General information	
Type of data	Kinetics of convective drying
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 latrine (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 trash
Experimental Procedure	
Drying experimental setup	Custom-design convective drying rig
Drying time	Until stabilisation of the sample mass
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 0, 15 and 25% ○ Air velocity: 0.03, 0.06 and 0.12 cm/s
Sample form in the dryer	Pellets of 8, 10, 12 and 14 mm diameter
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
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.	

Data source files

Wet basis
https://www.dropbox.com/s/zmm55q2o47iedcp/Convective%20drying%20of%20VIP%20pellets%28wb%29_2014-2015.xlsx?dl=0

Dry basis
https://www.dropbox.com/s/4a3m2a6pi5e0vfc/Convective%20drying%20of%20VIP%20pellets%20%28db%29_2014-2015.xlsx?dl=0

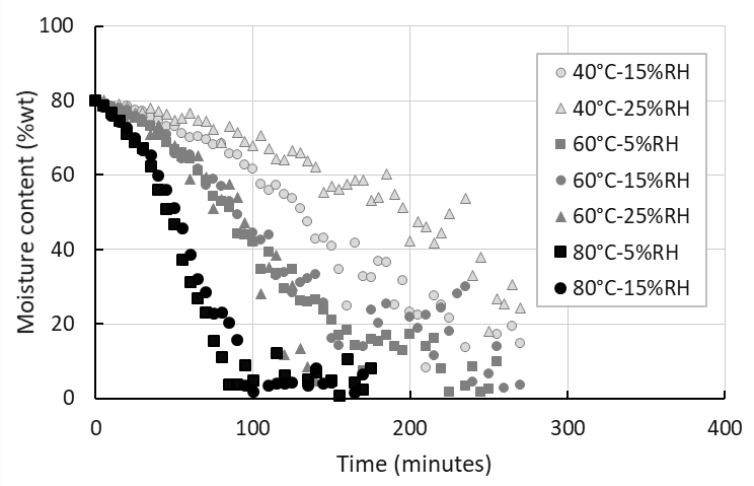
Additional Notes

-

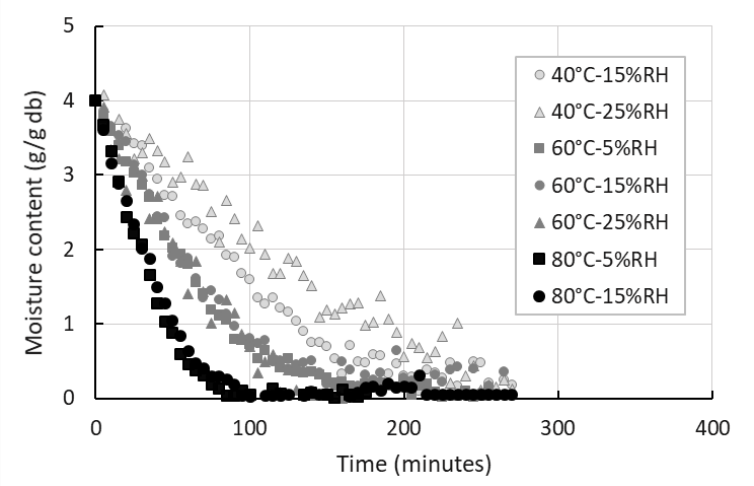
Description of Data

Moisture content as a function of temperature and relative humidity

Wet basis



Dry basis

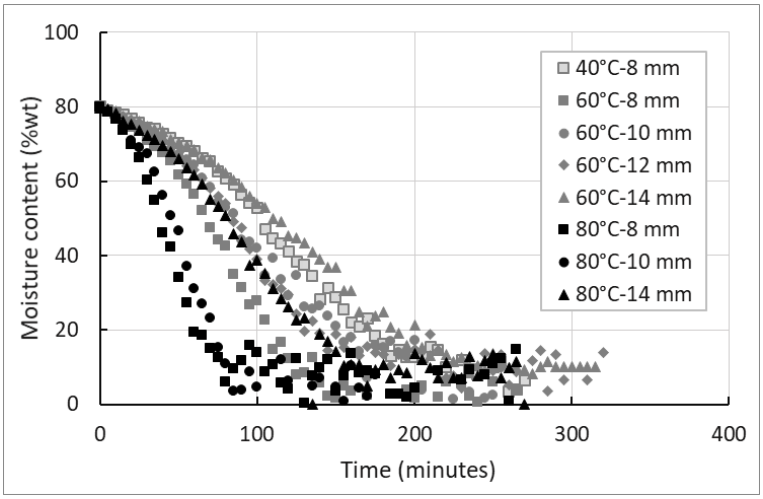


Observations

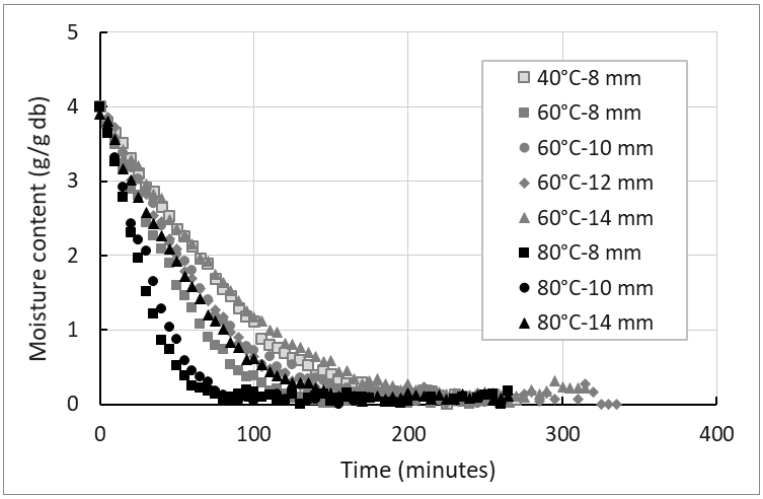
- Drying time varying between 100 and 250 min
- Faster drying at increasing drying temperature and decreasing relative humidity at 40°C
- No effect of relative humidity at 60 and 80°C

Moisture content versus time as a function of temperature and pellet diameter

Wet basis



Dry basis

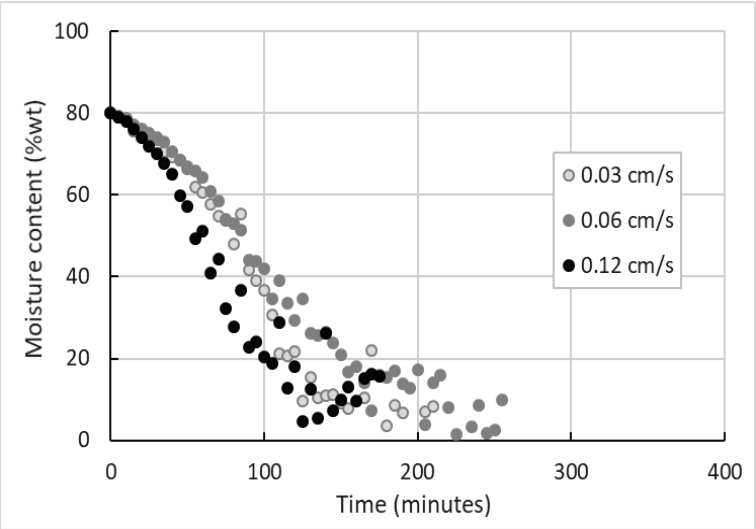


Observations

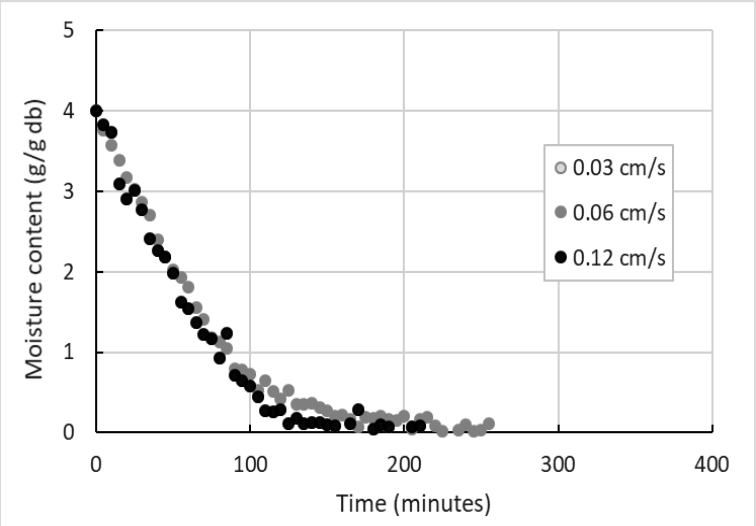
- Drying time varying between 100 and 200 min
- - Faster drying at increasing drying temperature and decreasing pellet diameter

Moisture content versus time as a function of air velocity

Wet basis



Dry basis



Observations

- Drying time around 150 min
- No significant effect of air velocity

General information	
Type of data	Kinetics of convective drying
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 latrine (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	Batch until complete drying
Operating conditions	o Air temperature: 40, 60 and 80°C o Air humidity: 0, 15 and 25% o Air velocity: 0.03, 0.06 and 0.12 cm/s
Sample form in the dryer	Thin layer on a petri dish of 70 mm diameter and 4 mm height
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
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.	

Data source files

Wet basis
https://www.dropbox.com/s/9ohytucjwpa8ppb/Convective%20drying%20of%20VIP%20thin%20layer%20%28wb%29_2014-2015.xlsx?dl=0

Dry basis
https://www.dropbox.com/s/vzlykg6aah163eu/Convective%20drying%20of%20VIP%20thin%20layer%20%28db%29_2014-2015.xlsx?dl=0

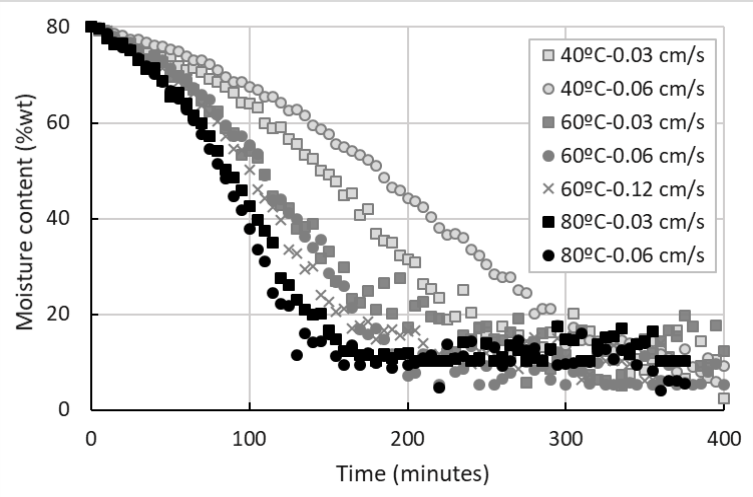
Additional Notes

-

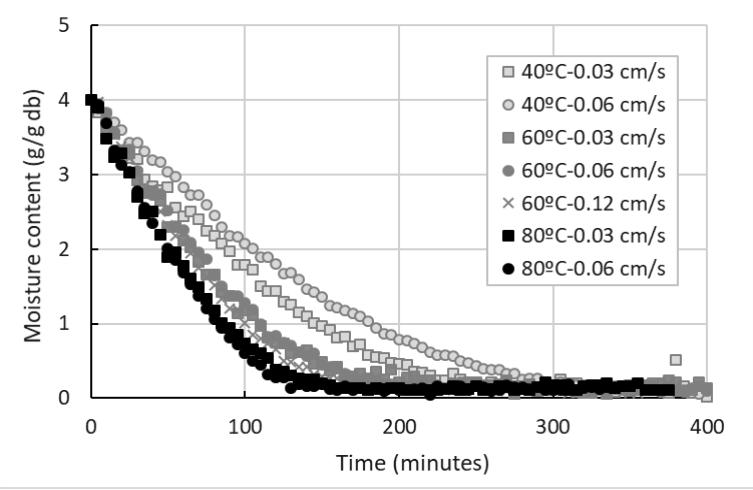
Description of Data

Moisture content as a function of temperature and air velocity

Wet basis



Dry basis

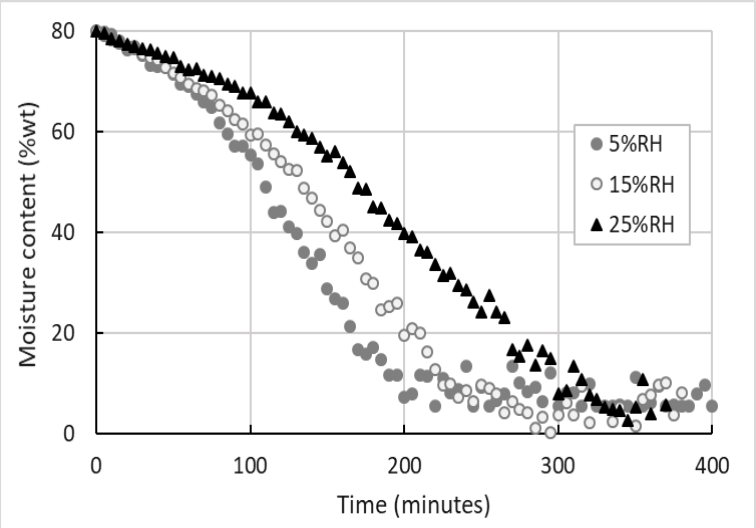


Observations

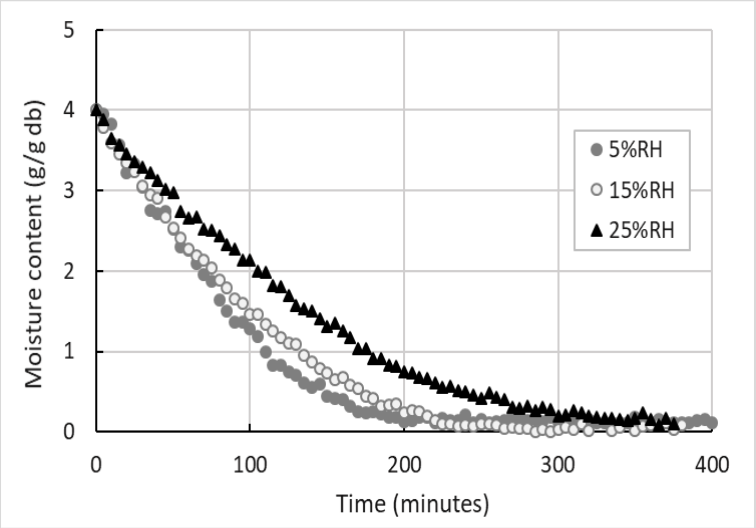
- Drying time varying between 150 and 300 min
- Faster drying at increasing drying temperature
- Slight faster drying at increasing air velocity

Moisture content versus time as a function of relative humidity

Wet basis



Dry basis



Observations

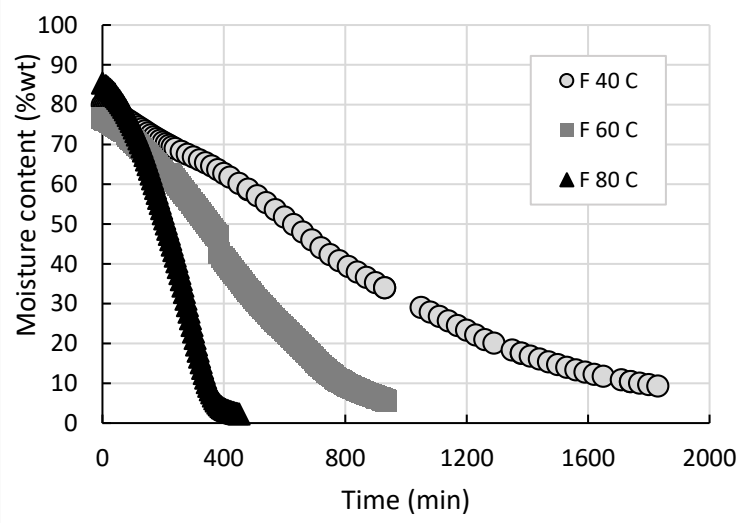
- Drying time varying between 200 and 300 min
- Faster drying at decreasing relative humidity

General information	
Type of data	Kinetics of convective drying
Place of experimentation	Duke University, Center for WaSH-AID, Durham, MC
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Durham, NC
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~20%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	No
Pre-treatment	Aging (sample placed in container with urine and flush water for 4, 18, 24 and 48 h)
Experimental Procedure	
Drying experimental setup	Custom-design convective drying rig
Drying time	Until stabilisation of the sample mass
Operating conditions	○ Air temperature: 40, 60 and 80°C ○ Air humidity: 5% ○ Air velocity: 0.03 cm/s
Sample form in the dryer	10 - 50 g of 9 mm thick sample in a 100 mm diameter petri dish
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

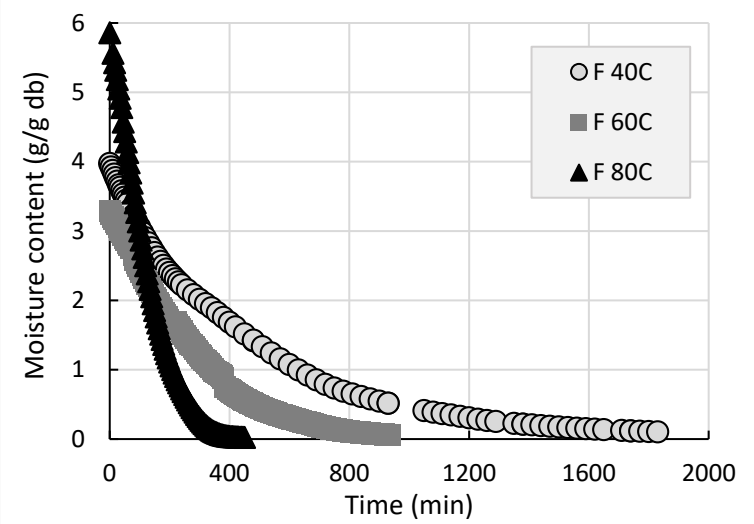
Data source files
https://www.dropbox.com/s/rzksa0gr6n5beez/Human%20Faeces%20convective%20drying%20kinetics%20and%20effects%20of%20conditioning%20data_Duke%20University%20%282018-2019%29%20.xlsx?dl=0
Additional Notes
○ Fresh faeces collected from voluntary and anonymous donations
Description of Data

Moisture content as a function of temperature (samples without aging)

Wet basis



Dry basis

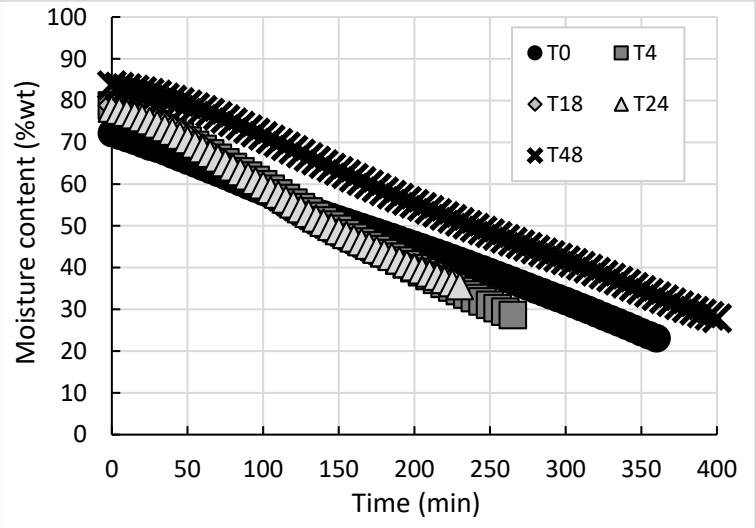


Observations

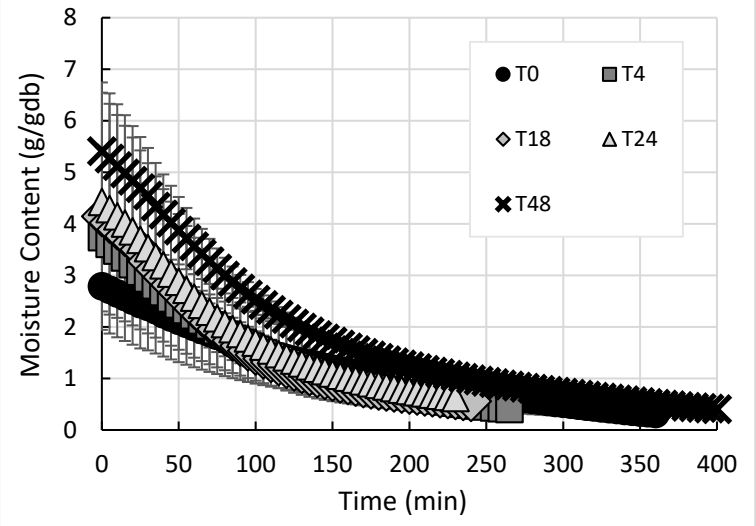
- Faster drying at increasing drying temperature

Moisture content versus time as a function of aging time

Wet basis



Dry basis



Observations

- Increase of the sample moisture content and drying rate with aging

General information	
Type of data	Kinetics of convective drying
Place of experimentation	RTI International, Research Triangle Park, North Carolina (USA)
Dates of the experiments	2016 - 2017
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	North Carolina, USA
Age before collection	A few days
Moisture content	~ 80%wt
Total solids content	~ 20%wt
Volatile solids content	N/A
Ash content	N/A
Presence of trash?	No
Pre-treatment	None
Experimental Procedure	
Drying experimental setup	Convection toaster oven
Drying time	Until stabilisation of the sample mass
Operating conditions	○ Air temperature: 105, 120 and 150°C ○ Relative humidity: ambient ○ Air velocity: none
Sample form in the dryer	9 mm thick sample in a 100 m diameter petri dish
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
Hawkins BT, Sellgren KL, Cellini E, Klem EJD, Rogers T, Lynch B. Piascik JR, Stoner BR. Remediation of suspended solids and turbidity by improved settling tank design in a small-scale, free-standing toilet system using recycled blackwater. Water and Environment Journal, 2018.	

