Drying experimental setup	Laboratory-scale medium infrared (MIR) dryer ('LaDePa')
Drying time	0, 4, 9, 13, 17, 25, 40 min
Operating conditions	○ MIR emitters power: 3, 5 and 6.5 kW (corresponding to ~ 85, 135 and 215°C respectively) ○ Distance between the emitters and the sample: 115 mm ○ Air stream flowrate: 18.3 m^3/min ○ Air humidity: ambient (70-80%)
Sample form in the dryer	Pellets of 8, 10, 12 and 14 mm diameter
Analysed parameters	Calorific Value
Employed methods	Use of calorimeter (SOP 8.8.1.1)

Publications

Mirara, S.W. (2017). Drying and Pasteurisation of VIP Latrine Faecal Sludge using a Bench Scale Medium Infrared Machine. Master thesis. University of KwaZulu-Natal, Durban, South Africa.

Septien, S., Mirara, S.W., Singh, A., Velkushanova, K., & Buckley, C. (2018). Characterisation of On-Site Sanitation Material and Products: VIP Latrines and Pour-Flush Toilets. WRC project final report. South Africa.

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

https://www.dropbox.com/s/qbqkf45sx5ysk25/2014-2015%20VIP%20composition%20analysis.xlsx?dl=0

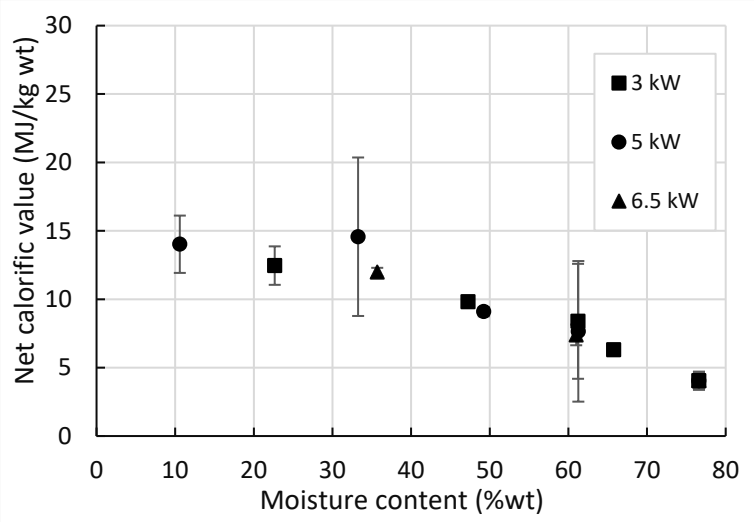
Additional Notes

-

Description of Data

Calorific value (wet and dry basis respectively) versus moisture content as a function of the MIR emitter power

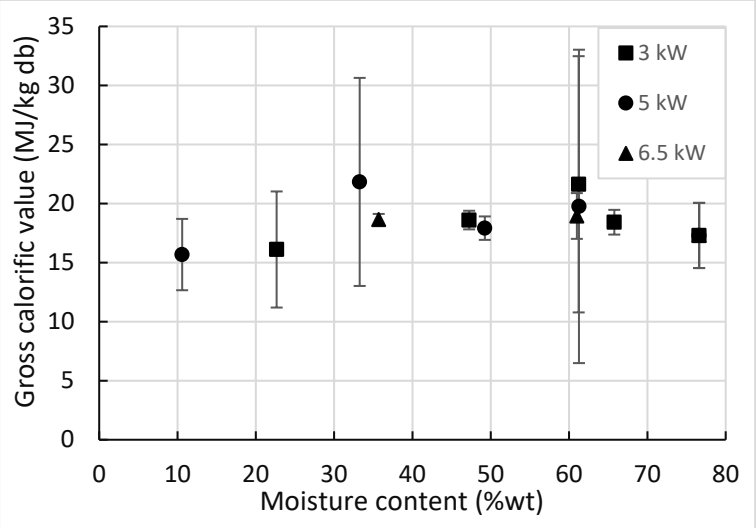
Wet basis



Observations:

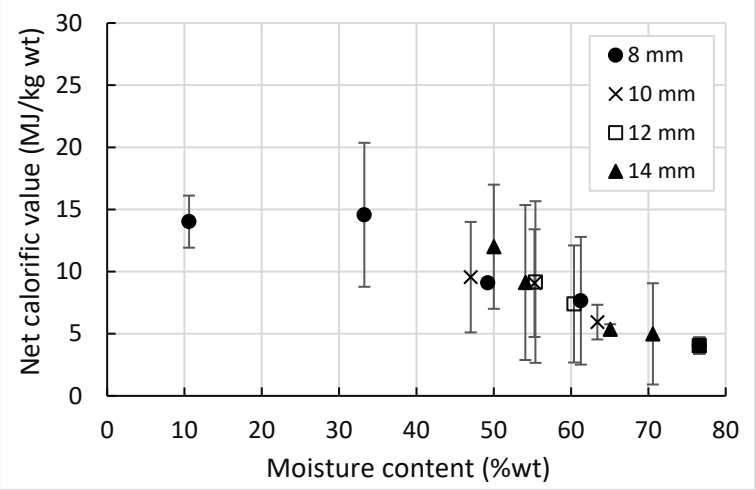
- Increase of net calorific value as sludge dried
- Constant gross calorific value during drying
- No effect of MIR emitter power on the calorific value

Dry basis

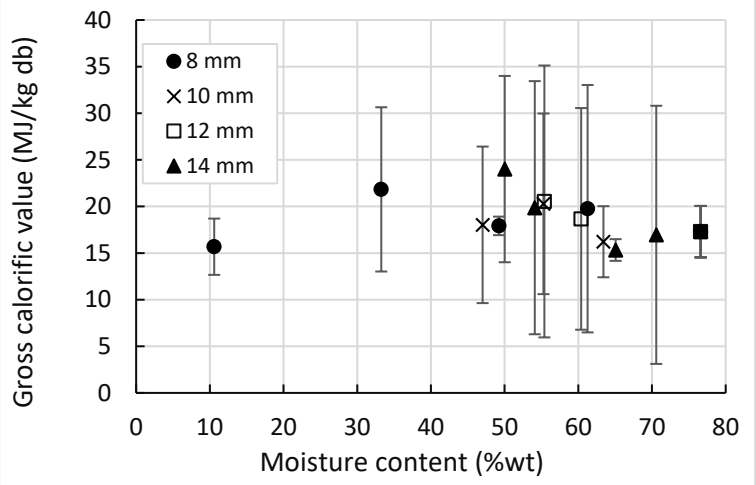


Net and gross calorific value versus moisture content as a function of the pellet diameter

Wet basis



Dry basis



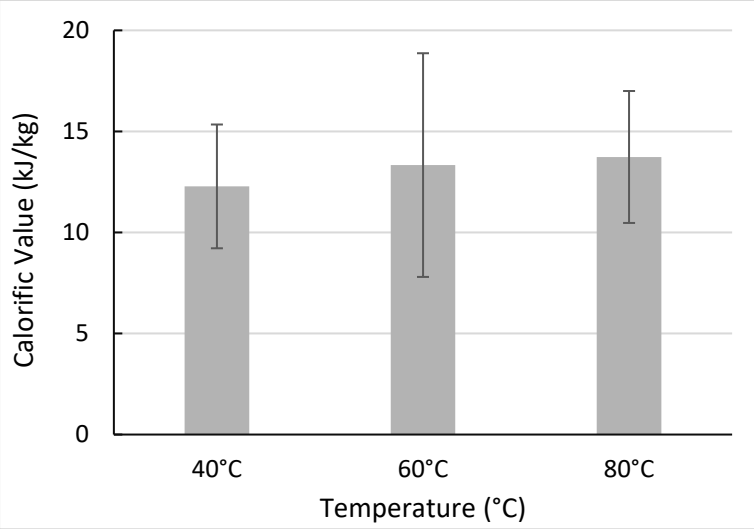
Observations:

- Increase of net calorific value as sludge gets
- Constant gross calorific value during drying
- No effect of pellet diameter on the calorific value

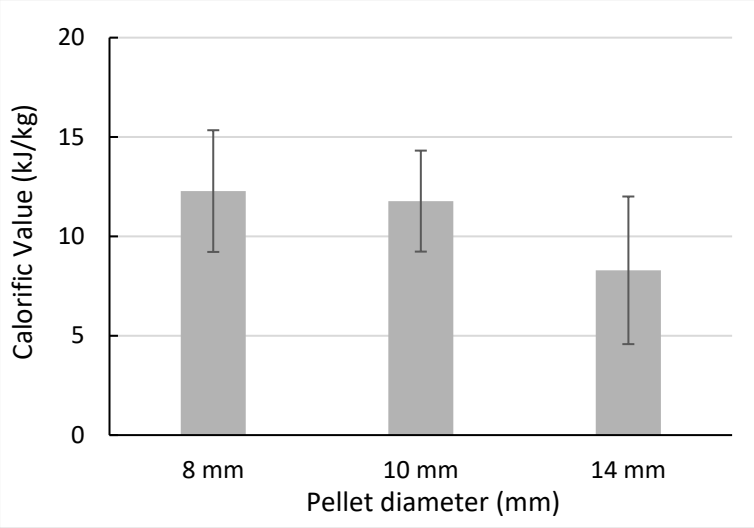
General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal Durban, South Africa
Dates of the experiments	2015-2016
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 50%db
Ash content	~ 50%db
Presence of trash?	Yes
Pre-treatment	Screening to remove the large pieces of trash
Experimental Procedure	
Drying experimental setup	Custom design convective drying rig
Drying time	Until mass stabilisation
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 0% ○ Air velocity: 0.06 cm/s
Sample form in the dryer	Pellets of 8, 10 and 14 mm diameter
Analysed parameters	Calorific Value
Employed methods	Use of calorimeter (SOP 8.8.1.1)
Publications	
-	

Data source files
https://www.dropbox.com/s/2dg6xp8s0m5pfse/2014-2015%20VIP%20Physicochemical%20properties.xlsx?dl=0
Additional Notes
○ Sludge almost completely dried
Description of Data

Calorific value as a function of temperature



Calorific value as a function of pellet diameter



Observations:

- No effect of temperature and pellet size on the calorific value

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 40%db
Ash content	~ 60%db
Presence of trash?	Yes (mainly hair extensions and rocks)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

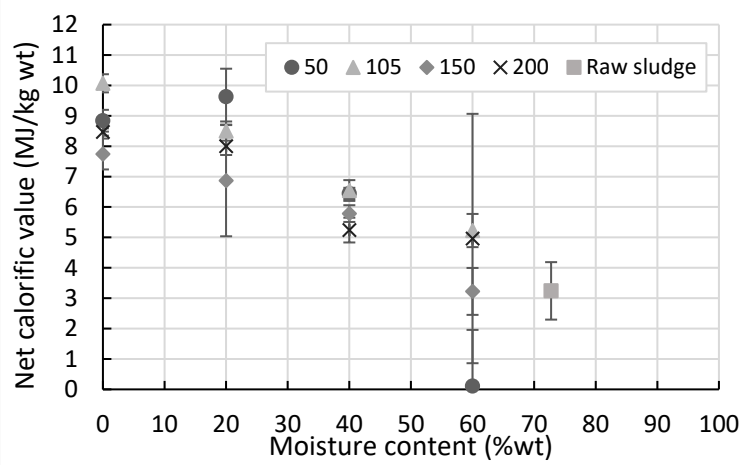
Additional Notes

-

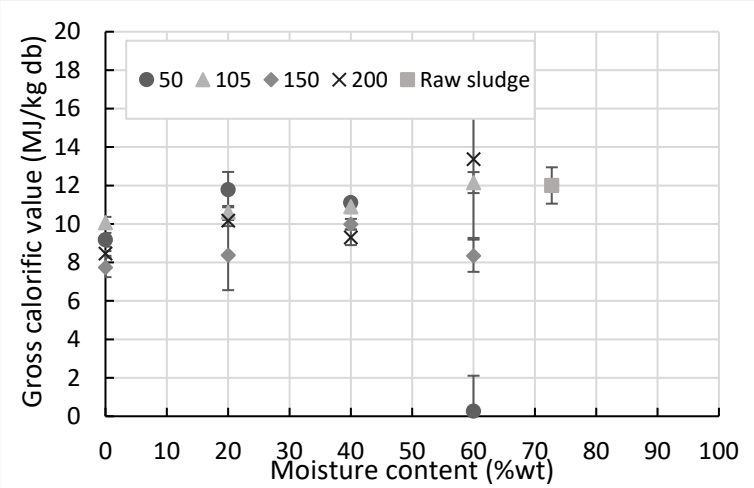
Description of Data

Calorific value as a function of moisture content and temperature

Wet basis



Dry basis



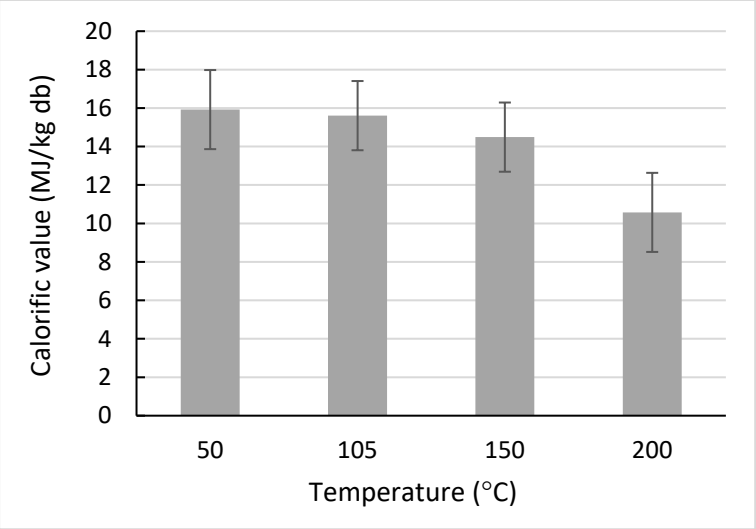
Observations:

- Increase of net calorific value as sludge dried
- Constant gross calorific value as sludge dried
- No effect of temperature
- Possible experimental error for 60%wt sample at 50°C

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 95%wt
Total solids content	~ 5%wt
Volatile solids content	~ 65%db
Ash content	~ 35%db
Presence of trash?	No (sludge pre-screened during pit emptying)
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until complete drying
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Data source files
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Gross calorific value as a function of temperature



Observations:

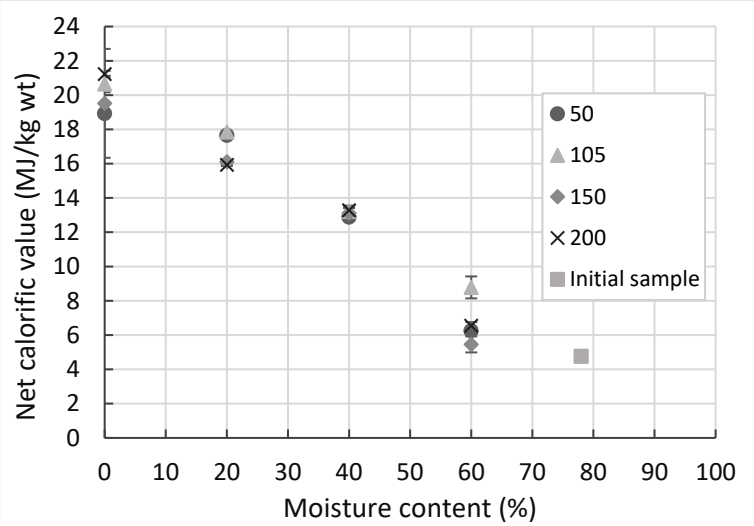
- Similar gross calorific value between 50 and 150°C
- Significant decrease at 200°C (possible thermal degradation)

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 85%db
Ash content	~ 15%db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until complete drying
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1)
Publications	
-	

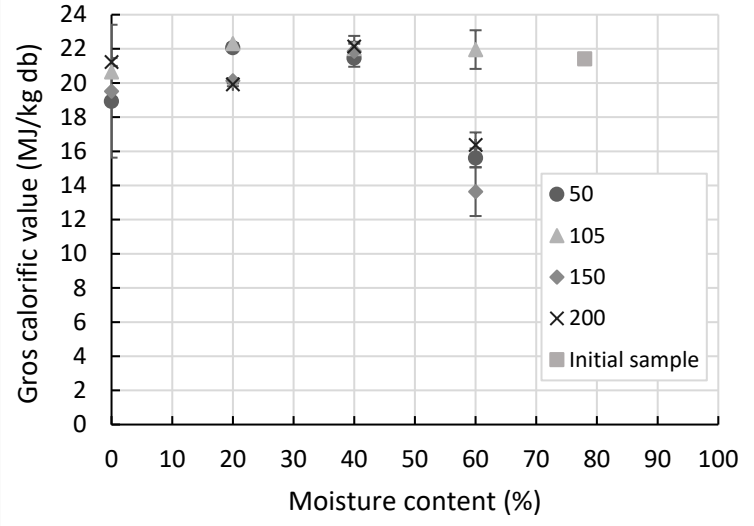
Data source files
https://www.dropbox.com/s/vpa68hptk81v4e4/2019%20Fresh%20faeces%20tests_PRG.xlsx?dl=0
Additional Notes
Fresh faeces collected from voluntary and anonymous donations
Description of Data

Calorific value as a function of moisture content and temperature

Wet basis



Dry basis



Observations:

- Increase of net calorific value as sludge dried
- Constant gross calorific value as sludge dried (except for the outliers corresponding to the samples with 60%wt at 60°C)
- No effect of temperature

General information	
Type of data	Calorific value
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 85%db
Ash content	~ 15%db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Natural drying (in the open-air)
Drying time	16 weeks
Operating conditions	○ Temperature: ambient (~ 20°C) ○ Relative humidity: ambient (~ 60%)
Sample form in the dryer	900 g of sample in 1 L plastic bucket
Analysed parameters	Calorific value
Employed method	Use of calorimeter bomb *Parr 6200* (SOP 8.8.1.1.)
Publications	
-	

Data source files

https://www.dropbox.com/s/xbv6su0jxsipiok/2019-2020%20Natural%20drying%20of%20fresh%20faeces%20in%20the%20open%20air_UKZN%20PRG.xlsx?dl=0

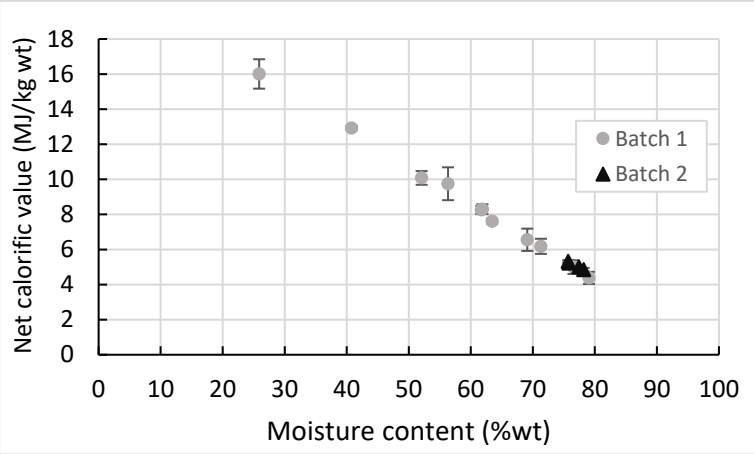
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations
- Containers with the sample placed in a ventilated area
- Mesh placed at the opening of the container to avoid the development of maggots
- Samples from batch 1 analysed in a weekly basis for 16 weeks
- Samples from batch 2 analysed at days 0, 3, 5 and 7 during one week