Sellgren KL, Gregory CW, Hunt MI, Raut AS, Hawkins BT, Parker CB, Klem EJD, Piascik JR, Stoner BR. Development of an electrochemical process for blackwater disinfection in a free-standing, additive-free toilet, RTI Press, 2017

Data source files

https://www.dropbox.com/s/tgg4sehv3xjlfhq/RTI%20International%20data_fresh%20faeces%20convective%20drying%20kinetics%20and%20shrinkage%20%282016-2017%29.xlsx?dl=0

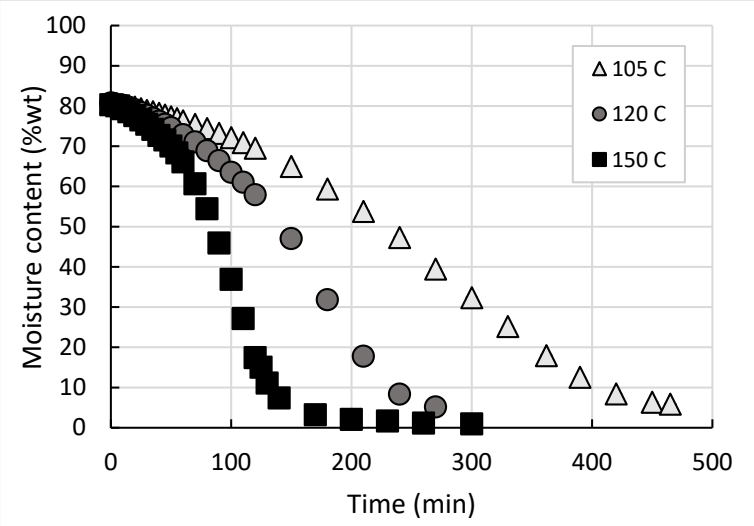
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations

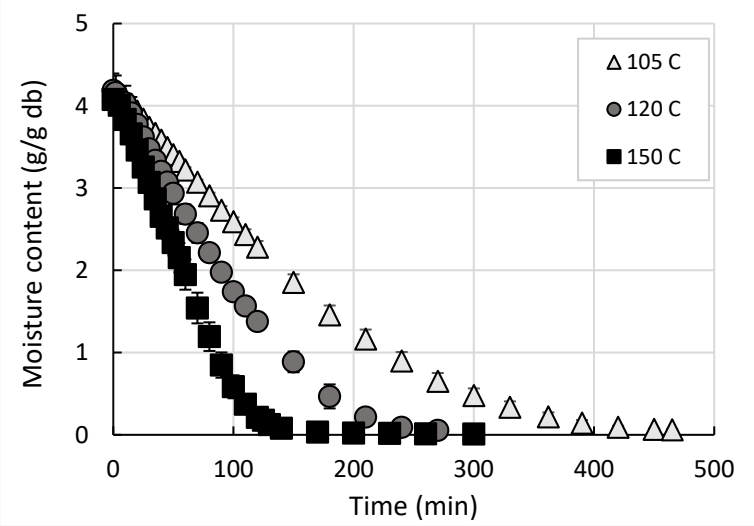
Description of Data

Moisture content as a function of temperature

Wet basis



Dry basis



Observations

- Faster drying at increasing drying temperature
- Crust formed on surface of fecal material at all temperatures

General information	
Type of data	Kinetics of infrared drying
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: 3.0, 3.3, 3.5, 5.0 and 6.5 kW o Distance between the emitters and the sample: 50, 80 and 115 mm o Air stream flowrate: 11.1 and 18.3 m^3/min o Air humidity: ambient (70-80%)
Sample form in the dryer	Pellets of 8, 10, 12 and 14 mm diameter
Analysed parameters	Moisture Content
Employed methods	Weighing the sample before and after oven drying at 105°C for 24 h (SOP 8.7.1.1)

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., Singh, A., Mirara, S. W., Teba, L., Velkushanova, K., & Buckley, C. A. (2018). 'LaDePa'process for the drying and pasteurization of faecal sludge from VIP latrines using infrared radiation. South African journal of chemical engineering, 25, 147-158.

Septien, S., Mirara, S., 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.

Data source files

https://www.dropbox.com/s/e6i0axdeejiacq3/Infrared%20drying%20of%20VIP%20pellets_2014-2015.xlsx?dl=0

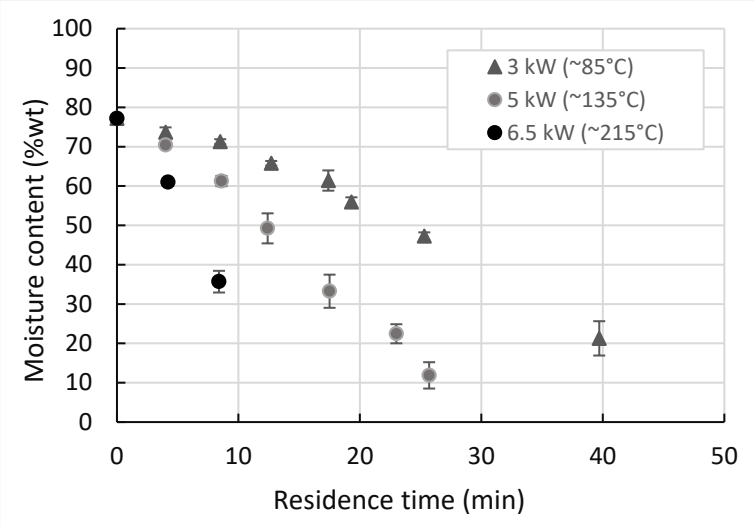
Additional Notes

- Some experiments using faecal sludge without sawdust addition and pre-dried sludge to approximately 70%wt moisture content

Description of Data

Moisture content versus residence time as a function of the MIR emitter power

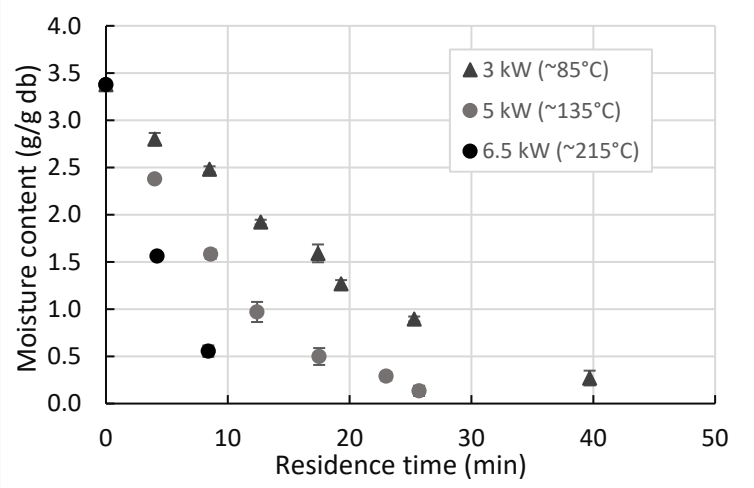
Wet basis



Observations:

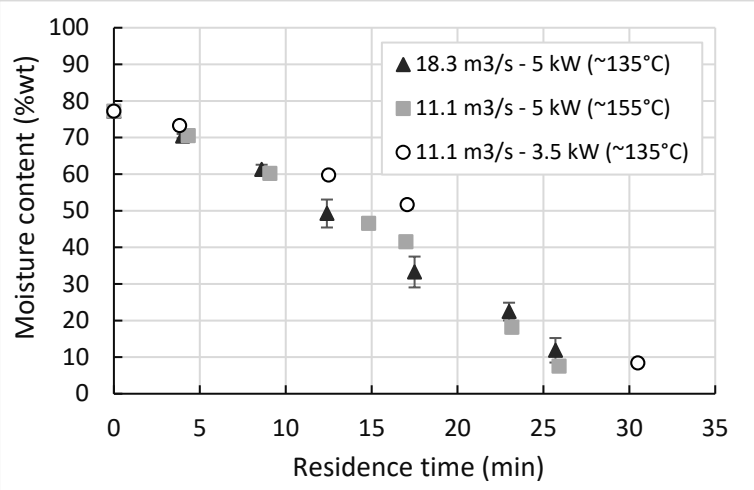
- Faster drying at higher MIR power

Dry basis

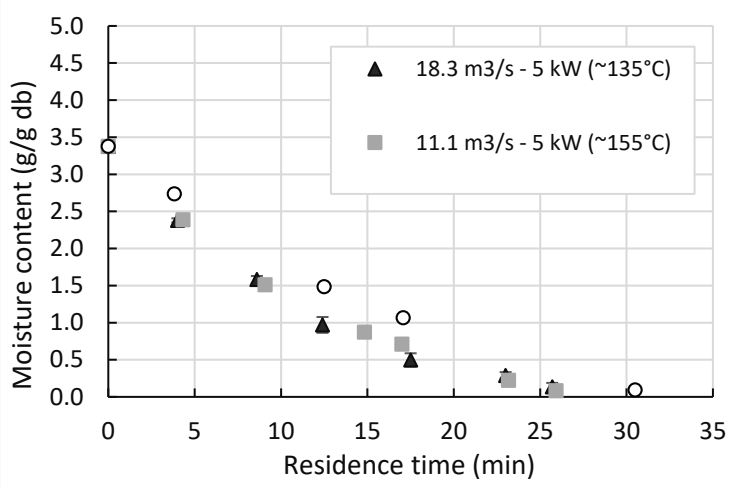


Moisture content versus residence time as a function of the MIR emitter power and air flowrate

Wet Basis



Dry basis

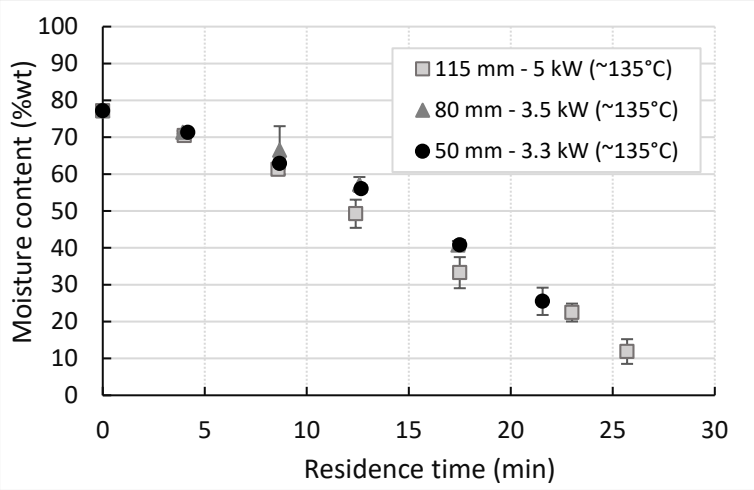


Observations:

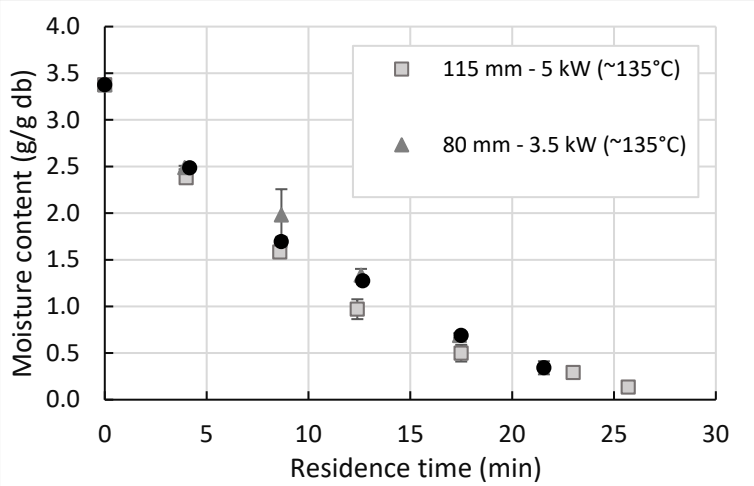
- Decrease of drying temperature by increasing the air flowrate (cooling effect)
- At fixed temperature, faster drying by increasing the air flowrate (but need to increase MIR power to compensate cooling effect)

Moisture content (wet and dry basis) versus residence time as a function of the MIR emitter power and height

Wet Basis



Dry Basis

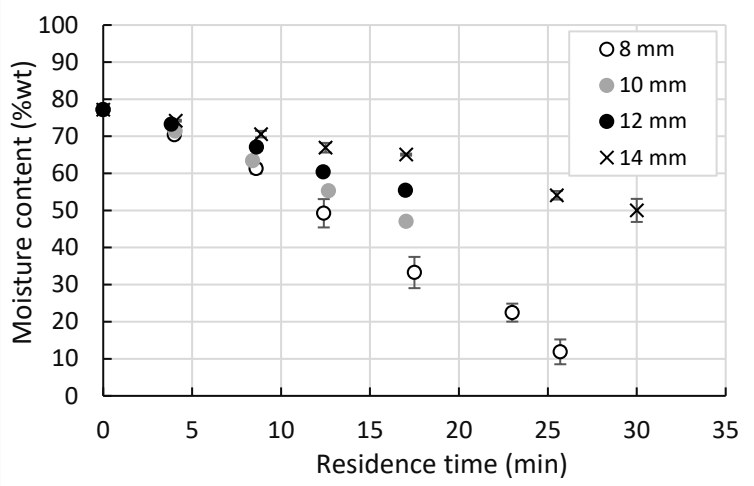


Observations:

- To maintain fixed temperature, need to increase the MIR power if the height of the emitter augmented
- At fixed temperature, same drying rate regardless the MIR emitter power and height

Moisture content versus residence time as a function of the pellet diameter

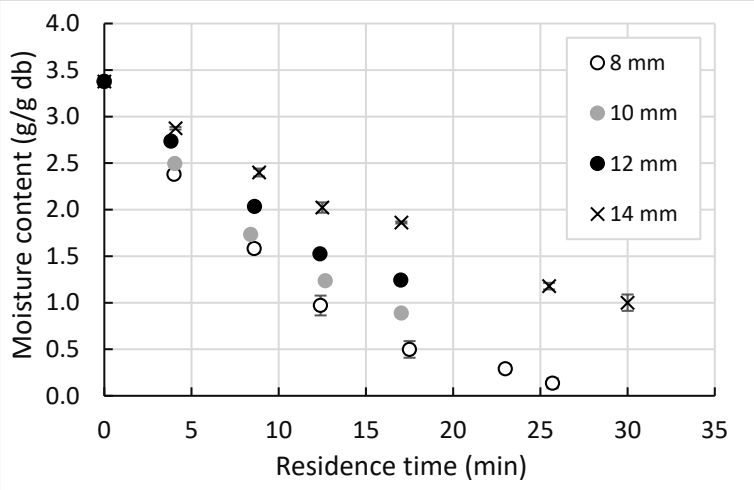
Wet Basis



Observations:

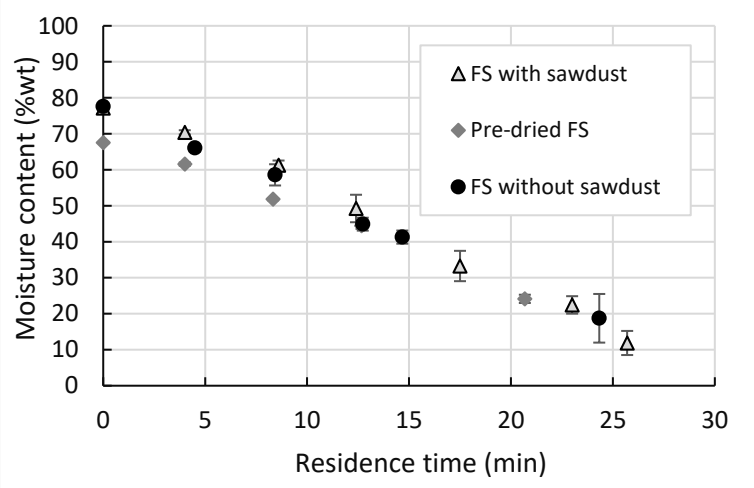
- Faster drying at lower pellet diameter

Dry Basis

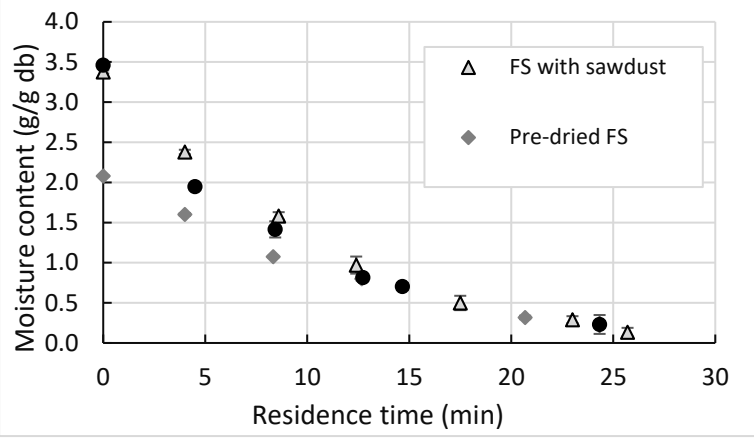


Moisture content versus residence time for the raw sludge, mixed with sawdust and pre-dried

Wet Basis



Dry Basis



Observations:

- No effect of the sludge pre-treatment on the drying rate

General information	
Type of data	Kinetics of solar thermal drying
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 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?	Small amounts of trash
Pre-treatment	Trash removal
Experimental Procedure	
Drying experimental setup	Custom-design solar thermal drying rig
Drying time	5 hours
Operating conditions	o Irradiance: ~ 1000 W/m^2 (sunny conditions) o Air flowrate: 0.5 m^3/min (corresponding to an air velocity of 0.5 m/s) o Air temperature: ambient (~20°C), 40 and 80°C o Air humidity: ~10%
Sample form	~ 90 g of sample as a thin layer of 5 mm thickness and 110 mm diameter
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)

Publications

-

Data source files

https://www.dropbox.com/s/hmthsylq3z6hq1e/2019-2020%20UD%20sludge%20solar%20drying%20at%20different%20temps.xlsx?dl=0

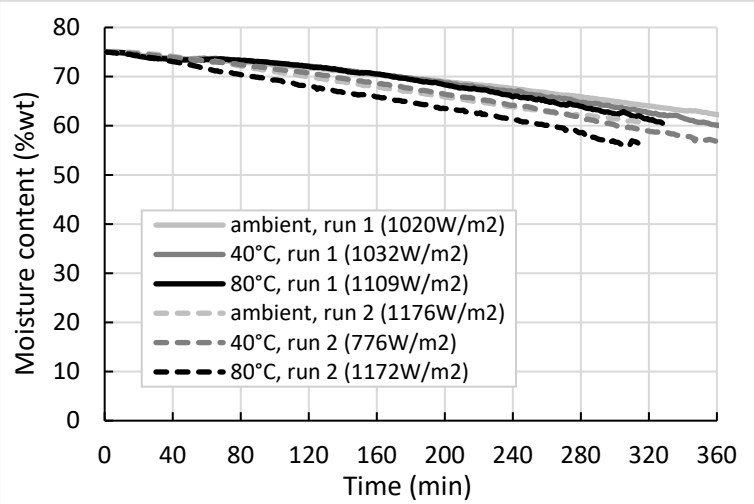
Additional Notes

- The measured average irradiance included in the results below for each experiment

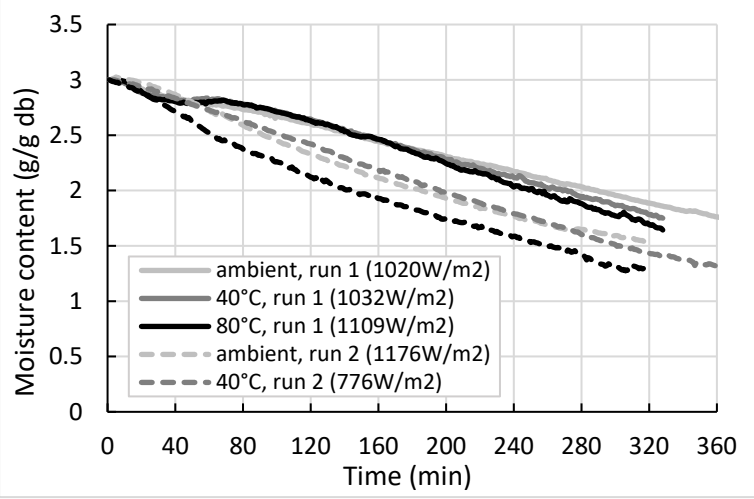
Description of Data

Moisture content versus time as a function of the air temperature

Wet basis



Dry basis



Observations:

- Similar drying rate between the different air temperatures

General information	
Type of data	Kinetics of solar thermal drying
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 (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 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 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	Moisture content
Employed methods	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)

Publications

Septien, S., Mugauri, T.R., Singh, A., & Inambao, F. (2019). Drying of Faecal Sludge using Solar Thermal Energy. WRC project final report.

Mugauri, T.R. (2019). Drying of Faecal Sludge from Ventilated-Improved Pit Latrines (VIP Latrines) using Solar Thermal Energy. Master thesis. University of KwaZulu-Natal, Durban, South Africa.

Septien, S., Mugauri, T.R., Singh, A., & Inambao, F. (2018). Solar drying of faecal sludge from pit latrines in a bench-scale device. 41st WEDC conference proceedings, Nakuru, Kenya.

Septien, S., Mugauri, T.R., Singh, A., & Inambao, F. (2018). Solar Drying of Faecal Sludge from On-Site Sanitation Facilities. 5th Southern Africa Solar Energy Conference proceedings, Durban, South Africa.

Data source files

https://www.dropbox.com/s/n2qp26y3zilt1ev/Solar%20thermal%20drying%20of%20VIP_2017-2018.xlsx?dl=0

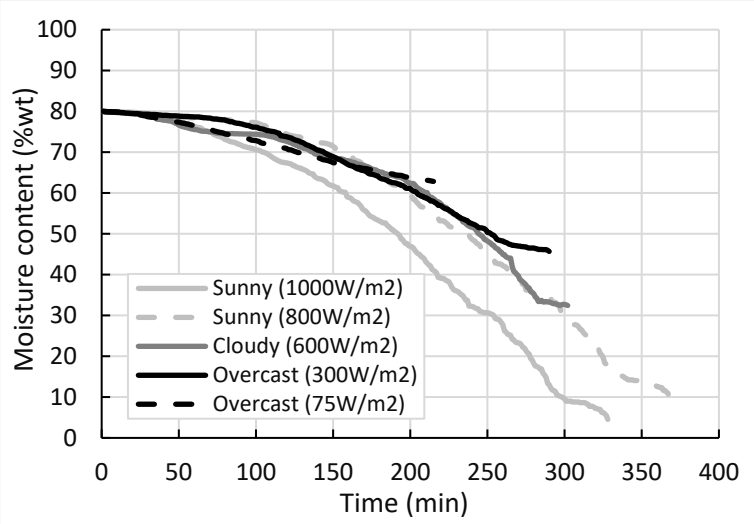
Additional Notes

- Control experiment: sample placed at the open-air
- The measured average irradiance included in the results below for each experiment

Description of Data

Moisture content versus time as a function of the weather conditions

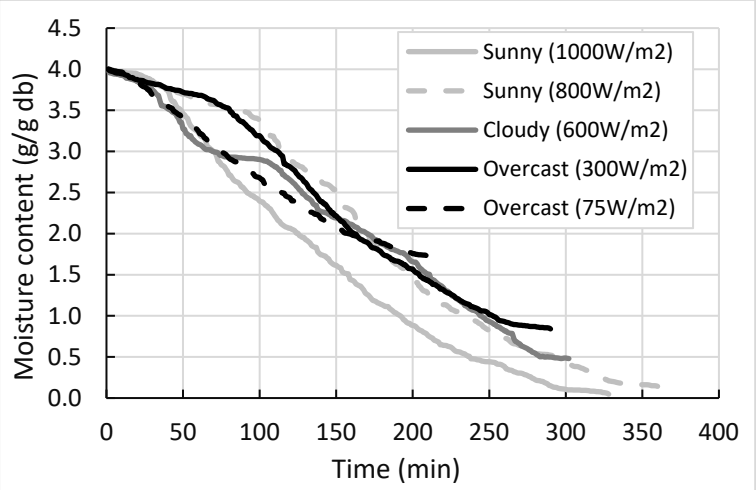
Wet Basis



Observations

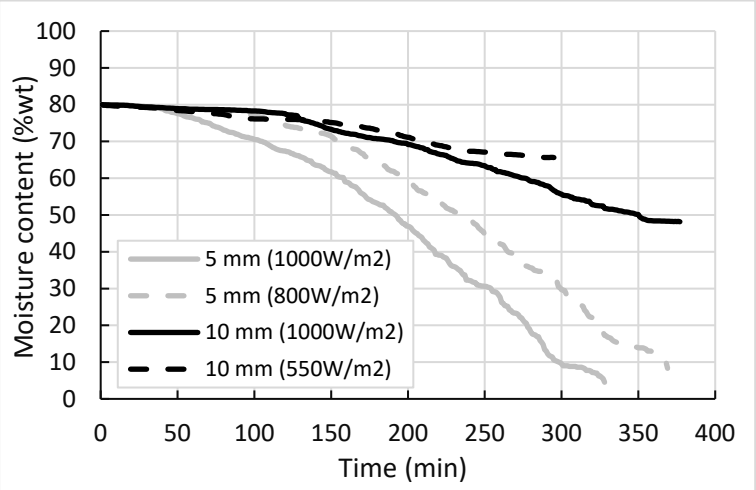
- Faster drying at sunny conditions (1000 W/m^2)

Dry Basis

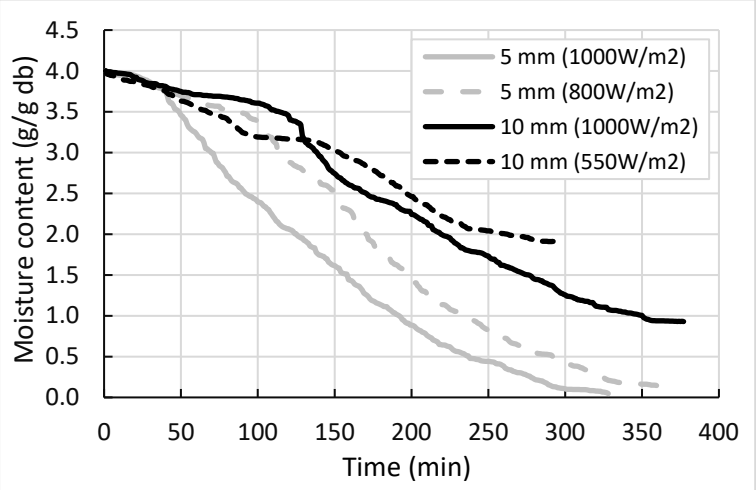


Moisture content versus time as a function of thickness of the thin layer

Wet Basis



Dry Basis

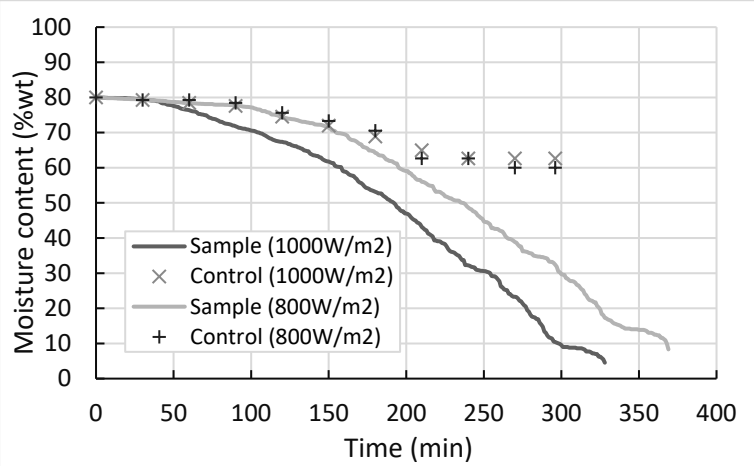


Observations

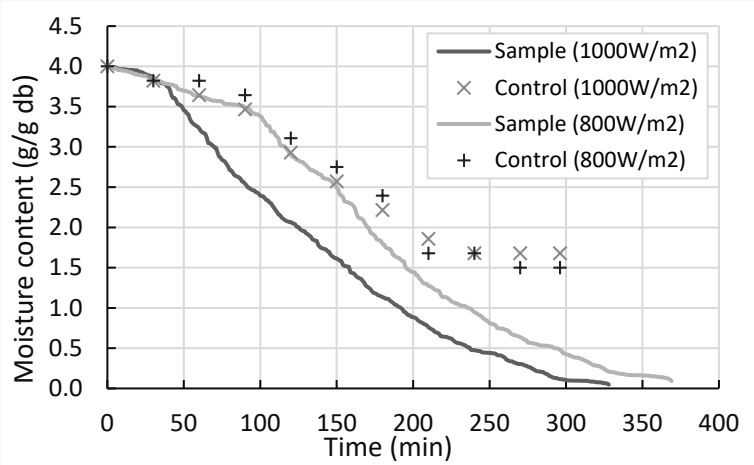
- Faster drying of the sludge thin layer of 5 mm

Moisture content versus time inside the solar drier and the control (sample placed at the open air) during sunny conditions

Wet Basis



Dry Basis

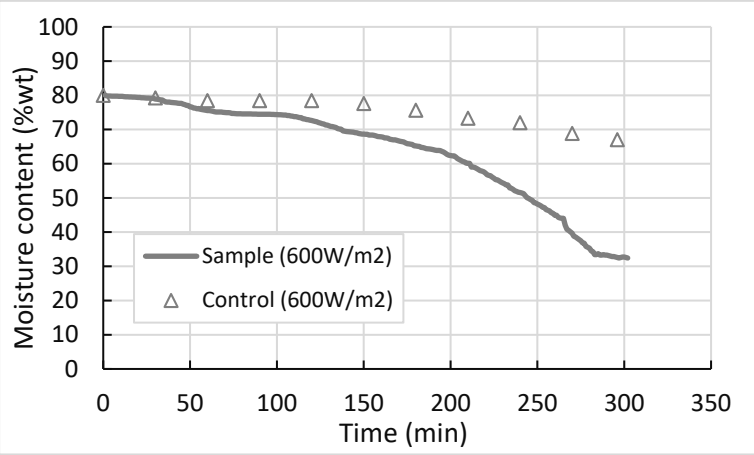


Observations

- Faster drying of the sample inside the solar dryer

Moisture content versus time inside the solar drier and the control (sample placed at the open air) during cloudy conditions

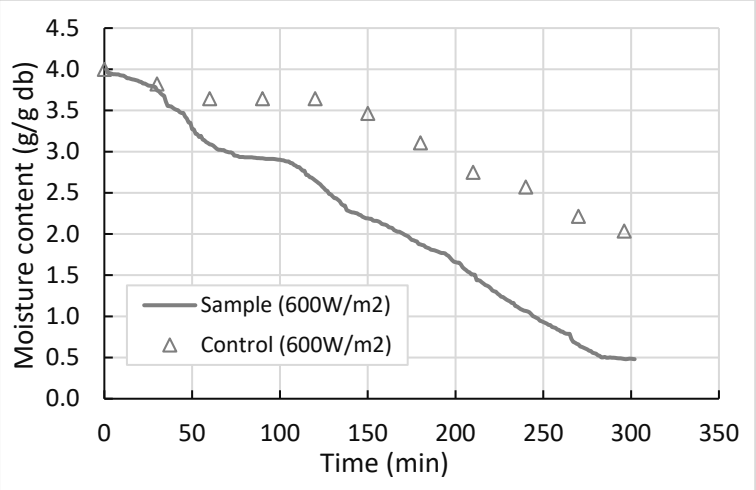
Wet Basis



Observations

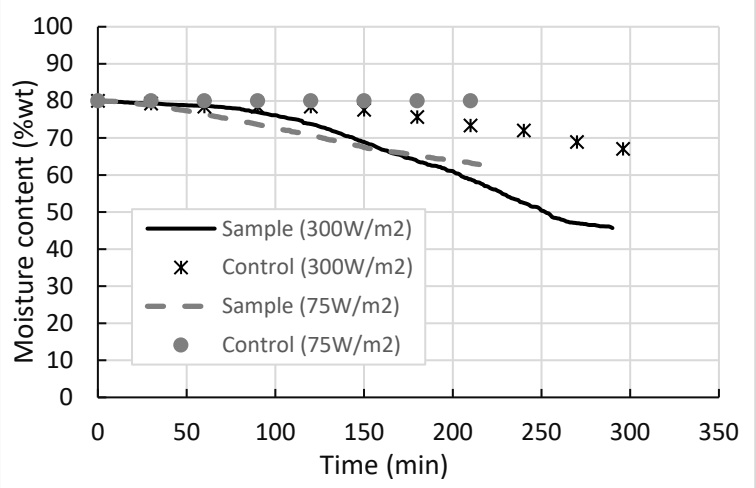
- Faster drying of the sample inside the solar dryer

Dry Basis

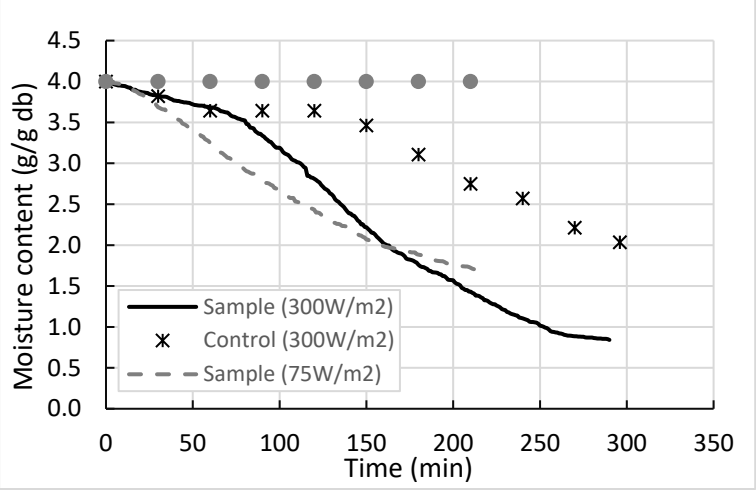


Moisture content versus time inside the solar drier and the control (sample placed at the open air) during overcast conditions

Wet Basis



Dry Basis



Observations

- Faster drying of the sample inside the solar dryer

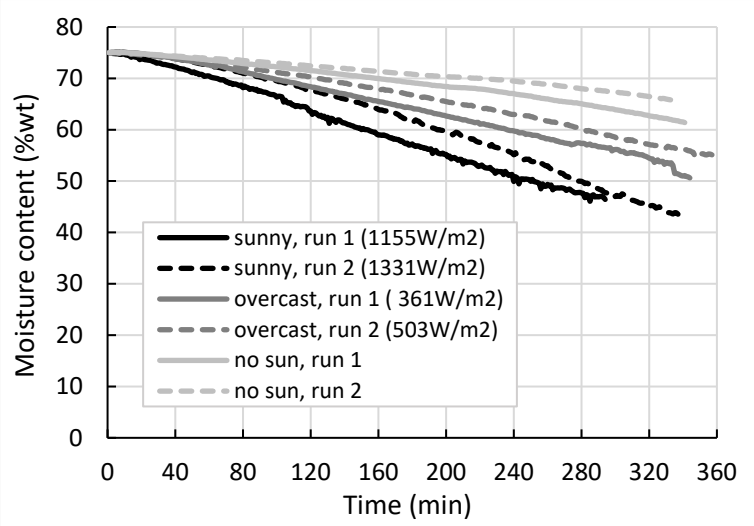
General information	
Type of data	Kinetics of solar thermal drying
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2019 - 2020
Feedstock	
Type of faecal material	Faecal sludge from ventilated improved pit latrine (VIP)
Location of 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	Custom-design solar thermal drying rig
Drying time	5 hours
Operating conditions	o Irradiance: 300 – 1300 W/m^2 (from overcast to sunny conditions) o Air flowrate: 0.5 and 1 m^3/min (corresponding to an air velocity of 0.5 and 1 m/s) o Air temperature: ambient (~20°C), 40 and 80°C o Air humidity: ~10%
Sample form	~ 90 and 170 g of sample as a thin layer of 5 and 10 mm thickness respectively, and 110 mm diameter
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)

Publications
-
Data source files
Sunny and overcast weather conditions https://www.dropbox.com/s/z5hfymnuljctwsc/2019-2020%20VIP%20solar%20drying%20based%20on%20weather%20conditions.xlsx?dl=0 **Different temperatures at air velocity of 0.5 m/s** https://www.dropbox.com/s/7qksuoct2p05q3k/2019-2020%20Solar%20drying%20of%20VIP%205mm%20at%200.5m%20per%20sec%20.xlsx?dl=0 **Different temperatures at air velocity of 1.0 m/s** https://www.dropbox.com/s/kvpjzpjojb8zml5/2019-2020%20Solar%20drying%20of%20VIP%205mm%20at%201m%20per%20sec.xlsx?dl=0 **Ambient temperature and varying air velocities** https://www.dropbox.com/s/ngrboytch6am0p8/2019-2020%20VIP%20solar%20drying%20at%20varied%20air%20velocities%20%28ambient%20temp%29_UKZN.xlsx?dl=0 **Open drying** https://www.dropbox.com/s/reqvrb7s4ik4ofg/2019-2020%20VIP%20Open%20drying%20tests.xlsx?dl=0
Additional Notes
○ Control experiments: (1) sample placed at the open-air and (2) drying chamber covered by an opaque sheet to block the solar radiation to penetrate within it ○ The measured average irradiance included in the results below for each experiment

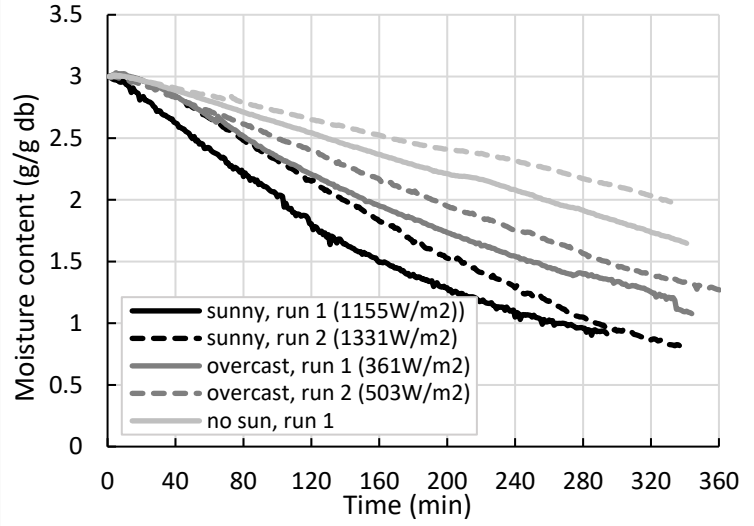
Description of Data

Moisture content versus time as a function of the weather conditions and comparison with control (2) (sample not exposed to the solar radiation)