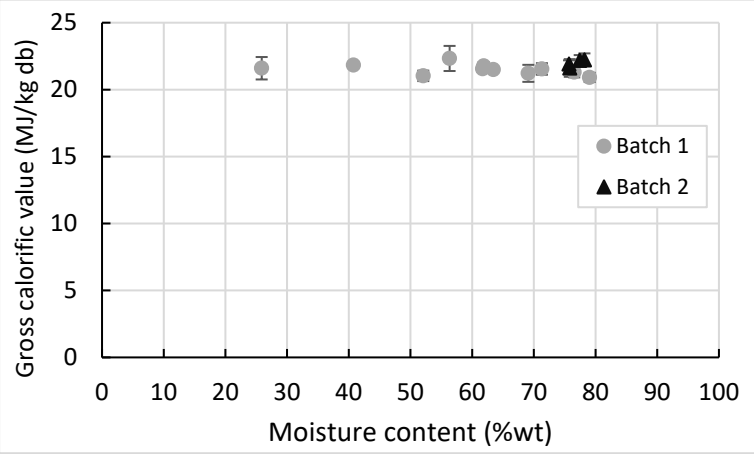
Description of Data

Calorific value as a function of moisture content of the faeces for the samples from batch 1 and 2

Wet basis



Dry basis



Observations:

- Increase of net calorific value by decreasing the moisture content during drying
- Constant gross calorific value during drying

General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from anaerobic baffled reactor (ABR) from a decentralised wastewater treatment plant (DEWAT)
Location of collection	Durban, South Africa
Age before collection	Unknown
Moisture content	~ 90%wt
Total solids content	~ 10%wt
Volatile solids content	~ 75%db
Ash content	~ 25%db
Presence of trash?	Yes (mainly small pieces of paper after pre-screening during pit emptying)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

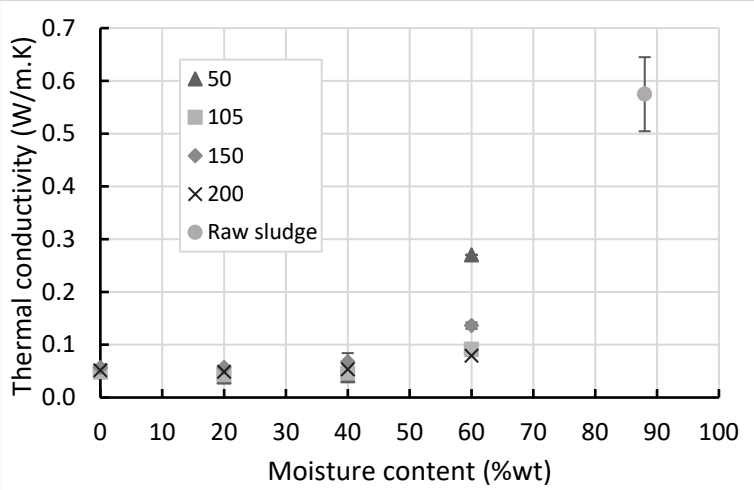
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

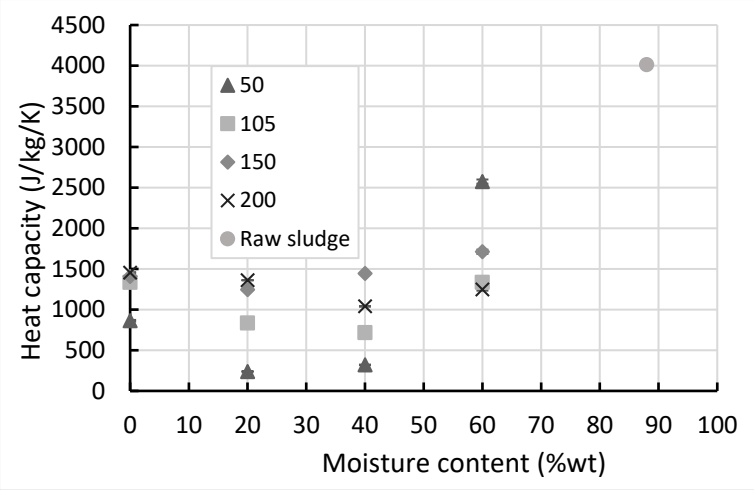
-

Description of Data

Thermal conductivity as a function of moisture content and temperature



Heat capacity as a function of moisture content and temperature



Observations:

- Decrease of the thermal conductivity as sludge dried until achieving 40%wt moisture content
- Stabilization of thermal conductivity below 40%wt
- No clear trend with the heat capacity
- No effect of temperature on the thermal conductivity and heat capacity

General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018-2019
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilets (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

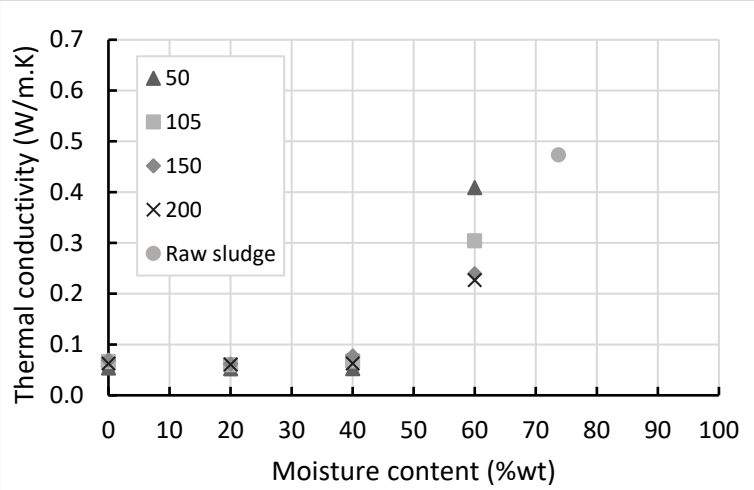
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

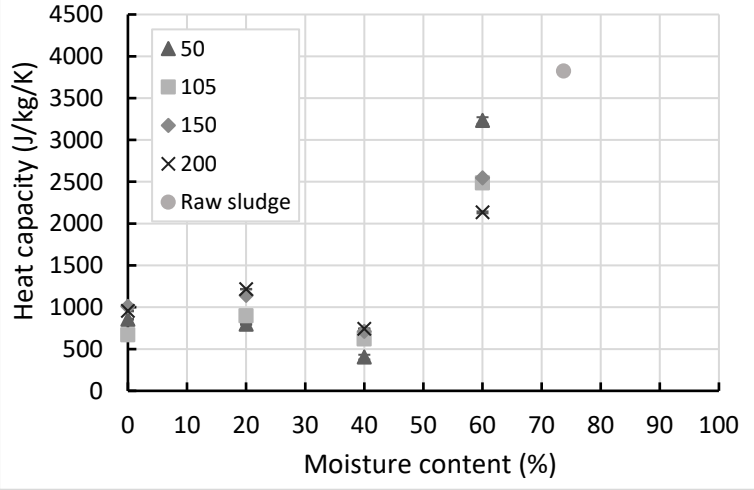
-

Description of Data

Thermal conductivity as a function of moisture content and temperature



Heat capacity as a function of moisture content and temperature



Observations:

- Decrease of the thermal conductivity and heat capacity as sludge dried until achieving 40%wt moisture content
- Stabilization below 40%wt
- No effect of temperature

General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018-2019
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilets (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

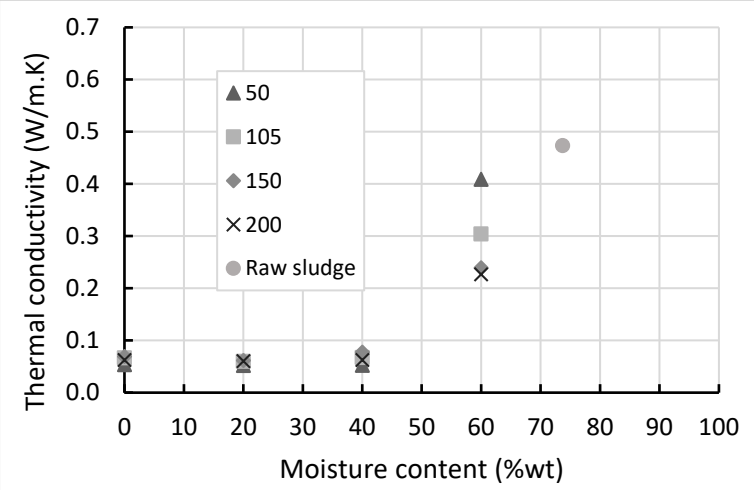
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