Wet basis



Dry basis

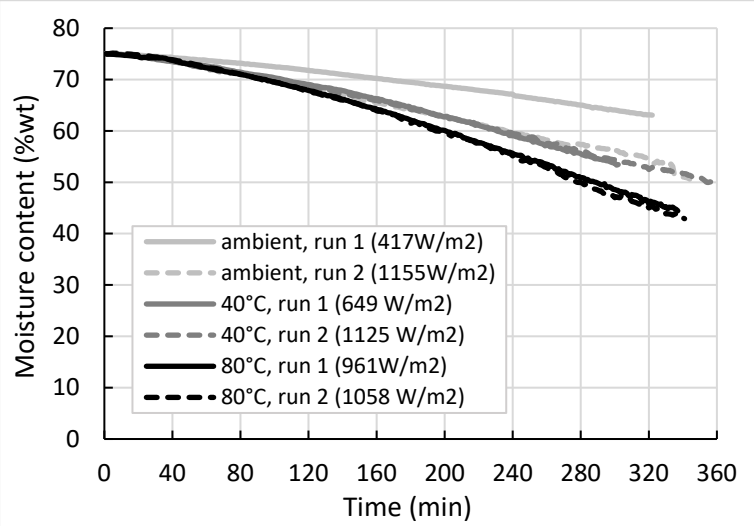


Observations:

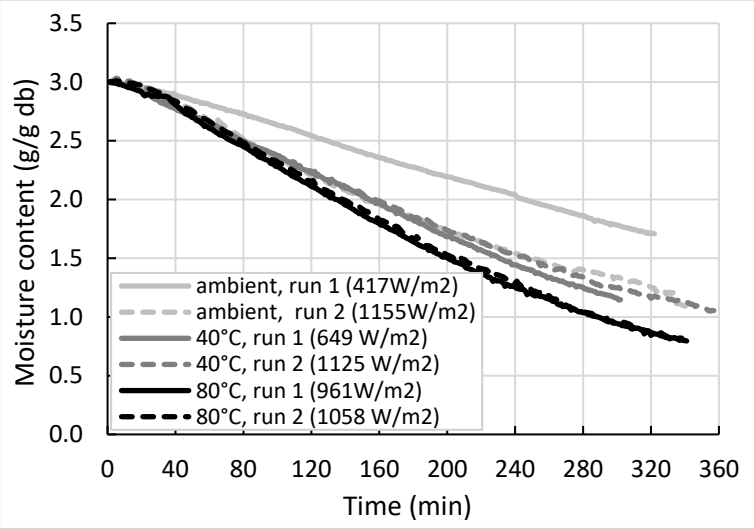
- Faster drying during sunny condition than overcast conditions
- Slowest drying without irradiance (control (2))
- Faster drying at higher irradiance

Moisture content versus time as a function of the air temperature at an air velocity of 0.5 m/s

Wet basis



Dry basis

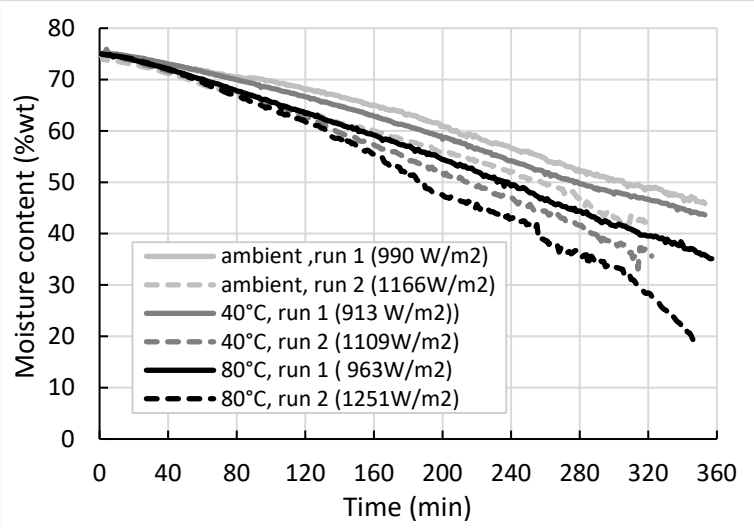


Observations:

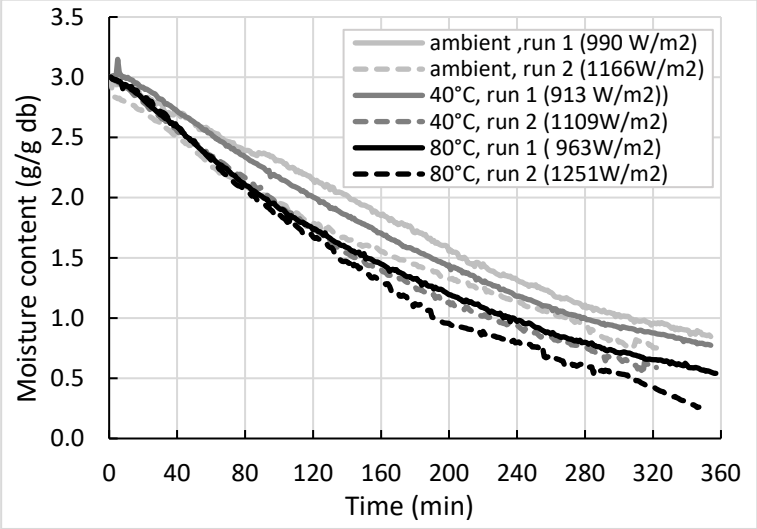
- Faster drying at 80°C
- No significant difference between ambient temperature and 40°C

Moisture content versus time as a function of the air temperature at an air velocity of 1 m/s

Wet basis



Dry basis

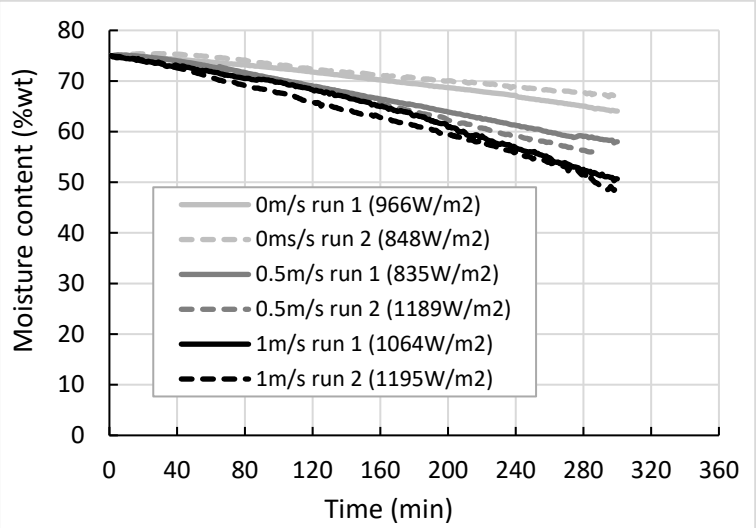


Observations:

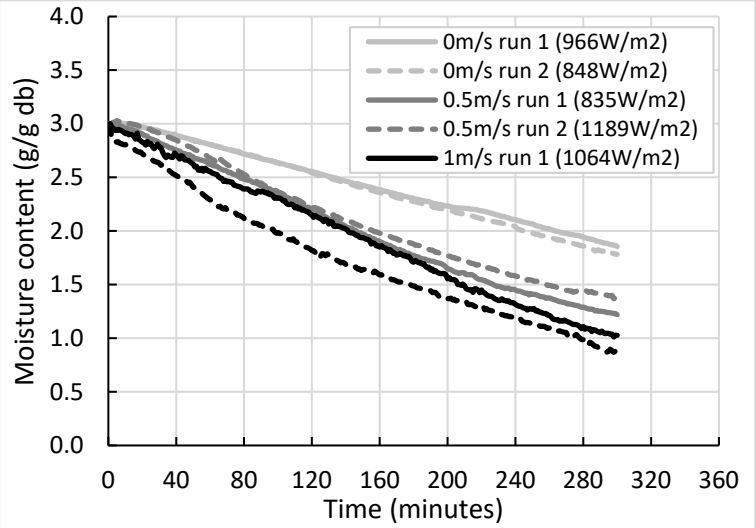
- Faster drying at 80°C than at ambient conditions, with 40°C as intermediate

Moisture content versus time as a function of the air velocity

Wet basis



Dry basis

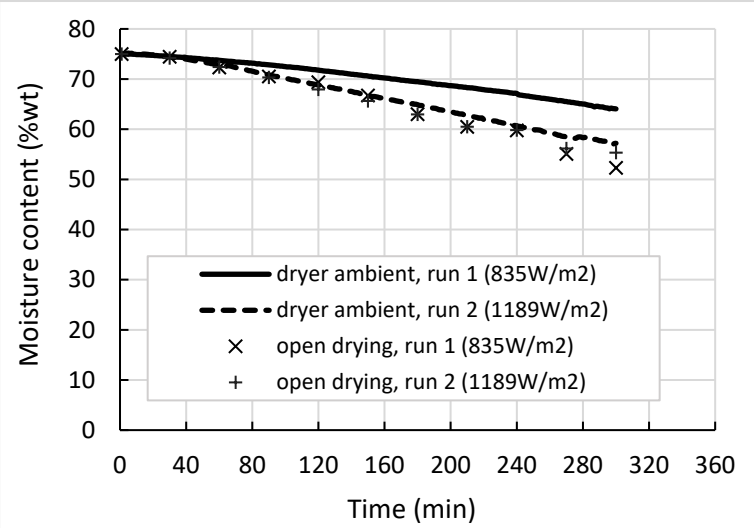


Observations:

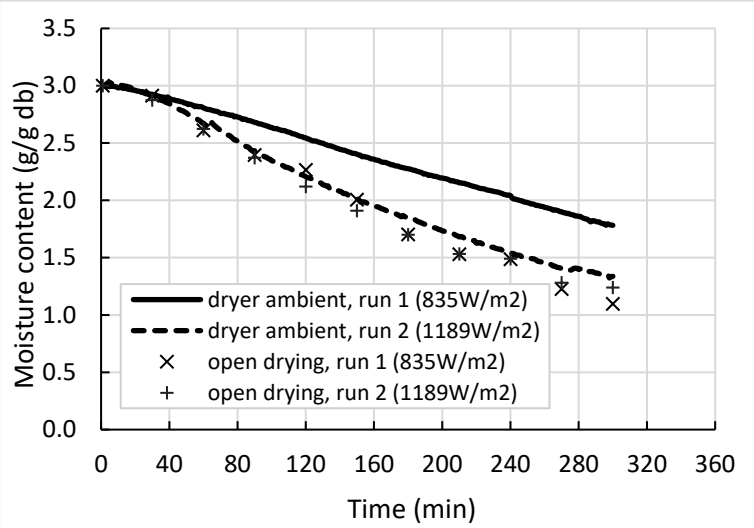
- Faster drying by increasing the air velocity (i.e. by increasing the air flowrate)

Moisture content versus time inside the solar drier and the control (sample placed at the open air) during sunny conditions

Wet basis



Dry basis

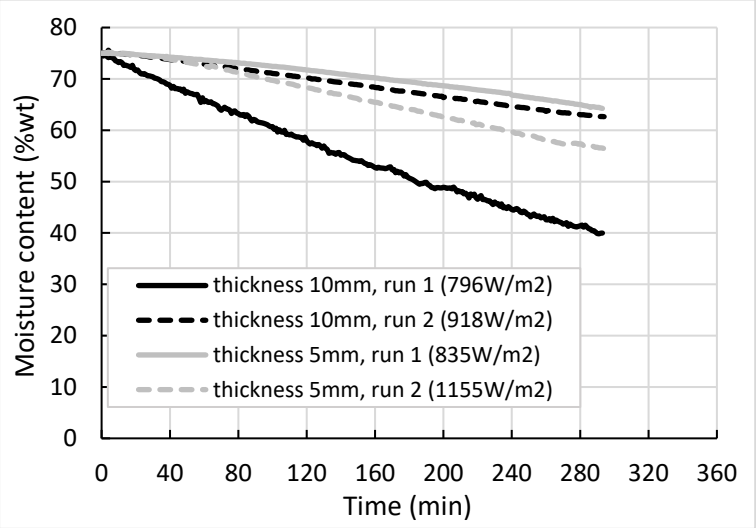


Observations:

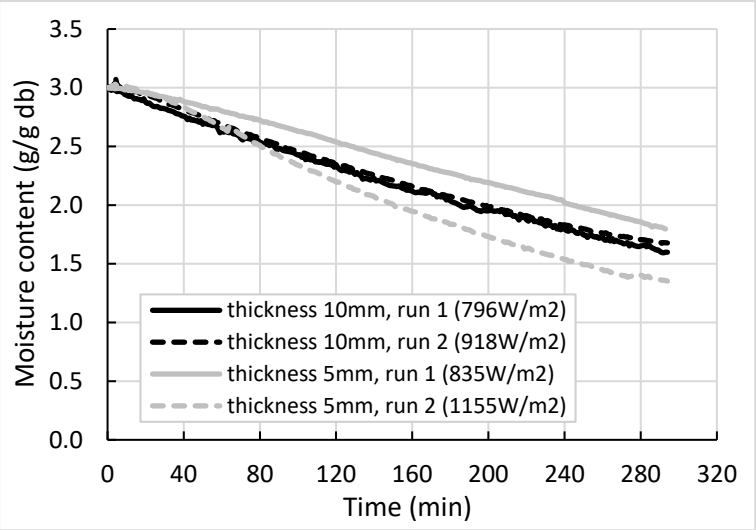
- Similar drying rate between the sample inside the drying chamber and the sample placed at the open air (control (1)) during the experiment with an average irradiance of 1189 W/m^2
- Faster drying for the open-air sample compared to the sample inside the drying chamber during the experiment with an average irradiance of 835 W/m^2 (probably due to the windy conditions on that day)

Moisture content versus time as a function of the sample thickness

Wet basis



Dry basis



Observations:

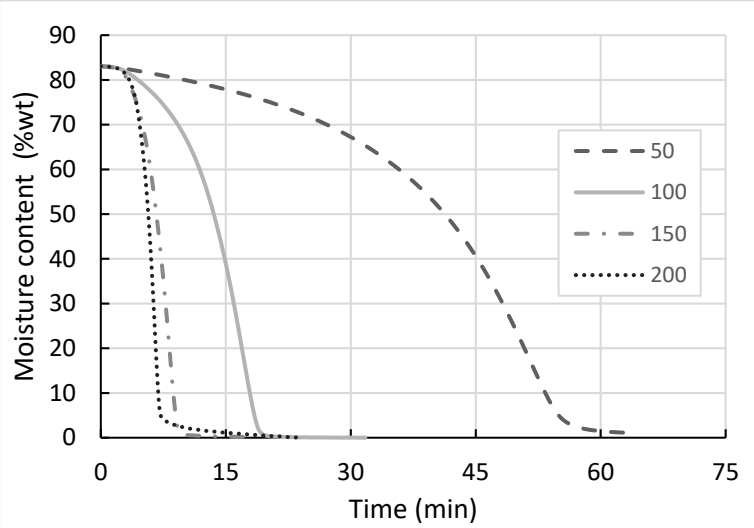
- No effect of the sludge thickness on the drying rate

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
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	Thermogravimetry - differential thermal analyser *SHIMADU DTG-60A*
Drying time	Until stabilisation of the sample mass
Operating conditions	○ Temperature: 50, 100, 150 and 200°C ○ Heating rate: 50°C/min ○ Air flowrate: 50 mL/min
Sample form in the dryer	~ 70 mg sample on aluminium crucible of 6 mm diameter and 5 mm height
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
Publications	
-	

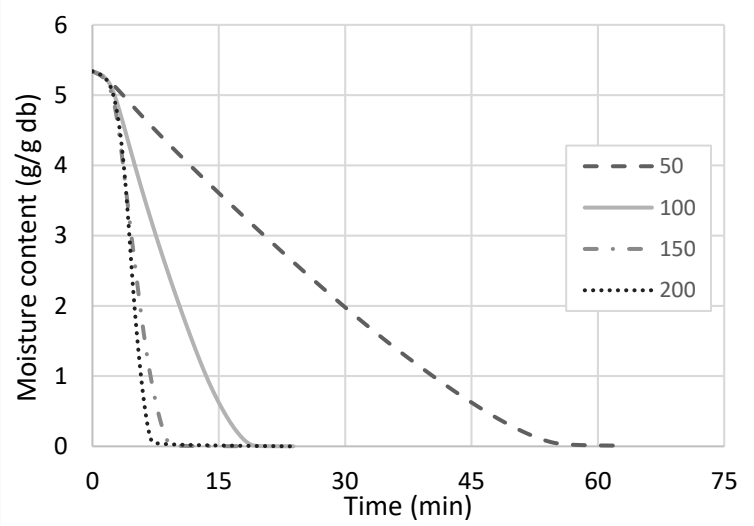
Data source files
https://www.dropbox.com/s/otzyeo7ze8rex9f/2018-2019%20ABR%20Isothermal%20Test_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature
- Strong influence of temperature on the drying rate below 150°C
- Weak effect of temperature above 150°C

General information	
Type of data	Isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
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	~ 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	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	Until mass stabilisation
Operating conditions	○ Temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 10 and 100°C/min ○ Flow rate: 4 mL/min
Sample in the drier	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
Somorin T, Getahun S, Septien S et al. Isothermal drying characteristics and kinetics of human faecal sludges [version 1; peer review: awaiting peer review]. Gates Open Res 2020, 4:67	

Data source files

https://www.dropbox.com/s/6kwot2hnlj2c2o1/Cranfield%20University_ABR%20sludge%20TGA%20Isothermal%20kinetics%20%282018-2019%29.xlsx?dl=0

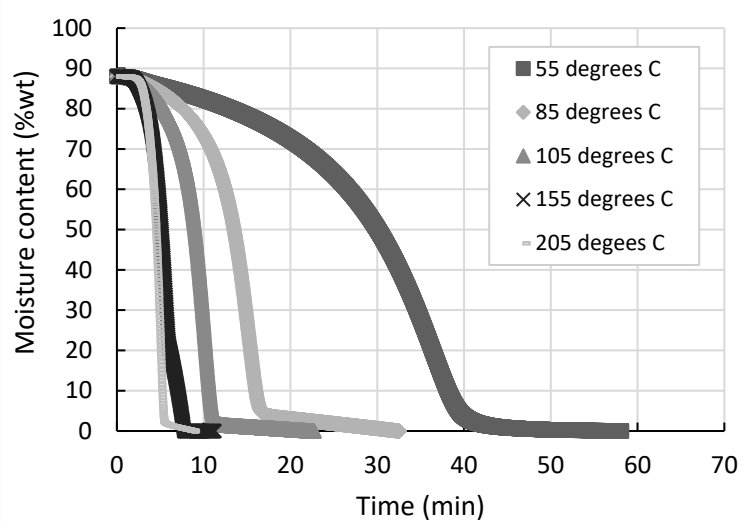
Additional Notes

- Faecal sludge couriered from South Africa

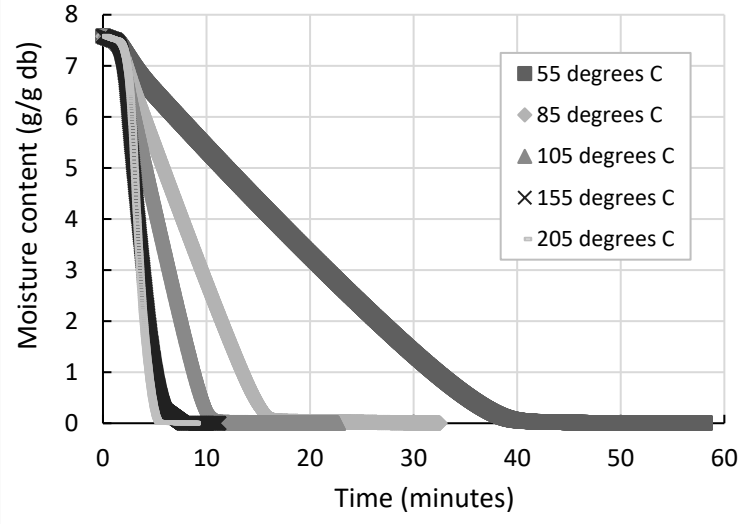
Description of Data

Moisture content versus time as a function of temperature at a heating rate of 100°C/min

Wet basis



Dry basis

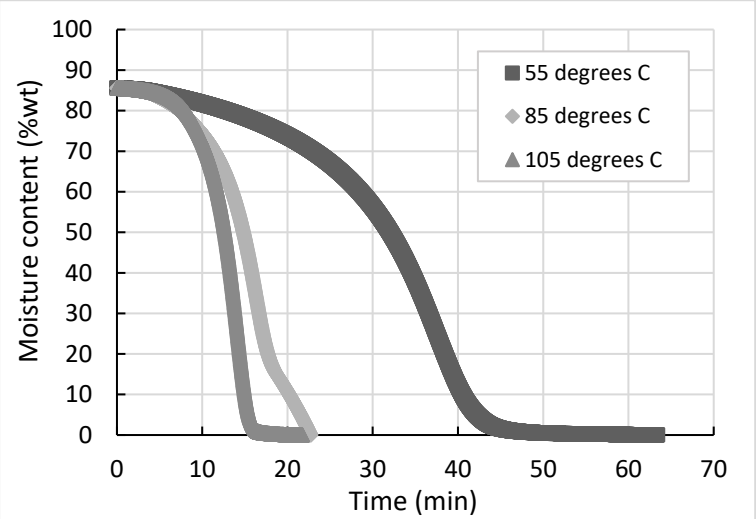


Observations:

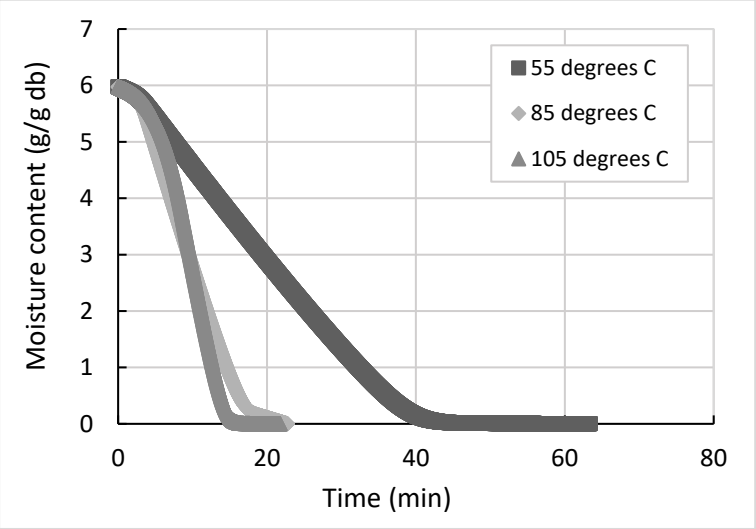
- Faster drying by increasing temperature
- Considerable influence of temperature on the drying rate below 155°C
- Weak effect of temperature above 155°C

Moisture content versus time as a function of temperature at a heating rate of 10°C/min

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
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	Thermogravimetric analyser - simultaneous thermal analysis *Perkin Elmer STA 6000*
Drying time	~ 40 - 80 min
Operating conditions	○ Set temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 10°C/min ○ Carrier gas: nitrogen ○ Flow rate: 30 mL/min
Sample form in the dryer	~ 40 mg in a crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

Wet basis
https://www.dropbox.com/s/r2jsoyod36pte3a/Swansea%20University_Sludge%20TGA%20Isothermal%20kinetics_wet%20basis%20%282018-2020%29.xlsx?dl=0

Dry basis
https://www.dropbox.com/s/w1zkkuuu7z21hyj/Swansea%20University_Sludge%20TGA%20Isothermal%20Kinetics_dry%20basis%20%282018-2020%29.xlsx?dl=0
https://www.dropbox.com/s/w1zkkuuu7z21hyj/Swansea%20University_Sludge%20TGA%20Isothermal%20Kinetics_dry%20basis%20%282018-2020%29.xlsx?dl=0

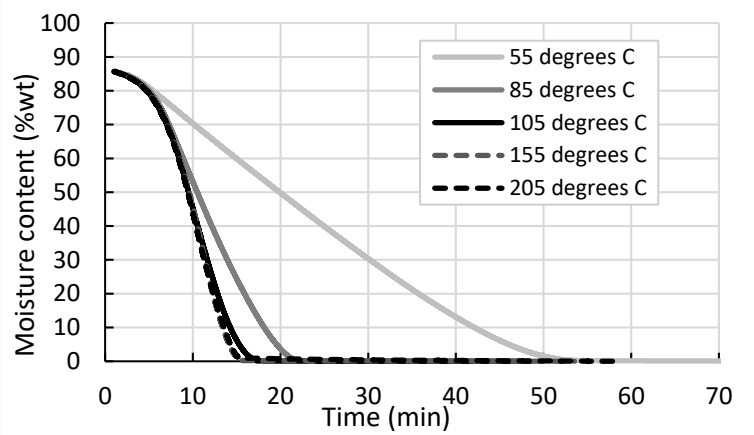
Additional Notes

- Samples couriered from South Africa
- Considerable drying of the sample before reaching the set temperature at 105, 155 and 205°C

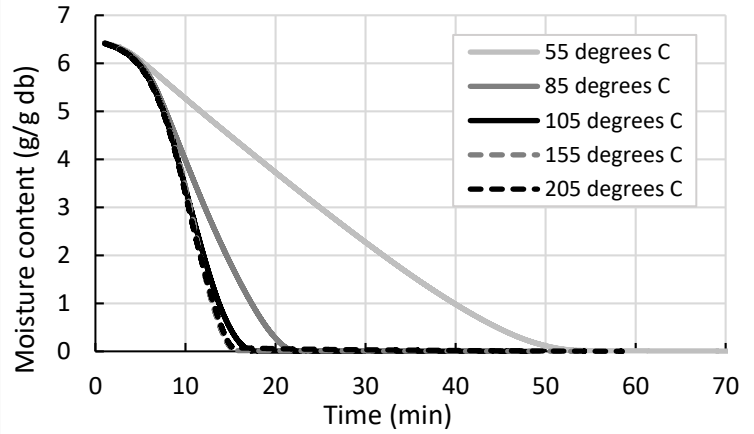
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations

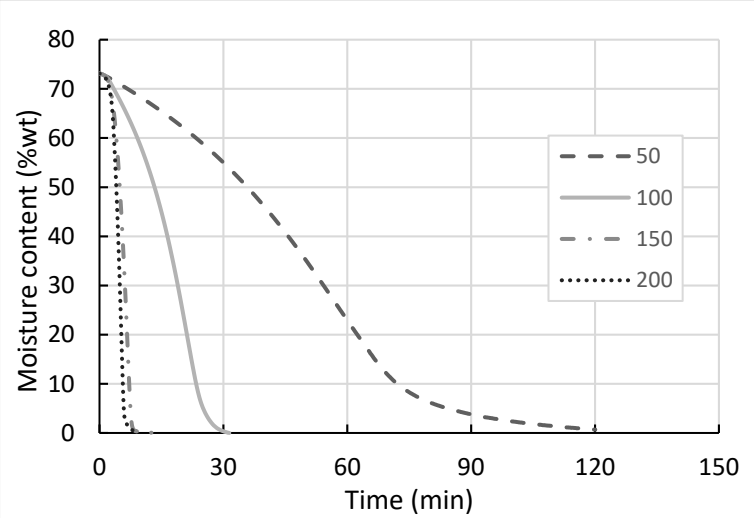
- Faster drying by increasing the temperature from 55 to 105°C
- Drying achieved before 20 minutes at temperatures above 85°C
- Same drying rate between 155 and 205°C (probably because major part of the drying occurred during the heating stage before reaching the final temperature)

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
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	Thermogravimetry - differential thermal analyser *SHIMADU DTG-60A*
Drying time	Until stabilisation of the sample mass
Operating conditions	o Temperature: 50, 100, 150 and 200°C o Heating rate: 50°C/min o Air flowrate: 50 mL/min
Sample form in the dryer	~ 70 mg sample on aluminium crucible of 6 mm diameter and 5 mm height
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
Publications	

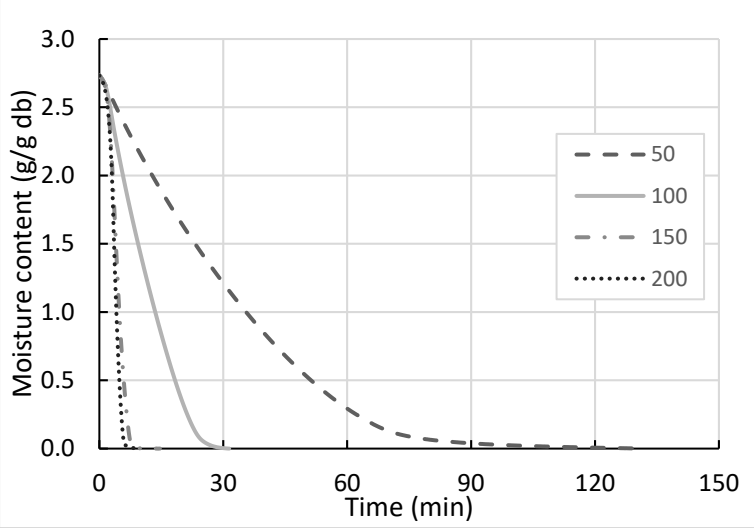
Data source files
https://www.dropbox.com/s/2k2bhqr8kqjcaws/2018-2019%20UDDT%20Isothermal%20tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature
- Strong influence of temperature on the drying rate below 150°C
- Weak effect of temperature above 150°C

General information	
Type of data	Isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
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	~ 50%wt
Total solids content	~ 50%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	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	Until mass stabilisation
Operating conditions	○ Temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 100°C/min ○ Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
Somorin T, Getahun S, Septien S et al. Isothermal drying characteristics and kinetics of human faecal sludges [version 1; peer review: awaiting peer review]. Gates Open Res 2020, 4:67	

Data source files

https://www.dropbox.com/s/jbuwxf4hggk1vwz/Cranfield%20UDDT%20sludge_TGA%20Isothermal%20Kinetics%20%282018-2019%29.xlsx?dl=0

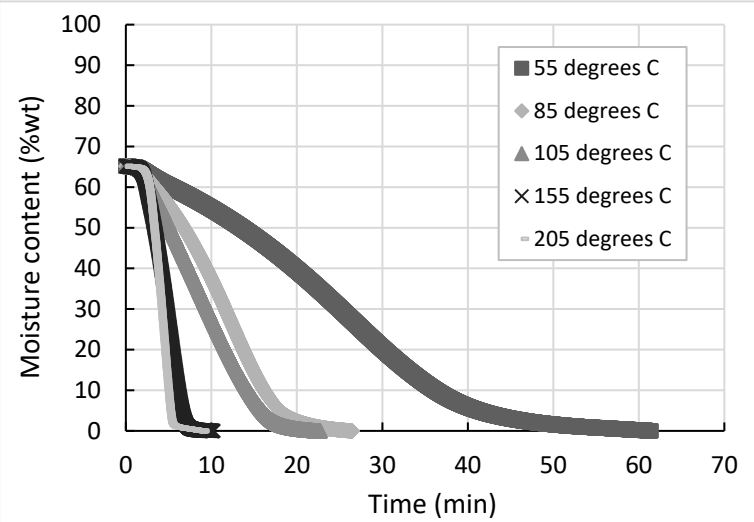
Additional Notes

- Samples couriered from South Africa

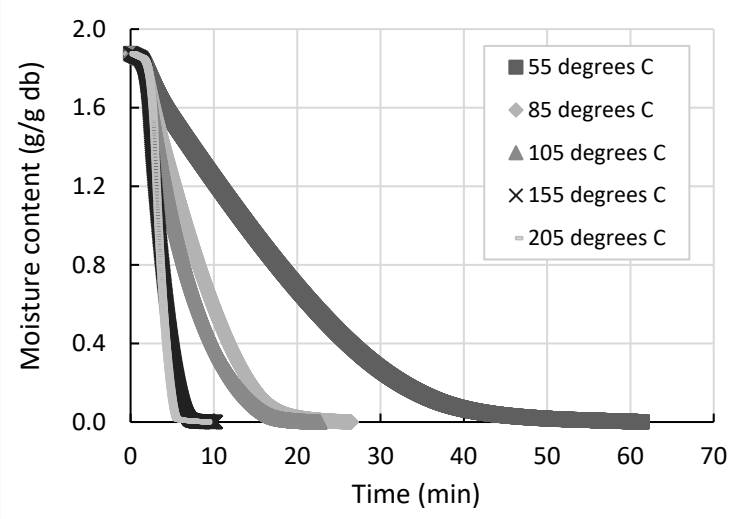
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis

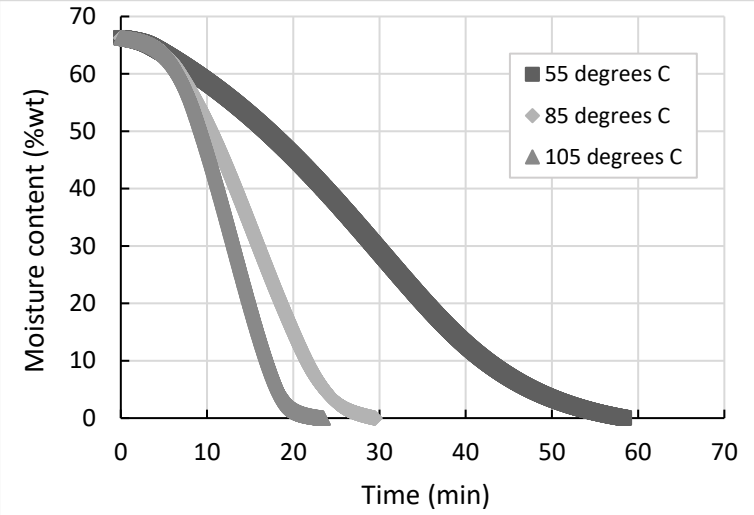


Observations:

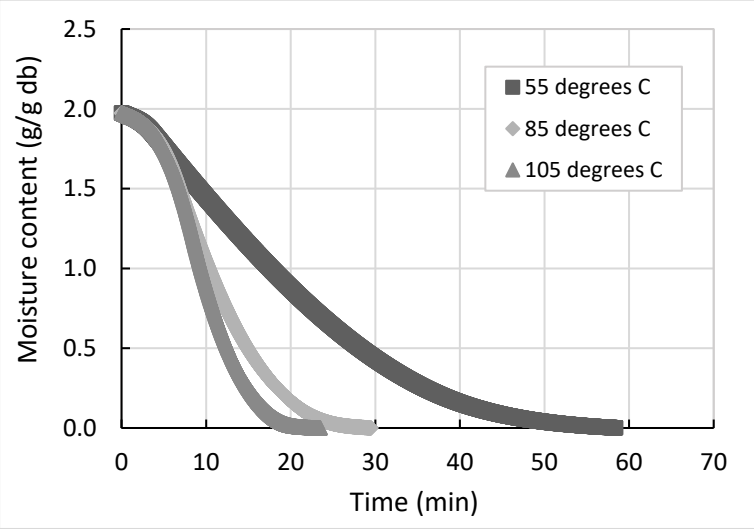
- Faster drying by increasing temperature
- Considerable influence of temperature on the drying rate below 155°C
- Weak effect of temperature above 155°C

Moisture content versus time as a function of temperature at a heating rate of 10°C/min

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
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 urine diversion dry toilets (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	Thermogravimetric analyser - simultaneous thermal analysis *Perkin Elmer STA 6000*
Drying time	~ 40 - 80 min
Operating conditions	○ Set temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 10°C/min ○ Carrier gas: nitrogen ○ Flow rate: 30 mL/min
Sample form in the dryer	~ 40 mg in a crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

Wet basis
https://www.dropbox.com/s/r2jsoyod36pte3a/Swansea%20University_Sludge%20TGA%20Isothermal%20kinetics_wet%20basis%20%282018-2020%29.xlsx?dl=0

Dry basis
https://www.dropbox.com/s/w1zkkuuu7z21hyj/Swansea%20University_Sludge%20TGA%20Isothermal%20Kinetics_dry%20basis%20%282018-2020%29.xlsx?dl=0

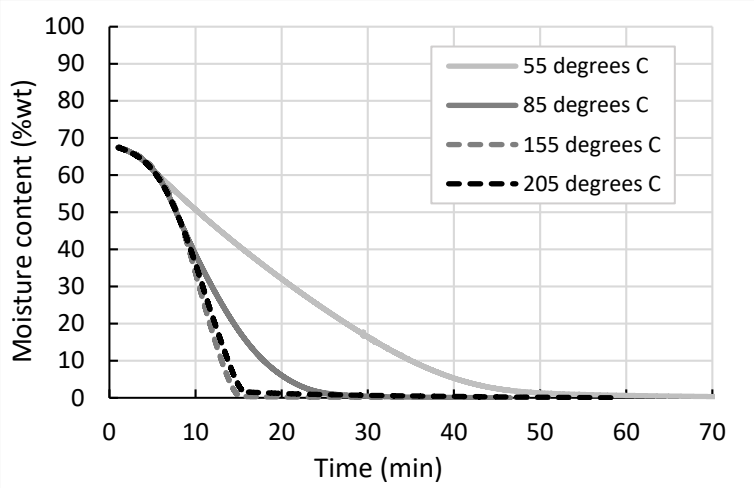
Additional Notes

- Samples couriered from South Africa
- Considerable drying of the sample before reaching the set temperature at 105, 155 and 205°C

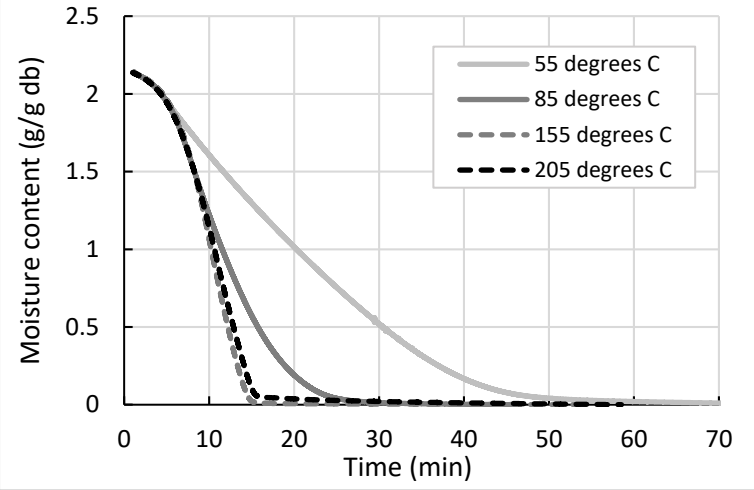
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations

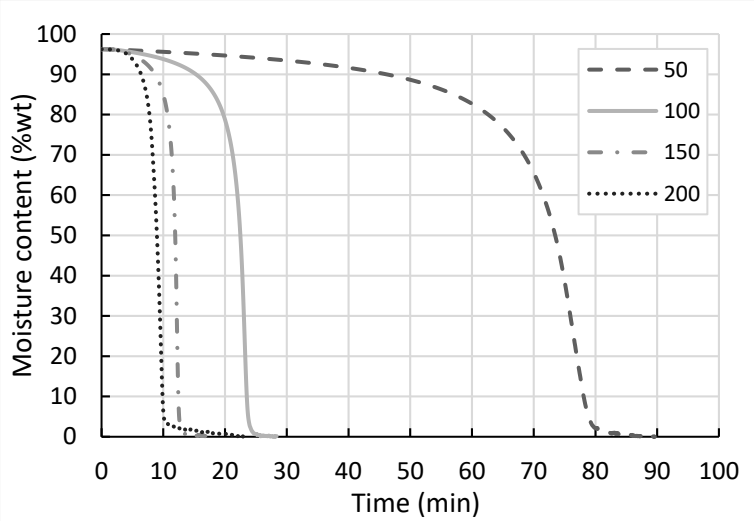
- Faster drying by increasing the temperature from 55 to 155°C
- Drying achieved before 20 minutes at temperatures above 155°C
- Same drying rate between 155 and 205°C (probably because major part of the drying occurred during the heating stage before reaching the final temperature)

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
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 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	Thermogravimetry - differential thermal analyser *SHIMADU DTG-60A*
Drying time	Until stabilisation of the sample mass
Operating conditions	○ Temperature: 50, 100, 150 and 200°C ○ Heating rate: 50°C/min ○ Air flowrate: 50 mL/min
Sample form in the dryer	~ 70 mg sample on aluminium crucible of 6 mm diameter and 5 mm height
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
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.	