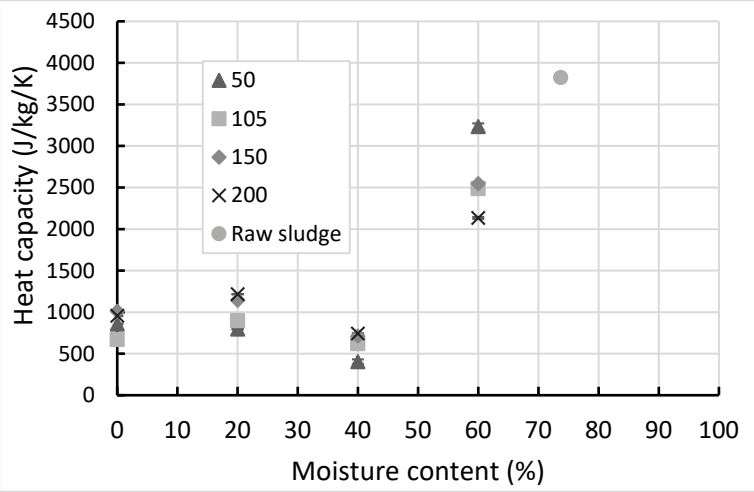
-

Description of Data

Thermal conductivity as a function of moisture content and temperature



Heat capacity as a function of moisture content and temperature



Observations:

- Decrease of the thermal conductivity and heat capacity as sludge dried until achieving 40%wt moisture content
- Stabilization below 40%wt
- No effect of temperature

General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018-2019
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilets (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 55%db
Ash content	~ 45%db
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

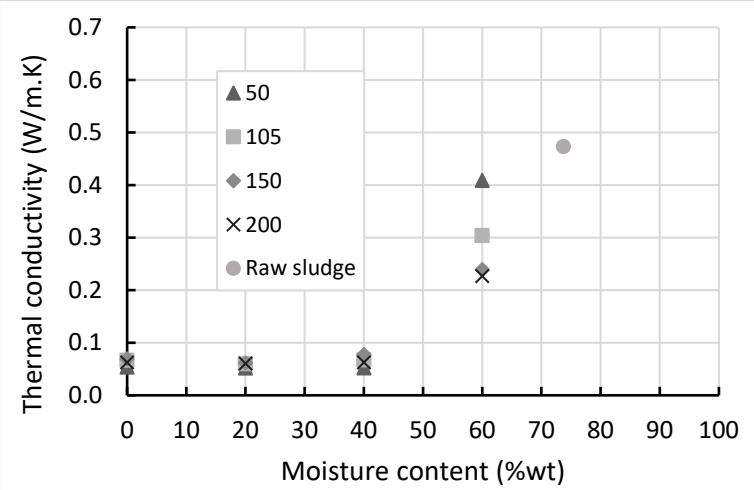
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

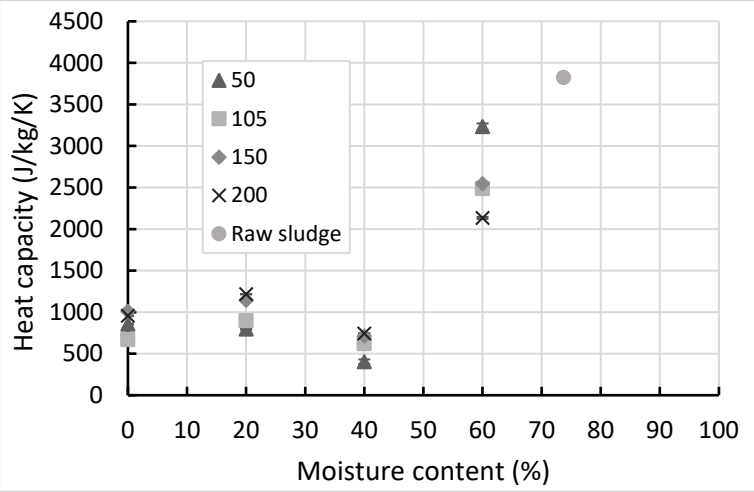
-

Description of Data

Thermal conductivity as a function of moisture content and temperature



Heat capacity as a function of moisture content and temperature



Observations:

- Decrease of the thermal conductivity and heat capacity as sludge dried until achieving 40%wt moisture content
- Stabilization below 40%wt
- No effect of temperature

General information	
Type of data	Thermal properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2015-2016
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~80% wt
Total solids content	~20% wt
Volatile solids content	~70% db
Ash content	~30% db
Presence of trash?	Yes
Pre-treatment	○ Screening to remove the large pieces of trash ○ Addition of 3%wt of sawdust for pellets formation
Experimental Procedure	
Drying experimental setup	Laboratory-scale medium infrared (MIR) dryer ('LaDePa')
Drying time	0, 4, 9, 13, 17, 25, 40 min
Operating conditions	○ MIR emitters power: 3, 5 and 6.5 kW (corresponding to ~ 85, 135 and 215°C respectively) ○ Distance between the emitters and the sample: 115 mm ○ Air stream flowrate: 18.3 m^3/min ○ Air humidity: ambient (70-80%)
Sample form in the dryer	Pellets of 8 and 14 mm diameter
Analysed parameters	Thermal properties
Employed methods	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)

Publications

Mirara, S.W. (2017). Drying and Pasteurisation of VIP Latrine Faecal Sludge using a Bench Scale Medium Infrared Machine. Master thesis. University of KwaZulu-Natal, Durban, South Africa.

Septien, S., Mirara, S.W., Singh, A., Velkushanova, K., & Buckley, C. (2018). Characterisation of On-Site Sanitation Material and Products: VIP Latrines and Pour-Flush Toilets. WRC project final report. South Africa.

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

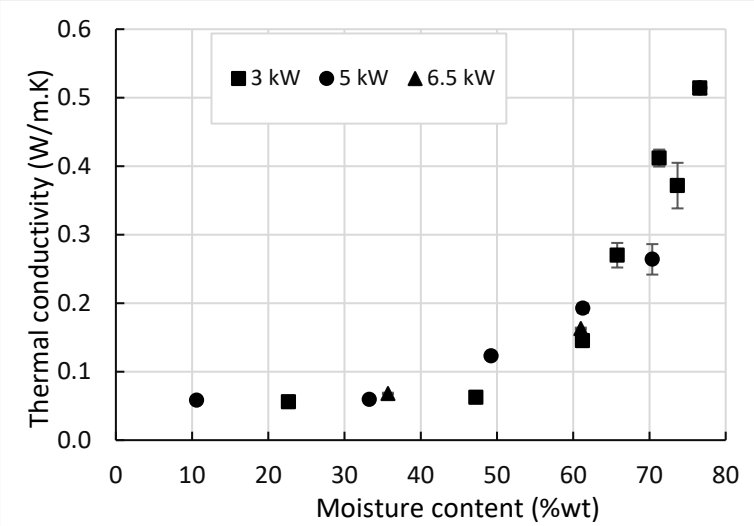
https://www.dropbox.com/s/qbqkf45sx5ysk25/2014-2015%20VIP%20composition%20analysis.xlsx?dl=0

Additional Notes

-

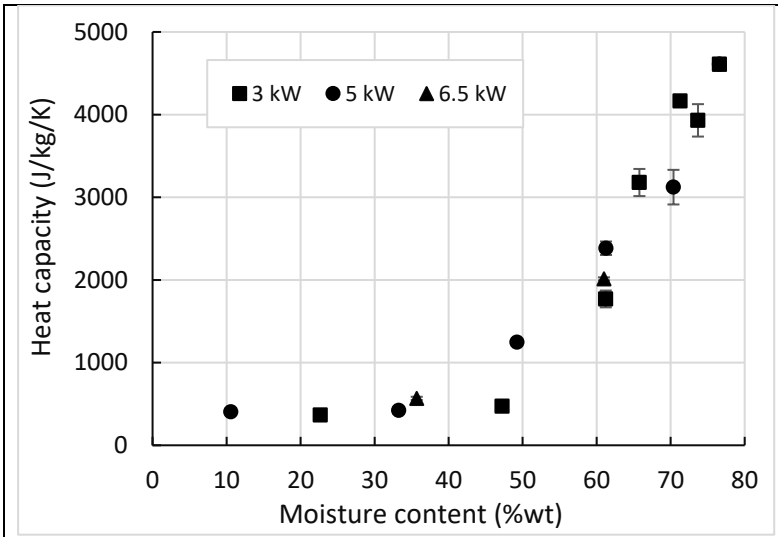
Description of Data

Thermal conductivity and heat capacity versus moisture content as a function of the MIR emitter power

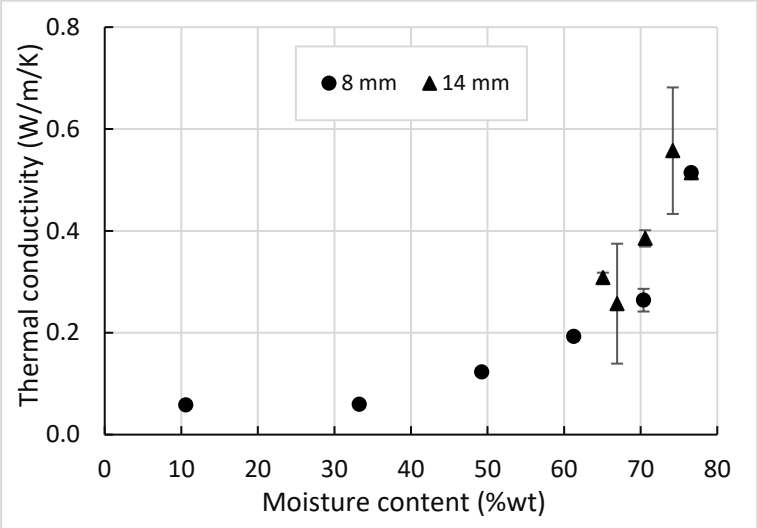


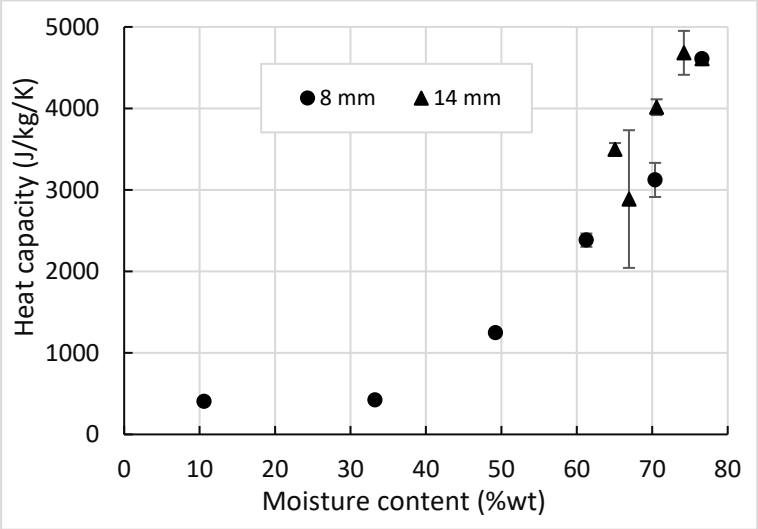
Observations:

- Decrease of thermal conductivity and heat capacity as sludge dried
- Higher thermal diffusivity for sludge dried al low moisture content in comparison to the raw material
- No effect of MIR emitter power on the thermal properties



Thermal conductivity and heat capacity versus moisture content as a function of the pellet diameter





Observations:

- Decrease of thermal conductivity and heat capacity as sludge dried
- Higher thermal diffusivity for sludge dried al low moisture content in comparison to the raw material
- No effect of MIR emitter power on the thermal properties

General information	
Type of data	Thermal properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2015-2016
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrines (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 50%db
Ash content	~ 50%db
Presence of trash?	Yes
Pre-treatment	Screening to remove the large pieces of trash
Experimental Procedure	
Drying experimental setup	Custom design convective drying rig
Drying time	(1) Until mass stabilization (2) Stopped at different moisture contents (8, 32, 58, 75%wt)
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 0% ○ Air velocity: 0.06 cm/s
Sample form in the dryer	Pellets of 8, 12 and 14 mm diameter
Analysed parameters	Thermal properties
Employed methods	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
Makununika, B. S. N. (2016). Thermal drying of faecal sludge from VIP latrines and characterisation of dried faecal material. Master thesis. University of KwaZulu-Natal, Durban, South Africa.	

Septien, S., Mirara, S. W., Makununika, B., Singh, A., Pocock, J., Velkushanova, K., & Buckley, C. A. (2019). Effect of drying on the physical and chemical properties of faecal sludge for its reuse. Journal of Environmental Chemical Engineering, 103652.

Data source files

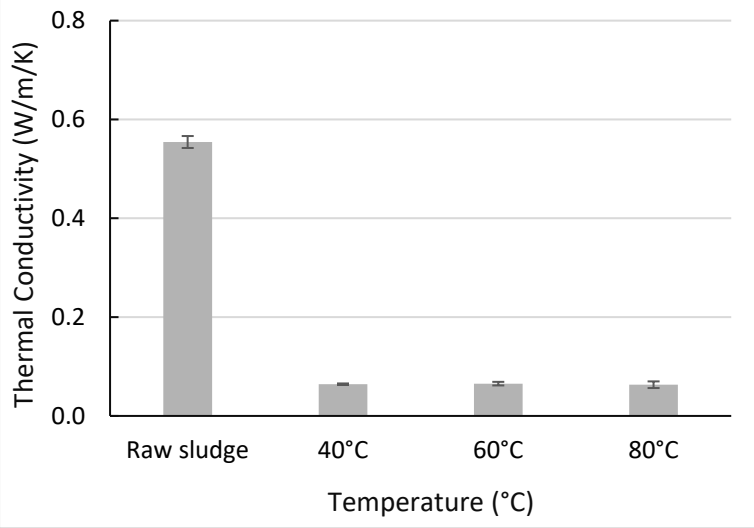
https://www.dropbox.com/s/2dg6xp8s0m5pfse/2014-2015%20VIP%20Physicochemical%20properties.xlsx?dl=0

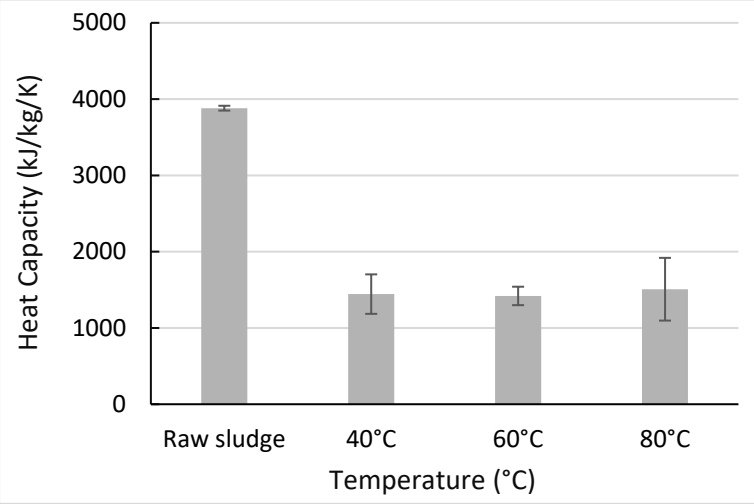
Additional Notes

-

Description of Data

Thermal conductivity and heat capacity as a function of temperature

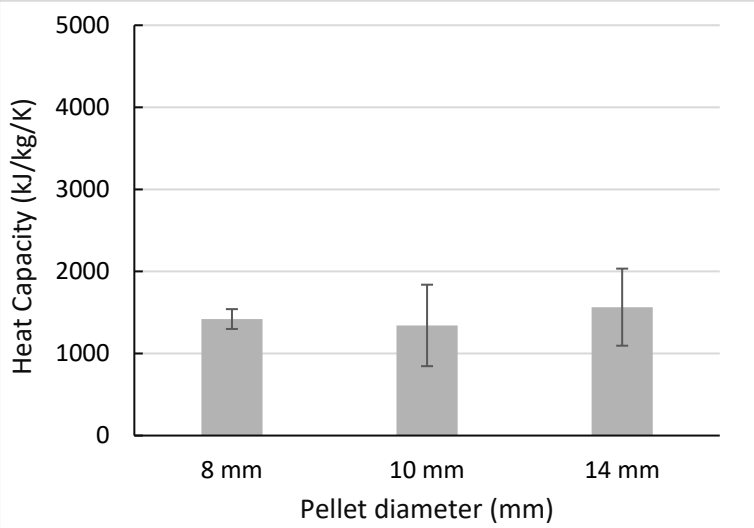


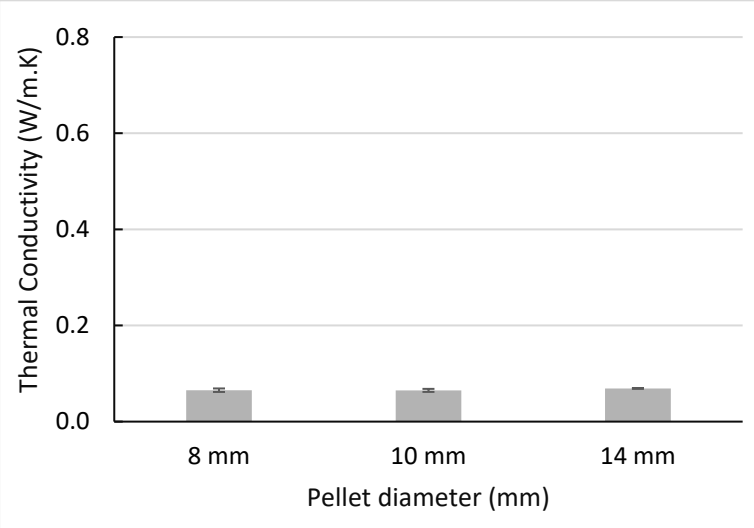


Observations:

- Decrease of thermal conductivity and heat capacity in the dried sludge with respect to the raw material
- No effect of temperature on the on the thermal properties

Thermal conductivity and heat capacity as a function of pellet diameter

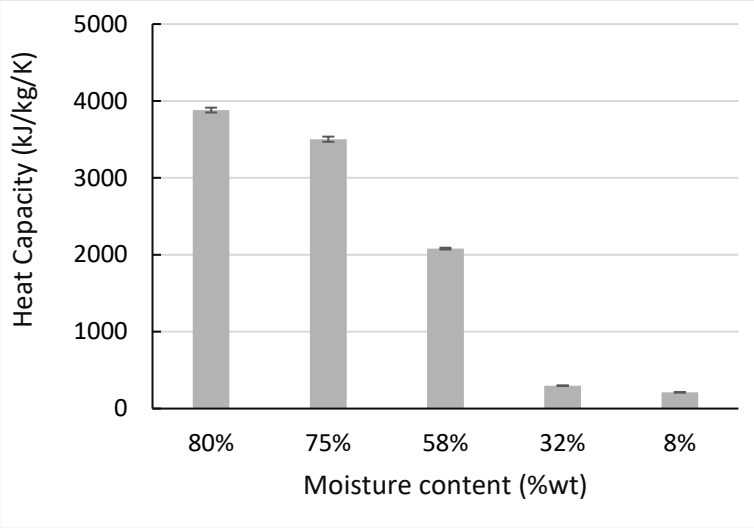


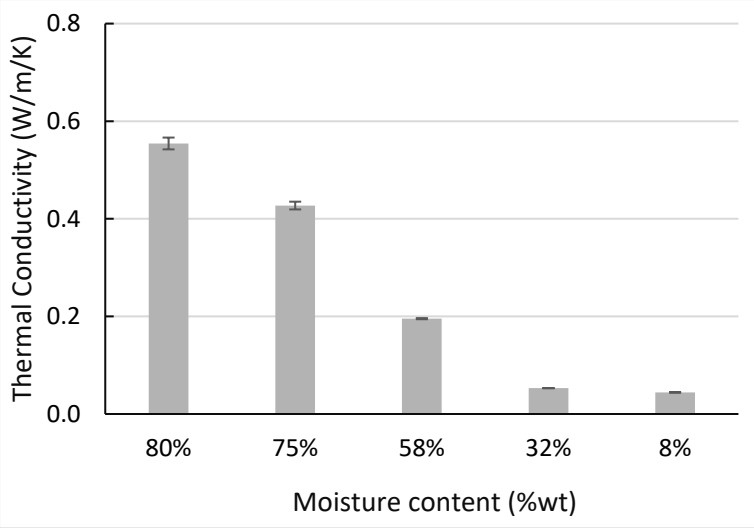


Observations:

- Decrease of thermal conductivity and heat capacity as sludge dried

Thermal conductivity and heat capacity as a function of pellet moisture content





Observations:

- Decrease of thermal conductivity and heat capacity as sludge dried

General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 75%wt
Total solids content	~ 25%wt
Volatile solids content	~ 40%db
Ash content	~ 60%db
Presence of trash?	Yes (mainly hair extensions, plastic and rocks)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
Getahun, S., Septien, S., Mata, J., Somorin, T., Mabbett, I., & Buckley, C. (2020). Drying characteristics of faecal sludge from different on-site sanitation facilities. *Journal of Environmental Management*, *261*, 110267.	

Getahun, S., Septien, S., Buckley, C.A. (2019). Effect of Drying Temperature and Moisture Content on The Enduse of Faecal Sludge as a Solid Fuel. Proceedings of the 10th Asia Pacific Drying Conference, Vadodara, India, 14-17 December.

Data source files

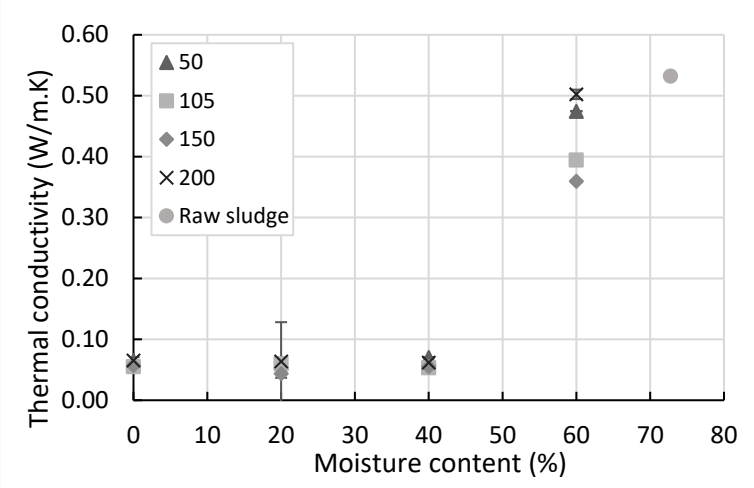
https://www.dropbox.com/s/qo53unswsdmvjgp/2018-2019%20ABR%2C%20UDDT%20and%20VIP%20tests_PRG.xlsx?dl=0

Additional Notes

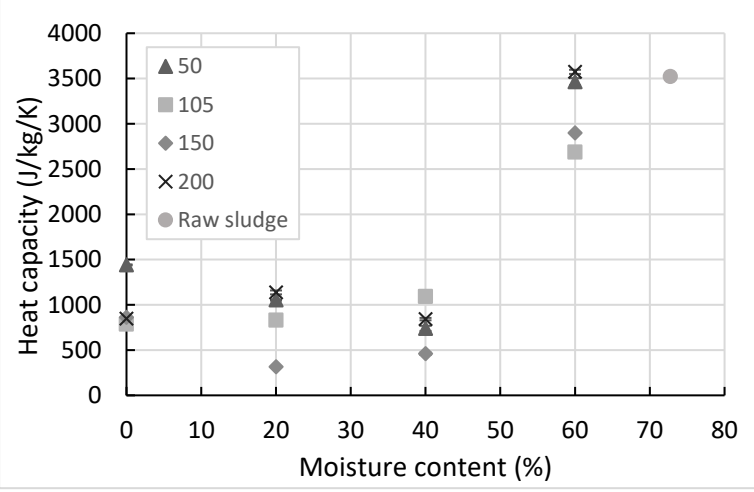
-

Description of Data

Thermal conductivity as a function of moisture content and temperature



Heat capacity as a function of moisture content and temperature



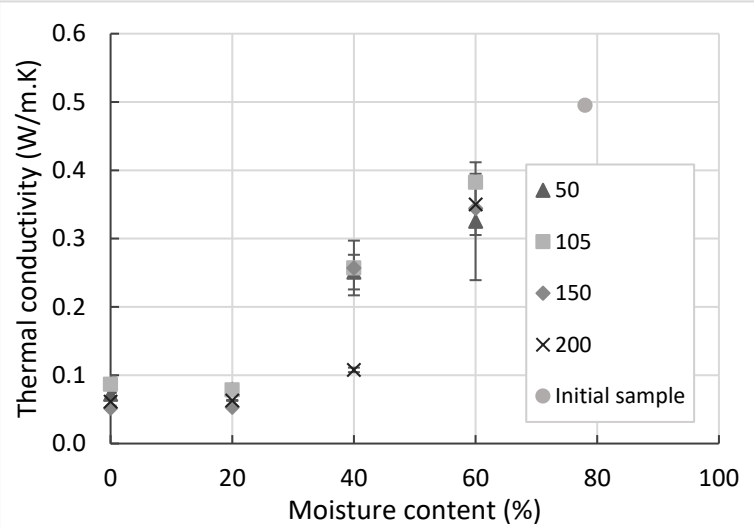
Observations:

- Decrease of the thermal conductivity and heat capacity as sludge dried until achieving 40%wt moisture content
- Stabilization below 40%wt
- No effect of temperature

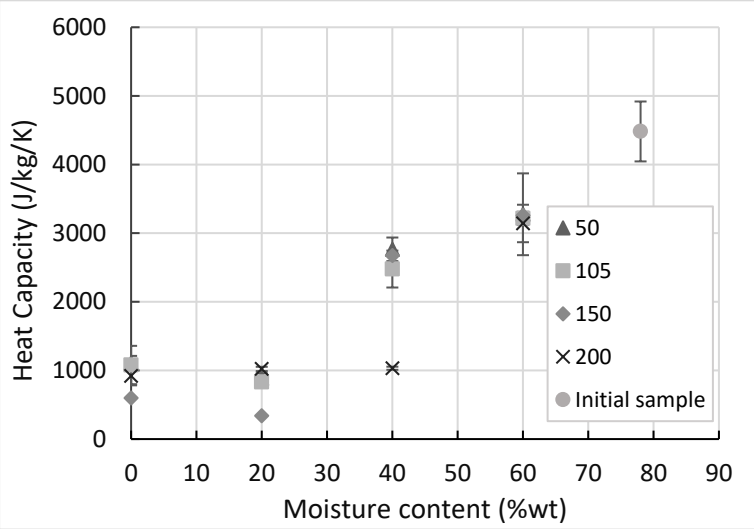
General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 85%db
Ash content	~ 15%db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 0, 20, 30, 40, 50 and 60%wt moisture content
Operating conditions	Temperature: 50, 100, 150 and 200°C
Sample form in the dryer	250 g of sample on an aluminium tray (52 × 8.4 × 33 cm)
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C-Therm TCi* (SOP 8.8.6.1)
Publications	
-	

Data source files
https://www.dropbox.com/s/vpa68hptk81v4e4/2019%20Fresh%20faeces%20tests_PRG.xlsx?dl=0
Additional Notes
Fresh faeces collected from voluntary and anonymous donations
Description of Data

Thermal conductivity as a function of moisture content and temperature



Heat capacity as a function of moisture content and temperature



Observations:

- Decrease of the thermal conductivity and heat capacity as sludge dried until achieving 20%wt moisture content
- Stabilization below 20%wt
- No effect of temperature

General information	
Type of data	Thermal Properties
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durban, South Africa
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	~ 85%db
Ash content	~ 15%db
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Natural drying (in the open-air)
Drying time	16 weeks
Operating conditions	○ Temperature: ambient (~ 20°C) ○ Relative humidity: ambient (~ 60%)
Sample form in the dryer	900 g in 1 L plastic bucket
Analysed parameters	Thermal conductivity and heat capacity
Employed method	Use of a modified transient plane source technique analyser *C- therm TCi* (SOP 8.8.6.1)
Publications	
-	