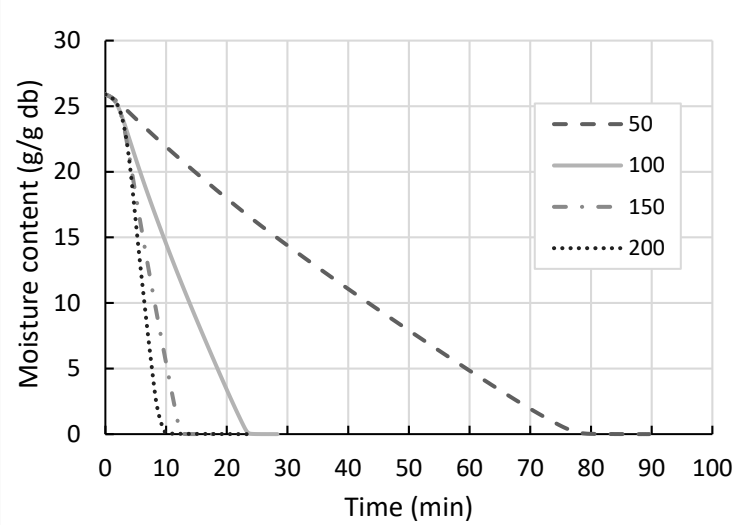
Data source files
https://www.dropbox.com/s/khl5b44277bgqw2/2018-2019%20VIP%20Isothermal%20Tests_PRG.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature
- Strong influence of temperature on the drying rate below 150°C
- Weak effect of temperature above 150°C

General information	
Type of data	Isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
Dates of the experiments	2018 - 2019
Feedstock	
Type of faecal material	Faecal sludge from ventilated 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	Not measured
Ash content	Not measured
Presence of trash?	No (sludge pre-screened during pit emptying)
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	Until mass stabilisation
Operating conditions	○ Temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 100°C/min ○ Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
Somorin T, Getahun S, Septien S et al. Isothermal drying characteristics and kinetics of human faecal sludges [version 1; peer review: awaiting peer review]. Gates Open Res 2020, 4:67	

Data source files

https://www.dropbox.com/s/rhp4d3okk1sgaxb/Cranfield%20University%20VIP%20sludge_TGA%20Isothermal%20kinetics%20%282018-2019%29.xlsx?dl=0

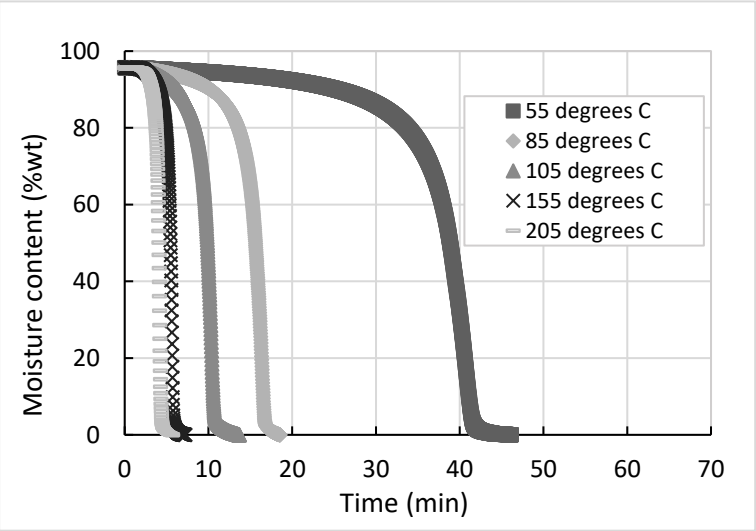
Additional Notes

- Faecal sludge couriered from South Africa

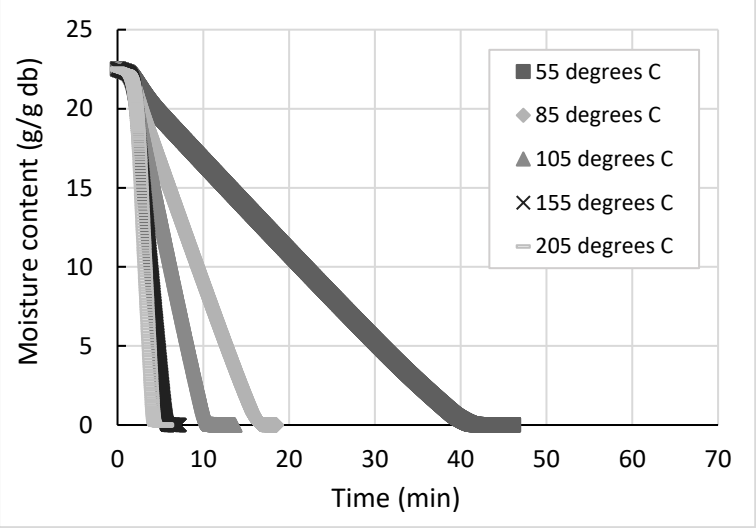
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis

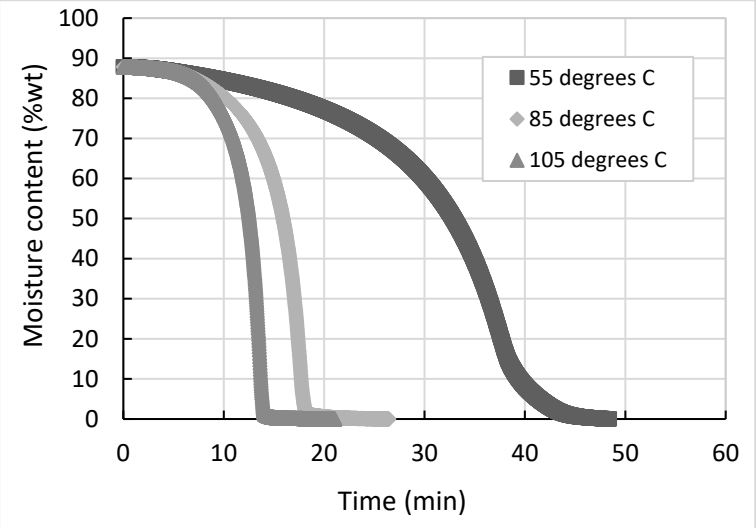


Observations:

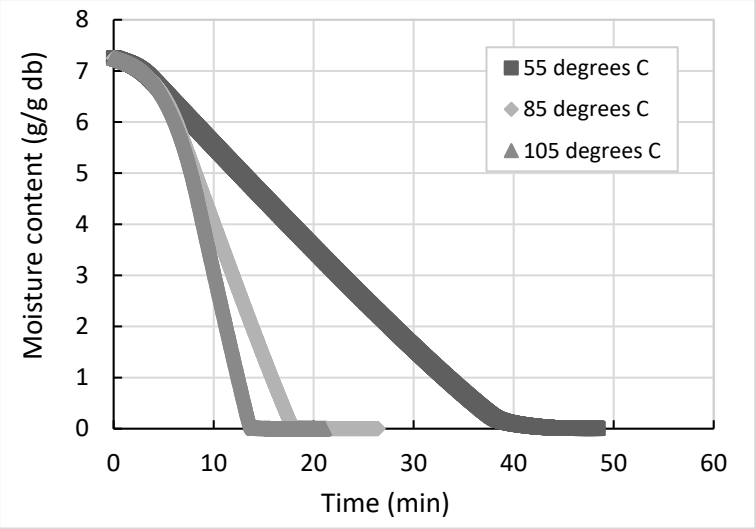
- Faster drying by increasing temperature
- Considerable influence of temperature on the drying rate below 155°C
- Weak effect of temperature above 155°C

Moisture content versus time as a function of temperature at a heating rate of 10°C/min

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
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 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	Not measured
Ash content	Not measured
Presence of trash?	No (sludge pre-screened during pit emptying)
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Thermogravimetric analyser - simultaneous thermal analysis *Perkin Elmer STA 6000*
Drying time	~ 40 - 80 min
Operating conditions	○ Set temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 10°C/min ○ Carrier gas: nitrogen ○ Flow rate: 30 mL/min
Sample form in the dryer	~ 40 mg in a crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

Wet basis
https://www.dropbox.com/s/r2jsoyod36pte3a/Swansea%20University_Sludge%20TGA%20Isothermal%20kinetics_wet%20basis%20%282018-2020%29.xlsx?dl=0

Dry basis
https://www.dropbox.com/s/w1zkkuuu7z21hyj/Swansea%20University_Sludge%20TGA%20Isothermal%20Kinetics_dry%20basis%20%282018-2020%29.xlsx?dl=0

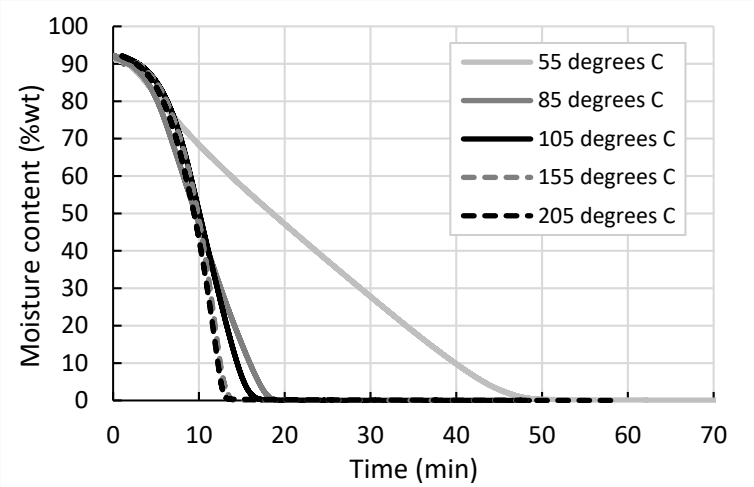
Additional Notes

- Faecal sludge couriered from South Africa
- Considerable drying of the sample before reaching the set temperature at 105, 155 and 205°C

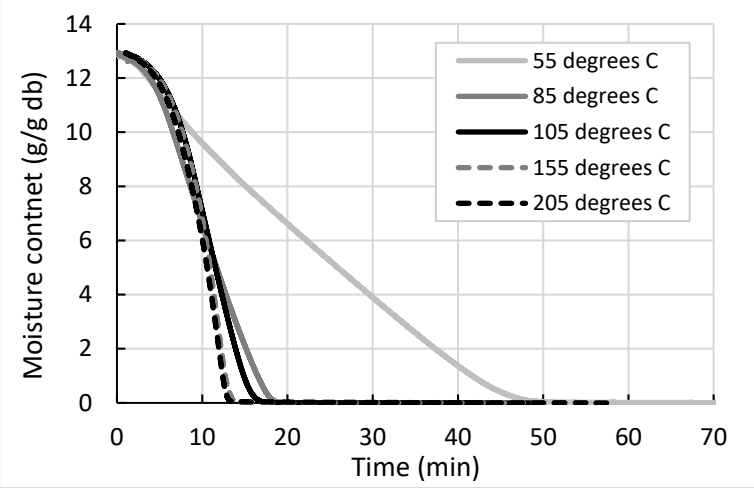
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations

- Faster drying by increasing the temperature from 55 to 155°C
- Drying achieved before 20 minutes at temperatures above 85°C
- Same drying rate between 155 and 205°C (probably because major part of the drying occurred during the heating stage before reaching the final temperature)

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
Place of experimentation	Pollution Research Group, University of KwaZulu-Natal (South Africa)
Dates of the experiments	2018 - 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	Thermogravimetry - differential thermal analyser *SHIMADU DTG-60A*
Drying time	Until stabilisation of the sample mass
Operating conditions	○ Temperature: 50, 100, 150 and 200°C ○ Heating rate: 50°C/min ○ Air flowrate: 50 mL/min
Sample form in the dryer	~ 70 mg sample on aluminium crucible of 6 mm diameter and 5 mm height
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
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/l2yq6knth6gcw1g/2019%20Fresh%20faeces_Isotherm%20Tests_PRG.xlsx?dl=0

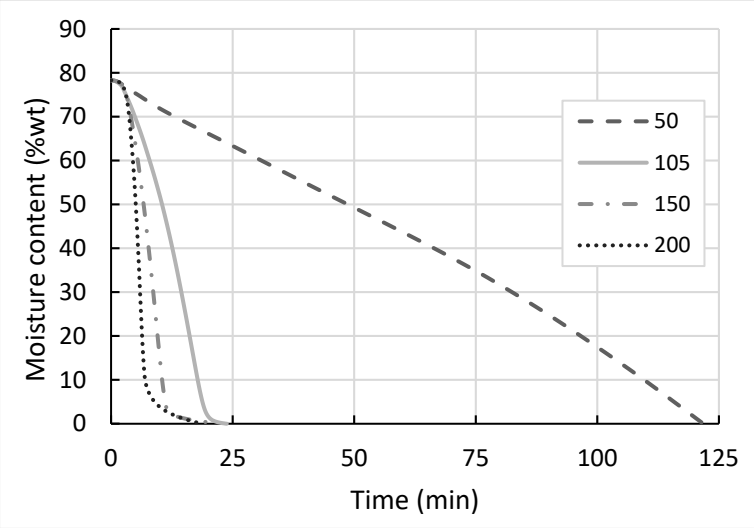
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations from healthy young adults

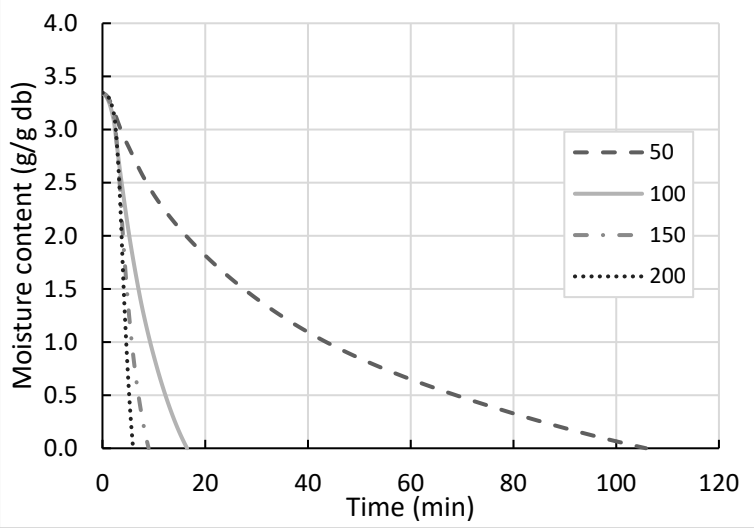
Description of Data

Moisture content vs time as a function of temperature

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature
- Strong influence of temperature on the drying rate below 150°C
- Weak effect of temperature above 150°C

General information	
Type of data	Isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
Dates of the experiments	2018 - 2019
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	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	Until mass stabilisation
Operating conditions	○ Temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 10 and 100°C/min ○ Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
Somorin T, Getahun S, Septien S et al. Isothermal drying characteristics and kinetics of human faecal sludges [version 1; peer review: awaiting peer review]. Gates Open Res 2020, 4:67	

Data source files

https://www.dropbox.com/s/92scdrvv2psut3h/Cranfield%20Human%20Faeces_TGA%20Isothermal%20kinetics%20%282018-2019%29.xlsx?dl=0

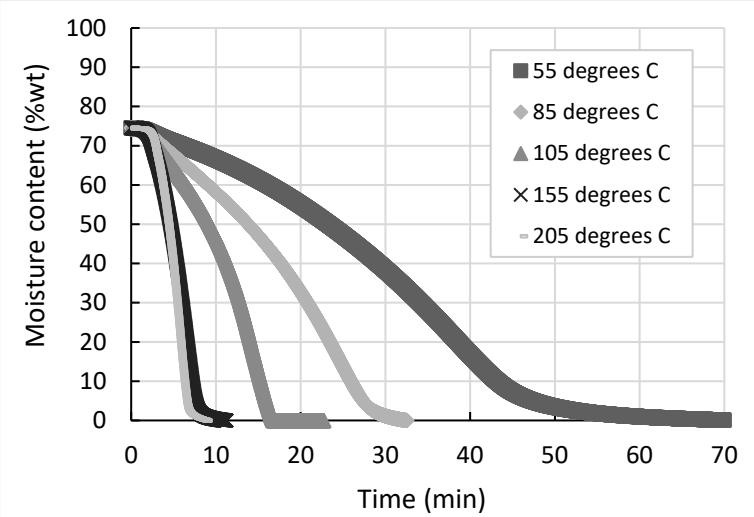
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations

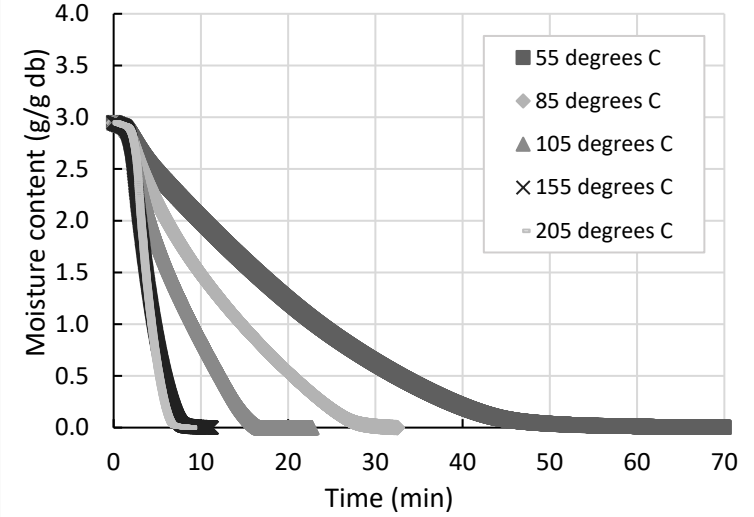
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis

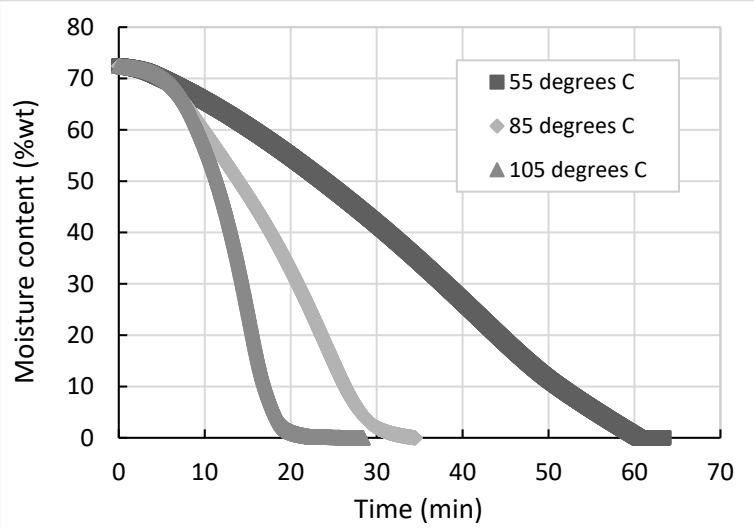


Observations:

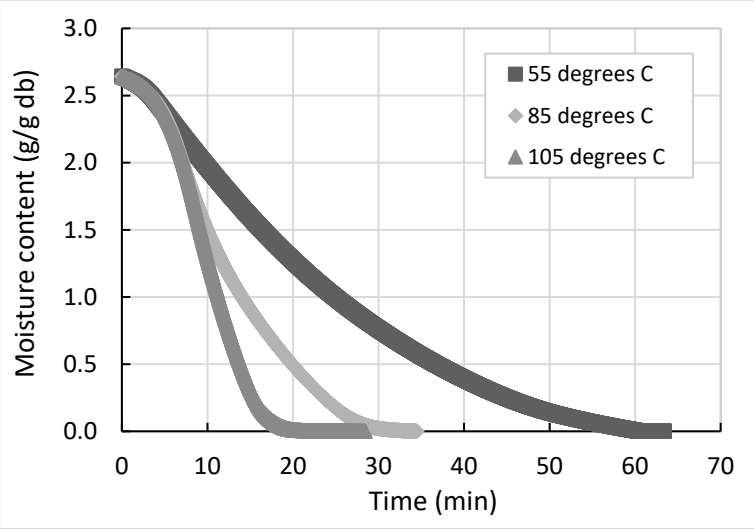
- Faster drying by increasing temperature
- Considerable influence of temperature on the drying rate below 155°C
- Weak effect of temperature above 155°C

Moisture content versus time as a function of temperature at a heating rate of 10°C/min

Wet basis



Dry basis



Observations:

- Faster drying by increasing temperature

General information	
Type of data	Isothermal kinetics in a thermogravimetric analyser
Place of experimentation	Material 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	Thermogravimetric analyser - simultaneous thermal analysis *Perkin Elmer STA 6000*
Drying time	~ 40 - 80 min
Operating conditions	○ Set temperature: 55, 85, 105, 155 and 205°C ○ Heating rate: 10°C/min ○ Carrier gas: nitrogen ○ Flow rate: 30 mL/min
Sample form in the dryer	~ 40 mg in a crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

Wet basis
https://www.dropbox.com/s/r2jsoyod36pte3a/Swansea%20University_Sludge%20TGA%20Isothermal%20kinetics_wet%20basis%20%282018-2020%29.xlsx?dl=0

Dry basis
https://www.dropbox.com/s/w1zkkuuu7z21hyj/Swansea%20University_Sludge%20TGA%20Isothermal%20Kinetics_dry%20basis%20%282018-2020%29.xlsx?dl=0

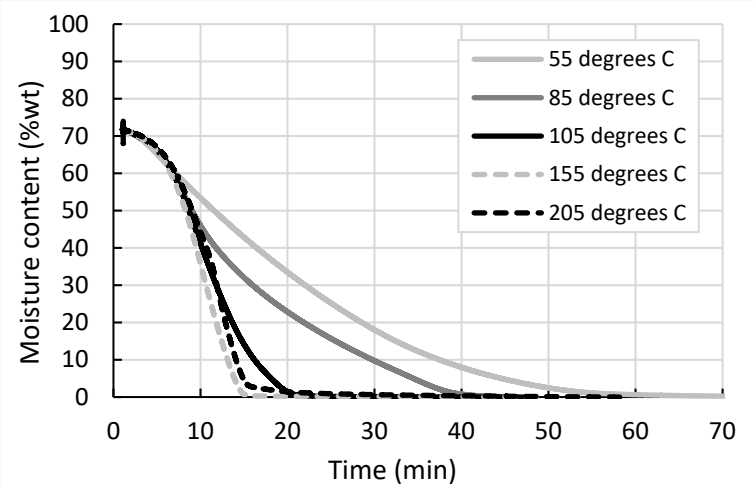
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations
- Considerable drying of the sample before reaching the set temperature at 105, 155 and 205°C

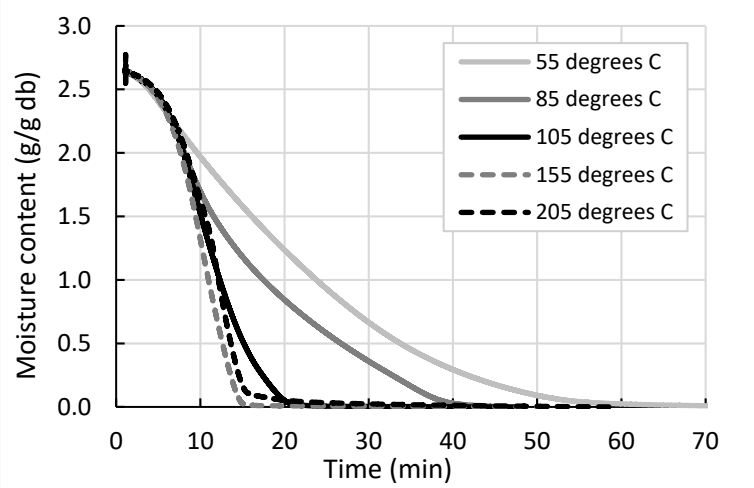
Description of Data

Moisture content as a function of time

Wet basis



Dry basis



Observations

- Faster drying by increasing the temperature from 55 to 155°C
- Drying achieved before 20 minutes at temperatures above 105°C
- Same drying rate between 155 and 205°C (probably because major part of the drying occurred during the heating stage before reaching the final temperature)

General information	
Type of data	Non isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
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	~ 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	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	~ 2, 4, 17 min
Operating conditions	○ Temperature: from ambient to 200°C ○ Heating rate: 10, 50 and 100°C/min ○ Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

https://www.dropbox.com/s/ttir3jkjp3aww6e/Cranfield%20University%20ABR%20sludge%20TGA%20Non-isothermal%20kinetics%20%282018-2019%29.xlsx?dl=0

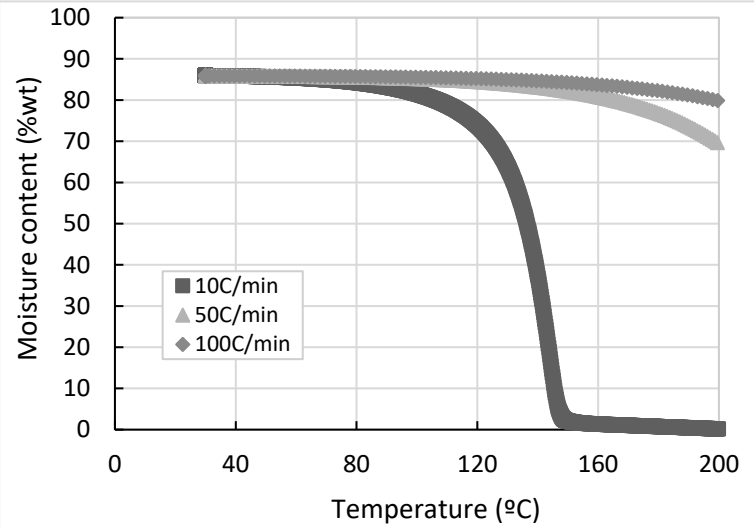
Additional Notes

- Faecal sludge couriered from South Africa

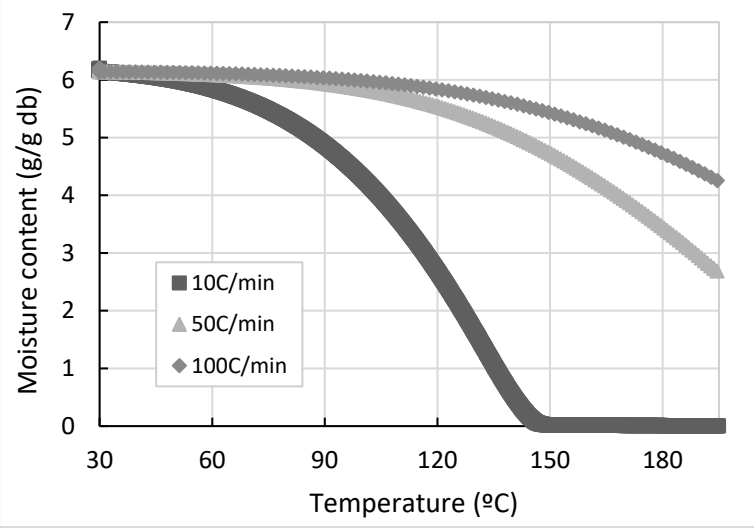
Description of Data

Moisture content versus temperature as a function of the heating rate

Wet basis



Dry basis



Observations:

- Complete drying at a constant rate of 10°C/ min
- Incomplete drying at a constant rate of 50 and 100°C/ min (drying time too short to achieve complete dryness)

General information	
Type of data	Non-isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
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	~ 50%wt
Total solids content	~ 50%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	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	Until temperature ramp reaching 200°C
Operating conditions	o Temperature: from ambient to 200°C o Heating rate: 10, 50 and 100°C/min o Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

https://www.dropbox.com/s/xjecvq6j7y7xove/Cranfield%20University%20UDDT%20sludge%20TGA%20Non-Isotherm%20Kinetics.xlsx?dl=0

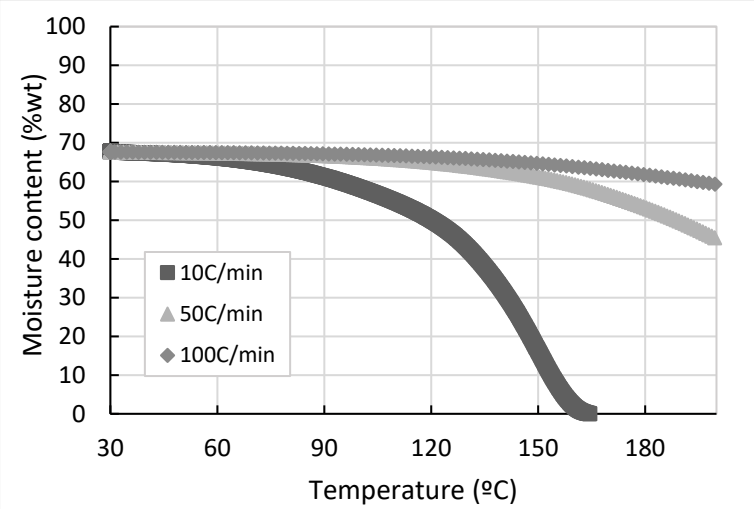
Additional Notes

- Faecal sludge couriered from South Africa

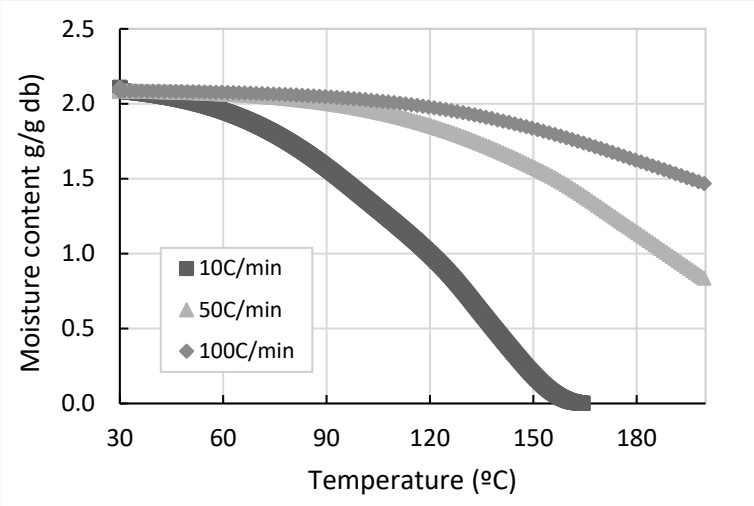
Description of Data

Moisture content versus temperature as a function of the heating rate

Wet basis



Dry basis



Observations:

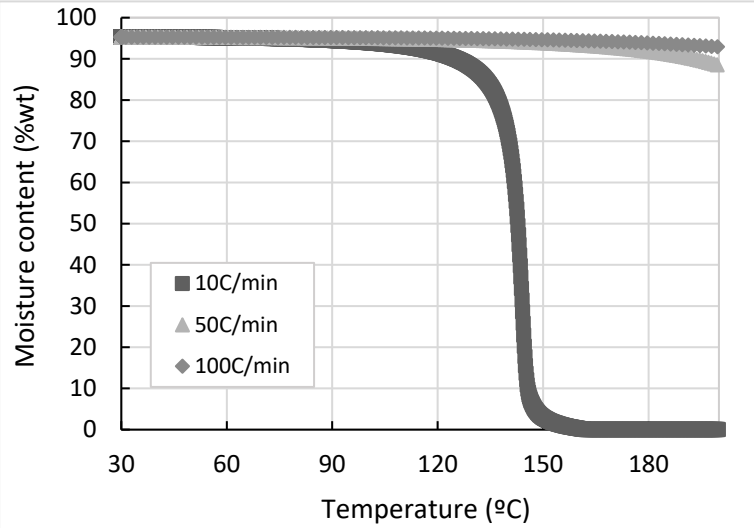
- Complete drying at a constant rate of 10°C/ min
- Incomplete drying at a constant rate of 50 and 100°C/ min (drying time too short to achieve complete dryness)

General information	
Type of data	Non isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
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	Not measured
Ash content	Not measured
Presence of trash?	No (sludge pre-screened during pit emptying)
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	~ 2, 4, 17 min
Operating conditions	○ Temperature: from ambient to 200°C ○ Heating rate: 10, 50 and 100°C/min ○ Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

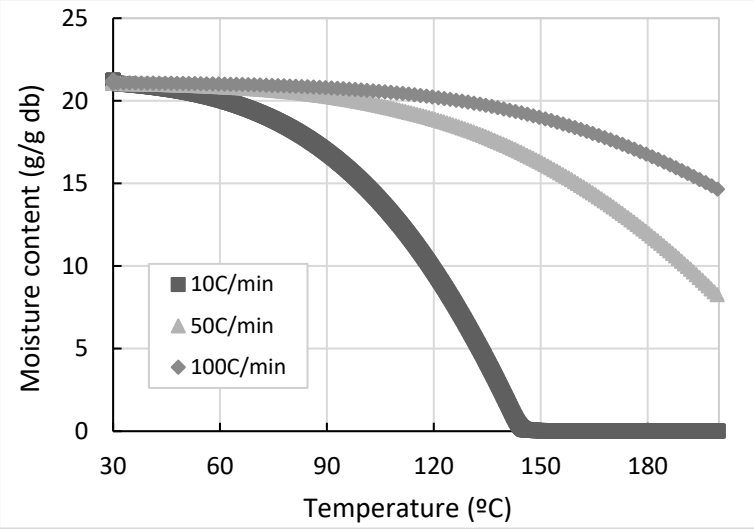
Data source files
https://www.dropbox.com/s/i8wdz9vy8gw71e2/Cranfield%20University%20VIP%20sludge%20TGA%20Non-isothermal%20kinetics%20%282018-2019%29.xlsx?dl=0
Additional Notes
○ Faecal sludge couriered from South Africa
Description of Data

Moisture content versus temperature as a function of the heating rate

Wet basis



Dry basis



Observations:

- Complete drying at a constant rate of 10°C/ min
- Incomplete drying at a constant rate of 50 and 100°C/ min (drying time too short to achieve complete dryness)

General information	
Type of data	Non isothermal kinetics in a thermogravimetry analyser
Place of experimentation	Bioenergy Lab, Cranfield Energy & Power, Cranfield University (United Kingdom)
Dates of the experiments	2018 - 2019
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	Thermogravimetric analyser *PerkinElmer TGA 8000™*
Drying time	~ 2, 4, 17 min
Operating conditions	○ Temperature: from ambient to 200°C ○ Heating rate: 10, 50 and 100°C/min ○ Flow rate: 4 mL/min
Sample form	~ 40 mg sample on a 3 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

https://www.dropbox.com/s/s89d7lhqk8bx5yn/Cranfield%20University%20Human%20Faeces%20TGA%20Non-isothermal%20kinetics%20%282018-2019%29.xlsx?dl=

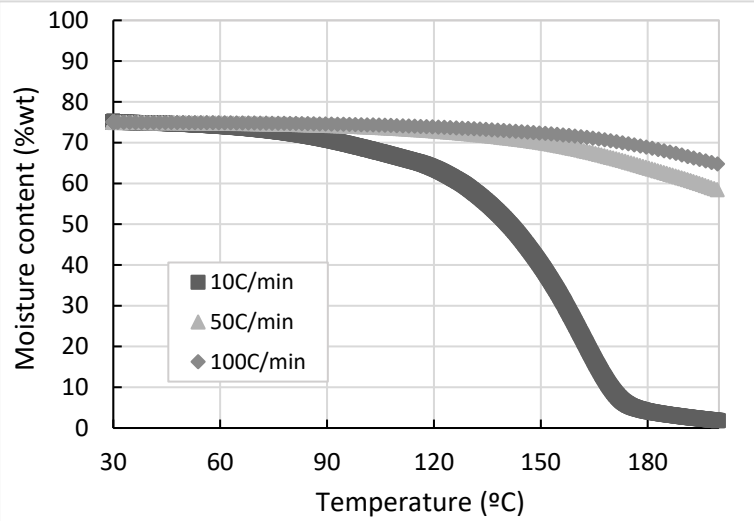
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations

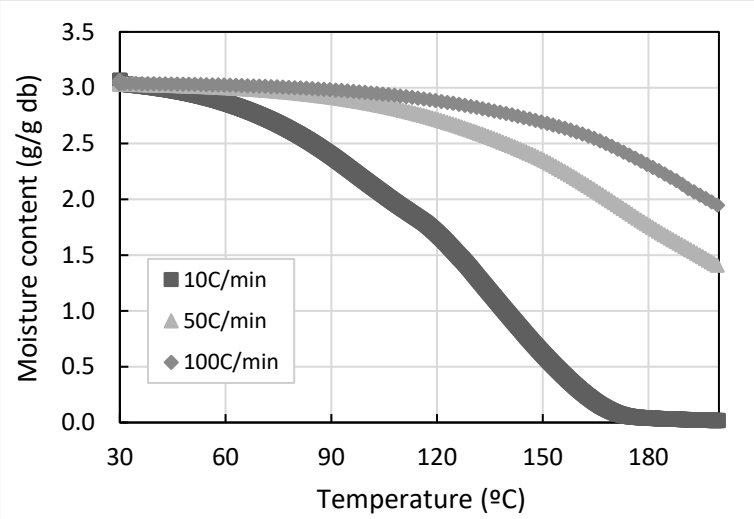
Description of Data

Moisture content versus temperature as a function of the heating rate

Wet basis



Dry basis



Observations:

- Complete drying at a constant rate of 10°C/ min
- Incomplete drying at a constant rate of 50 and 100°C/ min (drying time too short to achieve complete dryness)

General information	
Type of data	Kinetics in a moisture analyser balance
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	Moisture analyser balance *PCE-MB Series*
Drying time	Until complete drying
Operating conditions	Temperature: 100°C
Sample form in the dryer	1.5 g of sample on an 90 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed methods	Direct measurement by moisture analyser balance *PCE-MB Series* (SOP 8.7.1.5)
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/ahtih6apycqwx16/2018-2019%20Drying%20kinetics%20%28moisture%20analyser%29.xlsx?dl=0

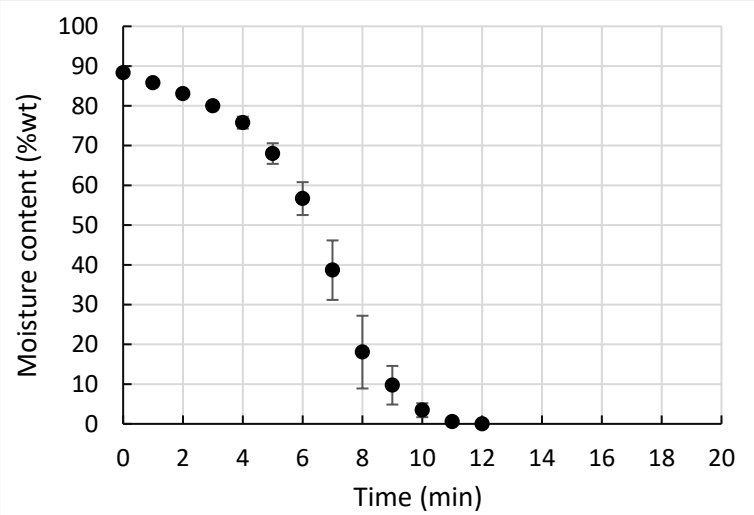
Additional Notes

-

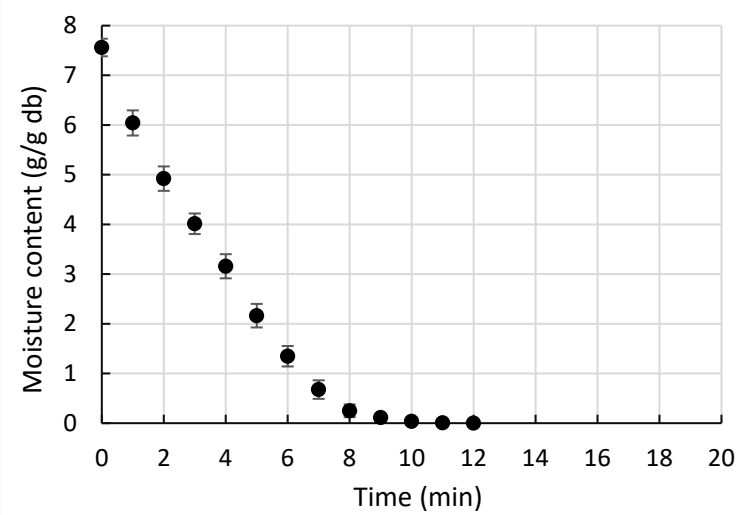
Description of Data

Moisture content versus time

Wet basis



Dry basis



Observations:

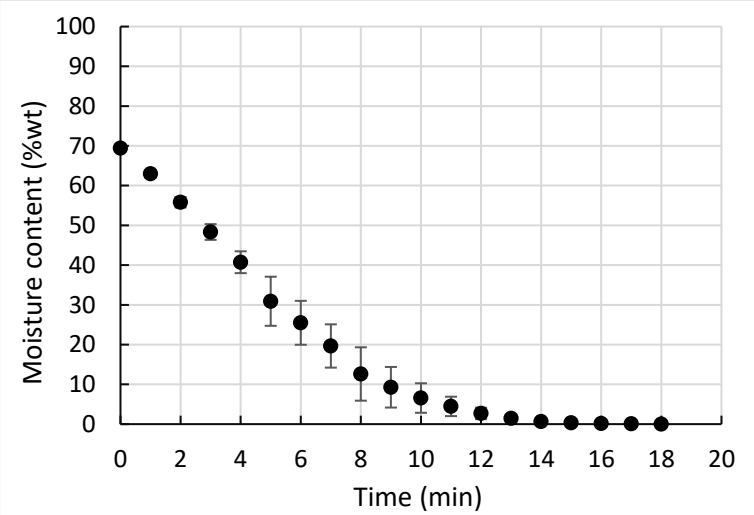
- Fast drying (less than 15 minutes)

General information	
Type of data	Kinetics in a moisture analyser balance
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	Moisture Analyser balance *PCE-MB Series*
Drying time	Until complete drying
Operating conditions	Temperature: 100°C
Sample form in the dryer	1.5 g of sample on an 90 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed methods	Direct measurement by moisture analyser balance PCE-MB Series (SOP 8.7.1.5)
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.	