Data source files

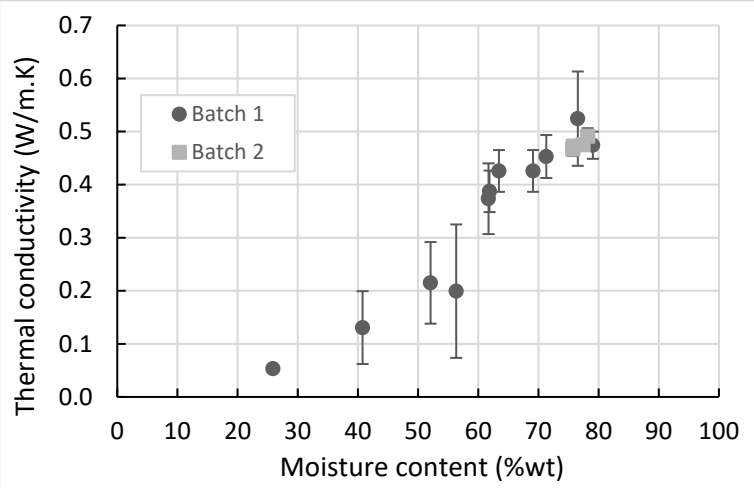
https://www.dropbox.com/s/xbv6su0jxsipiok/2019-2020%20Natural%20drying%20of%20fresh%20faeces%20in%20the%20open%20air_UKZN%20PRG.xlsx?dl=0

Additional Notes

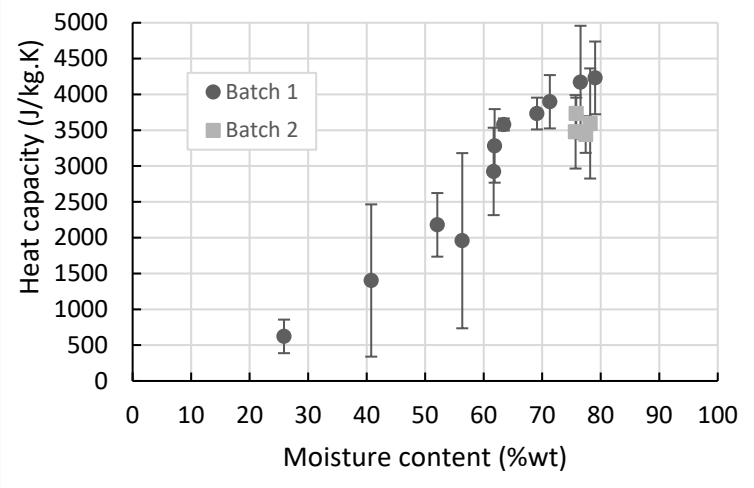
- Fresh faeces collected from voluntary and anonymous donations
- Containers with sample placed in a ventilated area
- Mesh placed at the opening of the container to avoid the development of maggots
- Samples from batch 1 analysed in a weekly basis for 16 weeks
- Samples from batch 2 analysed at days 0, 3, 5 and 7 within initial week

Description of Data

Thermal conductivity as a function of the moisture content for the samples from batch 1 and 2



Heat capacity as a function of the moisture content



Observations:

- Decrease of the thermal conductivity and heat capacity by decreasing the moisture content
- Initial values of the thermal conductivity and heat capacity close to those from pure water

General information	
Type of data	Radiative properties
Place of experimentation	Material Engineering Department (SPECIFIC), Swansea University Prifysgol Abertawe
Dates of the experiments	2018 - 2020
Feedstock	
Type of faecal material	Faecal sludge from anaerobic baffled reactor (ABR) from a decentralised wastewater treatment plant (DEWAT)
Location of collection	Durban, South Africa
Age before collection	Unknown
Moisture content	~ 85%wt
Total solids content	~ 15%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	Yes (mainly small pieces of paper after pre-screening during pit emptying)
Pre-treatment	Screening to remove trash
Experimental Procedure	
Drying experimental setup	N.A.
Drying time	N.A.
Operating conditions	N.A.
Sample form in the dryer	N.A.
Analysed parameters	Transmittance and reflectance
Employed method	Use of an UV-Vis-NIR spectrophotometer *Perkin Elmer Lambda 750S*
Publications	
-	

Data source files

Reflectance
https://www.dropbox.com/s/fatpciqrc1rxb1o/Swansea%20University%20ABR%20sludge%20Reflectance%20%282018-2020%29.xlsx?dl=0

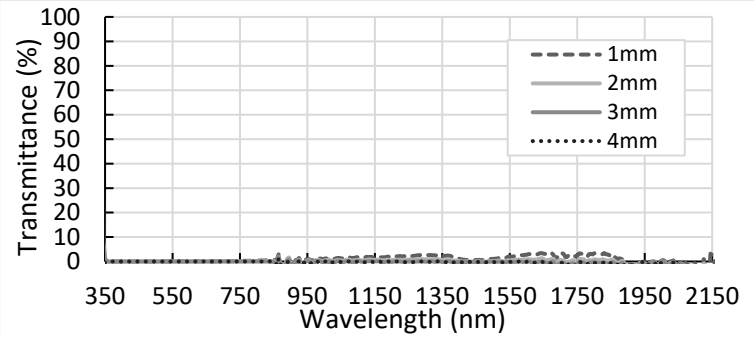
Transmittance
https://www.dropbox.com/s/y1dq29i47moqtl6/Swansea%20University%20Sludge%20UV%20Transmittance%20Properties%20%282018-2020%29.xlsx?dl=0

Additional Notes

- Sample couriered from South Africa
- Analysis for different faecal sludge thickness: 1, 2, 3 and 4 mm
- Measurement of the transmittance and reflectance by the analyser
- Determination of the absorbance by difference (absorbance ≈ 1 – reflectance)
- Data Collection range: 2500-250 nm
- Data collection interval: 5.00 nm
- Scan Speed: 1196.19 nm/minute
- Lamp: D2

Description of Data

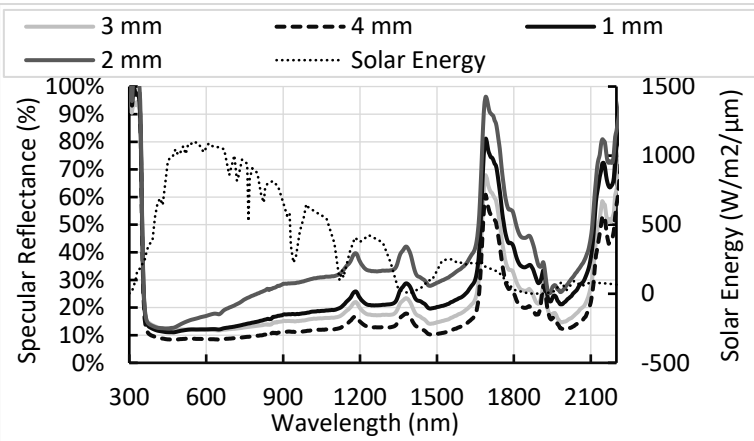
Transmittance of 1, 2, 3 and 4 mm thickness samples



Observations

- Low transmittance for all thickness (< 5%)
- Decrease of the transmittance by increasing the thickness

Reflectance of 1, 2, 3 and 4 mm thickness samples and comparison to the solar spectrum (ASTEM E903)



Observations

- Low reflectance in the visible light spectrum (400 – 700 nm) in average (~ 10%)
- Medium reflectance in the near infrared spectrum (700 – 2500 nm) in average (~ 40%)
- Average reflectance value about 35% showing the potential of solar thermal drying (absorbance ~ 65%)
- Not a clear effect of the sample thickness

General information	
Type of data	Radiative properties
Place of experimentation	Materials Engineering Department (SPECIFIC), Swansea University Prifysgol Abertawe
Dates of the experiments	2018 - 2020
Feedstock	
Type of faecal material	Faecal sludge from urine diversion dry toilet (UDDT)
Location of collection	Durban, South Africa
Age before collection	Up to 3 years
Moisture content	~ 70%wt
Total solids content	~ 30%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	Yes (mainly stones, hair and plastics)
Pre-treatment	Screening to remove the trash
Experimental Procedure	
Drying experimental setup	N.A.
Drying time	N.A.
Operating conditions	N.A.
Sample form in the dryer	N.A.
Analysed parameters	Transmittance and reflectance
Employed method	Use of an UV-Vis-NIR spectrophotometer *Perkin Elmer Lambda 750S*
Publications	
-	

Data source files

Reflectance
https://www.dropbox.com/s/o5x05sc995jixjb/Swansea%20University%20UDDT%20sludge%20Reflectance%20Properties%20%282018-2020%29.xlsx?dl=0

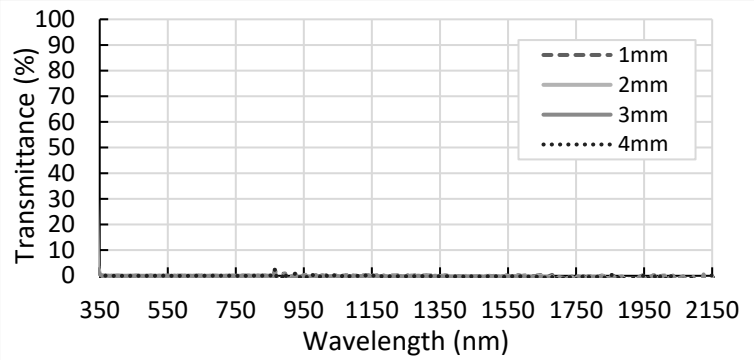
Transmittance
https://www.dropbox.com/s/y1dq29i47moqtl6/Swansea%20University%20Sludge%20UV%20Transmittance%20Properties%20%282018-2020%29.xlsx?dl=0

Additional Notes

- Sample couriered from South Africa
- Analysis for different faecal sludge thickness: 1, 2, 3 and 4 mm
- Measurement of the transmittance and reflectance by the analyser
- Determination of the absorbance by difference (absorbance ≈ 1 – reflectance)
- Data Collection range: 2500-250 nm
- Data collection interval: 5.00 nm
- Scan Speed: 1196.19 nm/minute
- Lamp: D2

Description of Data

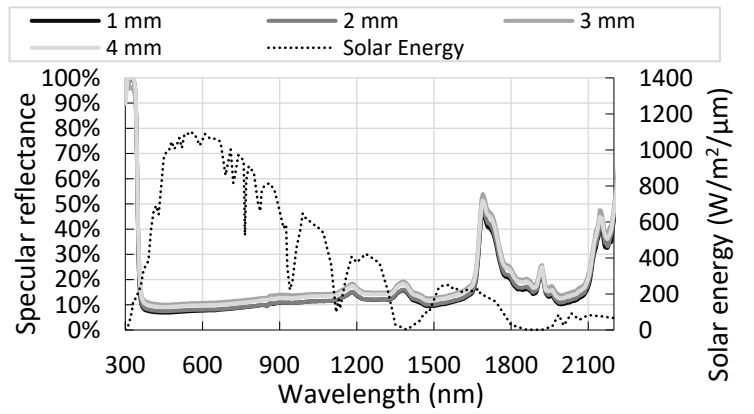
Transmittance of the 1, 2, 3 and 4 mm thickness samples



Observations

- Null transmittance for all thickness

Reflectance of the 1, 2, 3 and 4 mm thickness samples and comparison to the solar spectrum (ASTM E903)



Observations

- Low reflectance in the visible light spectrum (400 – 700 nm) in average (~ 10%)
- Medium reflectance in the near infrared spectrum (700 – 2500 nm) in average (~ 30%)
- Average reflectance value about 30% showing the potential of solar thermal drying (absorbance 70%)
- Not a clear effect of the sample thickness

General information	
Type of data	Radiative properties
Place of experimentation	Materials Engineering Department (SPECIFIC), Swansea University Prifysgol Abertawe
Dates of the experiments	2018 - 2020
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 95%wt
Total solids content	~ 5%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	No (sludge pre-screened during pit emptying)
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	N.A.
Drying time	N.A.
Operating conditions	N.A.
Sample form in the dryer	N.A.
Analysed parameters	Transmittance and reflectance
Employed method	Use of an UV-Vis-NIR spectrophotometer *Perkin Elmer Lambda 750S*
Publications	
-	

Data source files

Reflectance
https://www.dropbox.com/s/y9p8zg4kzpu9b3n/Swansea%20University%20VIP%20sludge%20Reflectance%20Properties%20%282018-2020%29.xlsx?dl=0

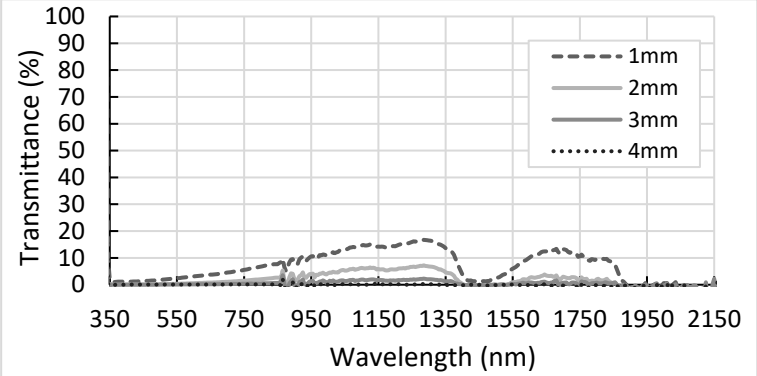
Transmittance
https://www.dropbox.com/s/y1dq29i47moqtl6/Swansea%20University%20Sludge%20UV%20Transmittance%20Properties%20%282018-2020%29.xlsx?dl=0

Additional Notes

- Sample couriered from South Africa
- Analysis for different faecal sludge thickness: 1, 2, 3 and 4 mm
- Measurement of the transmittance and reflectance by the analyser
- Determination of the absorbance by difference (absorbance ≈ 1 – reflectance)
- Data Collection range: 2500-250 nm
- Data collection interval: 5.00 nm
- Scan Speed: 1196.19 nm/minute
- Lamp: D2

Description of Data

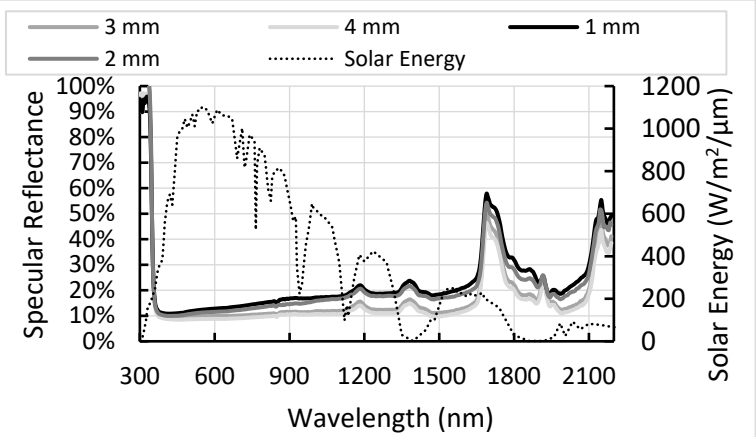
Transmittance of 1, 2, 3 and 4 mm thickness samples



Observations

- Low transmittance for all thickness (< 20%)
- Decrease of the transmittance by increasing the thickness

Reflectance of 1, 2, 3 and 4 mm thickness samples and comparison to the solar spectrum (ASTM E903)



Observations

- Low reflectance in the visible light spectrum (400 – 700 nm) in average (~ 10%)
- Medium reflectance in the near infrared spectrum (700 – 2500 nm) in average (~ 30%)
- Average reflectance value about 30% showing the potential of solar thermal drying (absorbance ~ 70%)
- Not a clear effect of the sample thickness

General information	
Type of data	Radiative properties
Place of experimentation	Materials Engineering Department (SPECIFIC), Swansea University Prifysgol Abertawe
Dates of the experiments	2018 - 2020
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Cranfield, UK
Age before collection	A few days
Moisture content	~ 60%wt
Total solids content	~ 40%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	N.A.
Drying time	N.A.
Operating conditions	N.A.
Sample form in the dryer	N.A.
Analysed parameters	Transmittance and reflectance
Employed method	Use of an UV-Vis-NIR spectrophotometer *Perkin Elmer Lambda 750S*
Publications	
-	

Data source files

Reflectance
https://www.dropbox.com/s/lwhnevbpw02kdg4/Swansea%20University%20Human%20Faeces%20Reflectance%20Properties%20%282018-2020%29.xlsx?dl=0

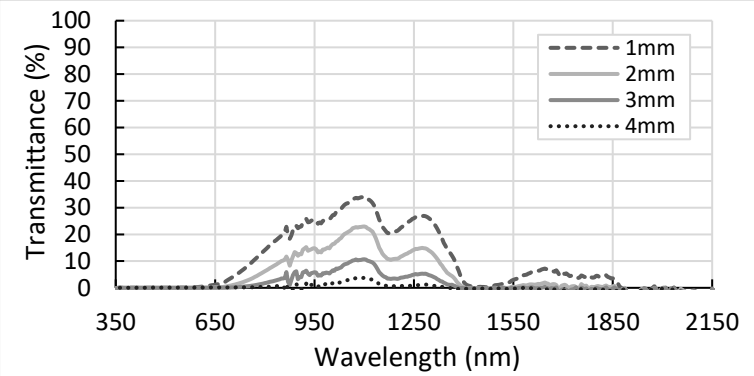
Transmittance
https://www.dropbox.com/s/y1dq29i47moqtl6/Swansea%20University%20Sludge%20UV%20Transmittance%20Properties%20%282018-2020%29.xlsx?dl=0

Additional Notes

- Faeces obtained from anonymous and voluntary donations
- Analysis for different faecal sludge thickness: 1, 2, 3 and 4 mm
- Measurement of the transmittance and reflectance by the analyser
- Determination of the absorbance by difference (absorbance ≈ 1 – reflectance)
- Data Collection range: 2500-250 nm
- Data collection interval: 5.00 nm
- Scan Speed: 1196.19 nm/minute
- Lamp: D2

Description of Data

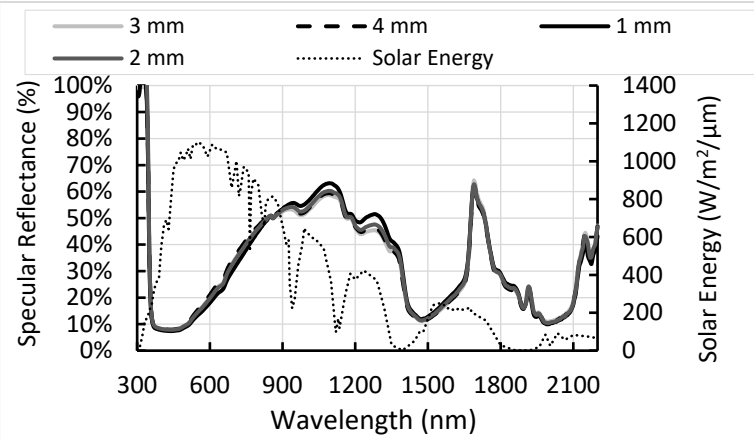
Transmittance of the 1, 2, 3 and 4 mm thickness samples



Observations

- Low to medium transmittance at 850 – 1350 nm (peak from 5 to 35%)
- Decrease of the transmittance by increasing the thickness

Reflectance of the 1, 2, 3 and 4 mm thickness samples and solar irradiance spectrum (ASTM E903)



Observations

- Low reflectance in the visible light spectrum (400 – 700 nm) in average (~ 15%)
- Medium reflectance in the near infrared spectrum (700 – 2500 nm) in average (~ 45%)
- Average reflectance value about 40% showing the potential of solar thermal drying (absorbance ~ 60%)
- Not a clear effect of the sample thickness