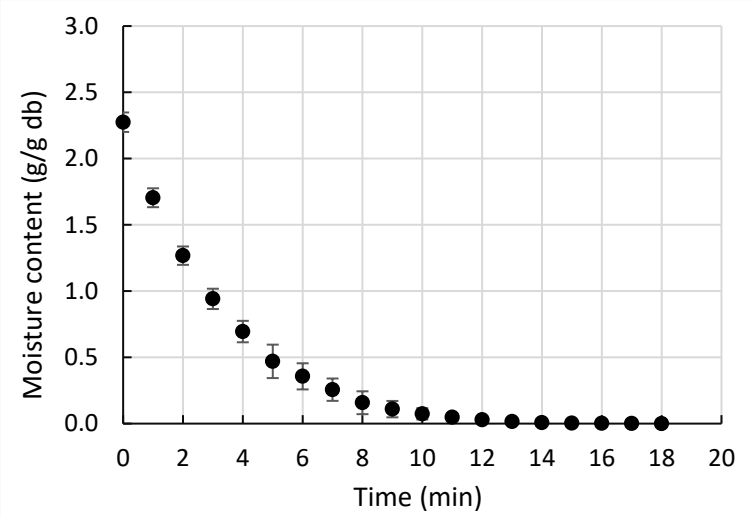
Data source files
https://www.dropbox.com/s/ahtih6apycqwx16/2018-2019%20Drying%20kinetics%20%28moisture%20analyser%29.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time

Wet basis



Dry basis



Observations:

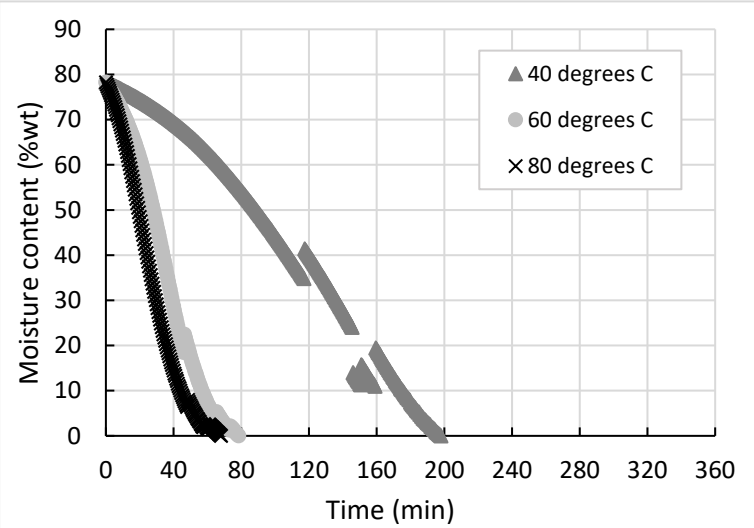
- Fast drying (less than 15 minutes)

General information	
Type of data	Kinetics in a moisture analyser balance
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 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?	Small amounts of trash
Pre-treatment	Trash removal
Experimental Procedure	
Drying experimental setup	Moisture analyser balance *PCE-MB Series*
Drying time	5 hours
Operating conditions	Temperature: 40, 60 and 80°C
Sample form	~ 3 g of faecal sludge in a crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) in a thermal balance (SOP 8.7.1.5)
Publications	
-	

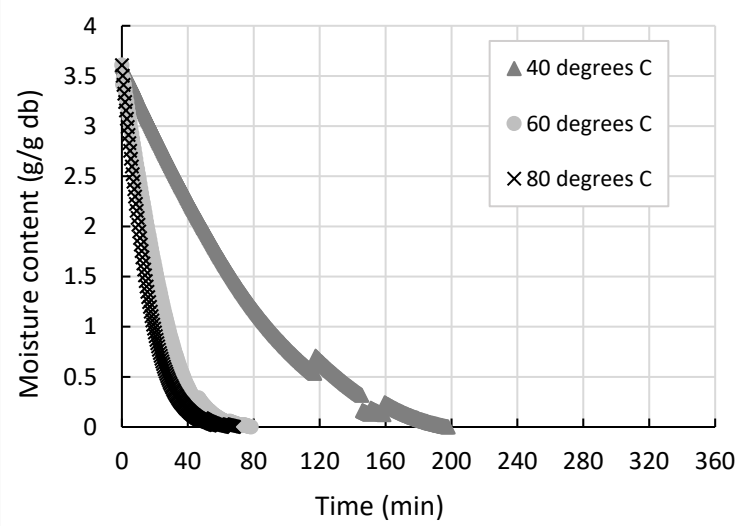
Data source files
https://www.dropbox.com/s/56rm46w5t144p4t/2019-2020%20FS%20drying%20tests_PRG-UKZN.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations:

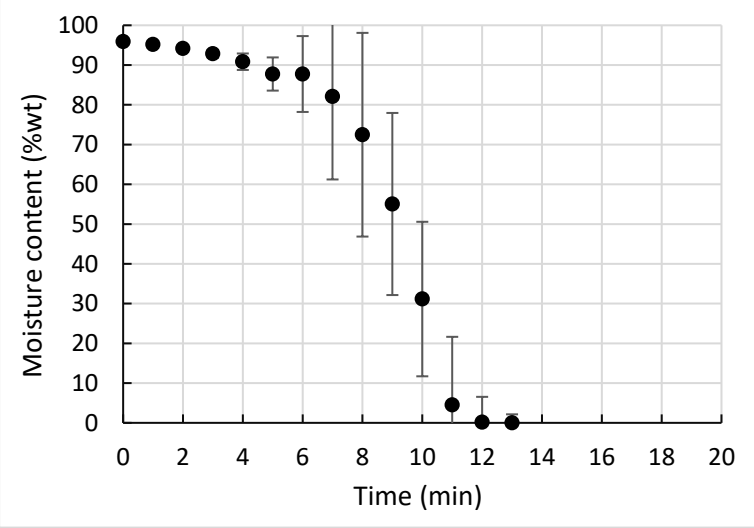
- Faster drying rate as temperature increases
- Important difference between 40 and 60°C
- Lower difference between 60 and 80°C

General information	
Type of data	Kinetics in a moisture analyser balance
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 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	Moisture Analyser balance *PCE-MB Series*
Drying time	Until complete drying
Operating conditions	Temperature: 100°C
Sample form in the dryer	1.5 g of sample on an 90 mm diameter aluminium crucible
Analysed parameters	Moisture content
Employed methods	Thermogravimetry (determined through the measurement of the sample mass variation) (SOP 8.7.1.1)
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.	

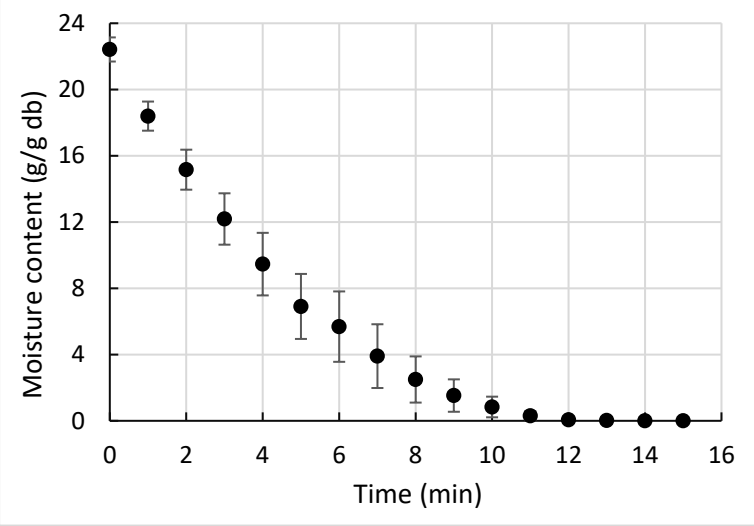
Data source files
https://www.dropbox.com/s/ahtih6apycqwx16/2018-2019%20Drying%20kinetics%20%28moisture%20analyser%29.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time

Wet basis



Dry basis



Observations:

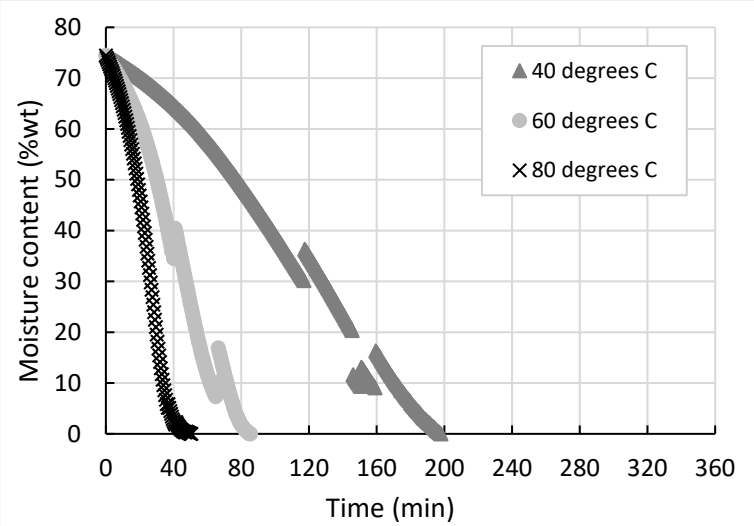
- Fast drying (less than 15 minutes)

General information	
Type of data	Kinetics in a moisture analyser balance
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 toilet (VIP)
Location of collection	Durban, South Africa
Age before collection	Up to 5 years
Moisture content	~ 70%wt
Total solids content	~ 30%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	Small amounts of trash
Pre-treatment	Trash removal
Experimental Procedure	
Drying experimental setup	Moisture analyser balance *PCE-MB Series*
Drying time	5 hours
Operating conditions	Temperature: 40, 60 and 80°C
Sample form	~ 3 g of faecal sludge in a crucible
Analysed parameters	Moisture content
Employed method	Thermogravimetry (determined through the measurement of the sample mass variation) in a thermal balance (SOP 8.7.1.5)
Publications	
-	

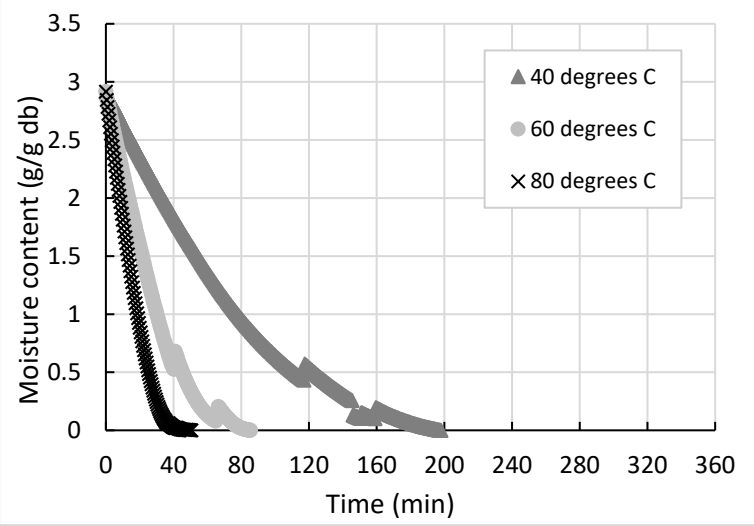
Data source files
https://www.dropbox.com/s/56rm46w5t144p4t/2019-2020%20FS%20drying%20tests_PRG-UKZN.xlsx?dl=0
Additional Notes
-
Description of Data

Moisture content versus time as a function of temperature

Wet basis



Dry basis



Observations:

- Faster drying rate as temperature increases
- Important difference between 40 and 60°C
- Lower difference between 60 and 80°C

General information	
Type of data	Kinetics in a moisture analyser balance
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	Moisture content
Employed method	Direct measurement by moisture analyser balance *PCE-MB Series* (SOP 8.7.1.5)
Publications	
-	

Data source files

https://www.dropbox.com/s/3w62xnsmet4fvsy/2019-2020%20Natural%20drying%20of%20fresh%20faeces%20Batch%202%20Kinetics%20in%20a%20moisture%20analyser_UKZN%20PRG.xlsx?dl=0

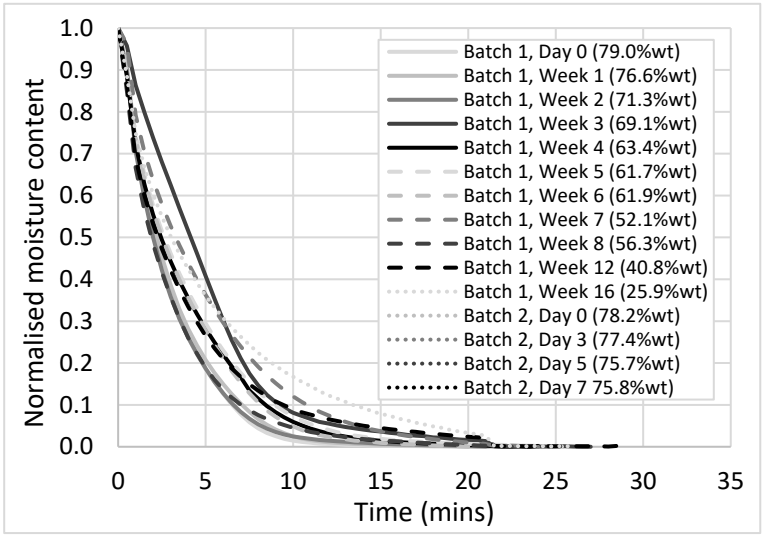
https://www.dropbox.com/s/d4tp25vu9ylqhmh/2019-2020%20Fresh%20faeces%20Natural%20Drying%20kinetics_UKZN%20PRG.xlsx?dl=0

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

Normalized moisture content (with respect to the initial value) as a function of time for the samples from batch 1 and 2



Observations

- No considerable effect of the initial moisture content on the drying kinetics
- Time for complete drying between 10 and 20 minutes

General information	
Type of data	Kinetics of natural drying
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	Moisture content
Employed method	Weighing the sample before and after drying at 105°C in the laboratory oven for 24 hours (SOP 8.7.1.1)
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

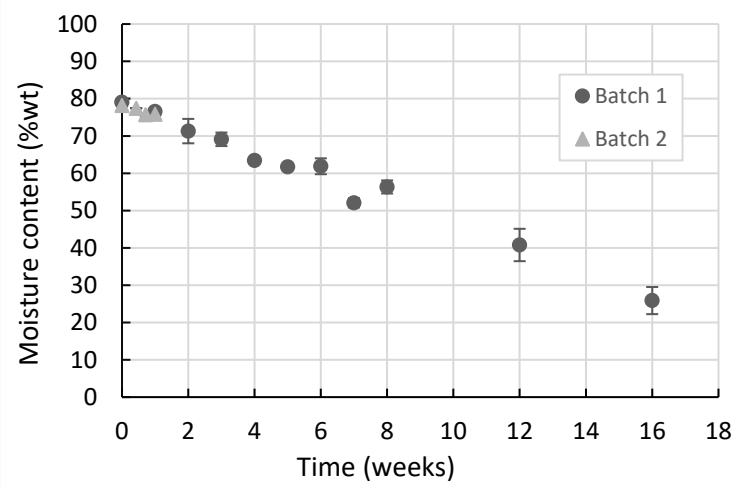
Additional Notes

- Fresh faeces collected from voluntary and anonymous donations
- Containers with 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

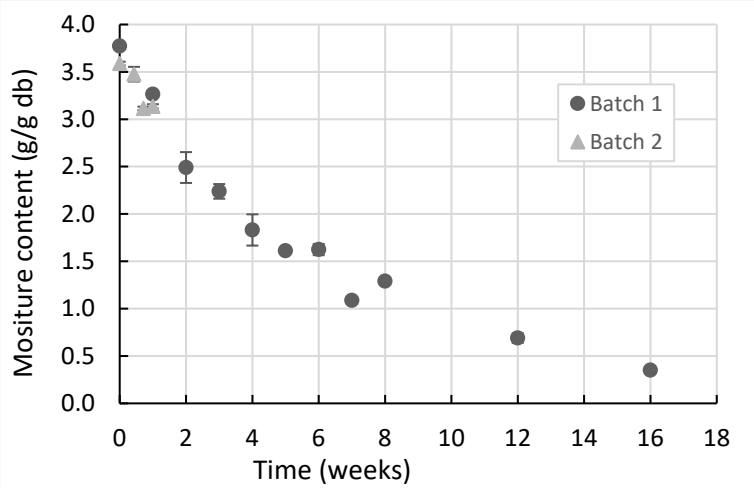
Description of Data

Moisture content as a function of storage time for the samples from batch 1 and 2

Wet basis



Dry basis



Observations

- Decrease of moisture content from 80%wt (3.5 g/g db) to 25%wt (0.5 g/g db) after 16 weeks of natural drying

General information	
Type of data	Drying time
Place of experimentation	Chemical Engineering & Applied Chemistry, University of Toronto (Canada)
Dates of the experiments	2012
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Ontario, Canada
Age before collection	A few days
Moisture content	~ 85%wt
Total solids content	~ 15%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Environmental chamber
Drying time	Several hours
Operating conditions	○ Temperature: 28ºC ○ Air flowrate: 2100 L/min (air velocities of 4.6 m/s) ○ Relative humidity: 85%
Sample form in the dryer	Thin layer of 110 x 110 x 2 mm
Analysed parameters	Moisture content
Employed methods	Gravimetric method (determined through the measurement of the sample mass variation)
Publications	
-	

Data source files

https://www.dropbox.com/s/hloxql9ixp462re/2012%20Drying%20Kinetics%20of%20Human%20faeces_Toronto%20University.xlsx?dl=0

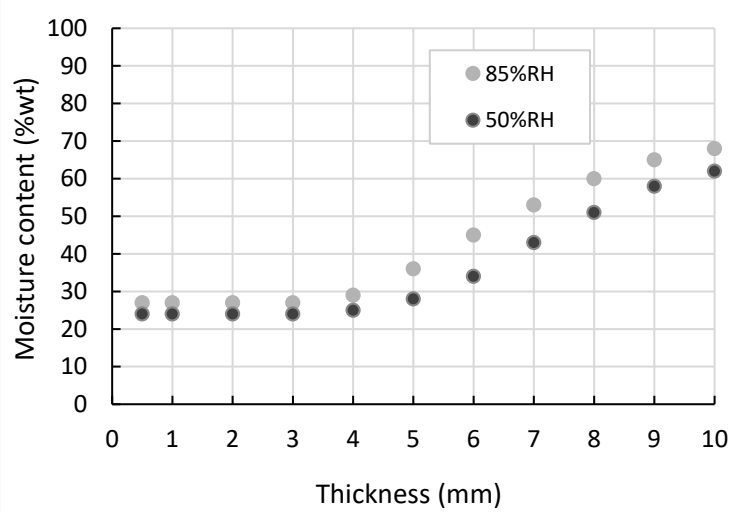
Additional Notes

Fresh faeces collected from voluntary and anonymous donations

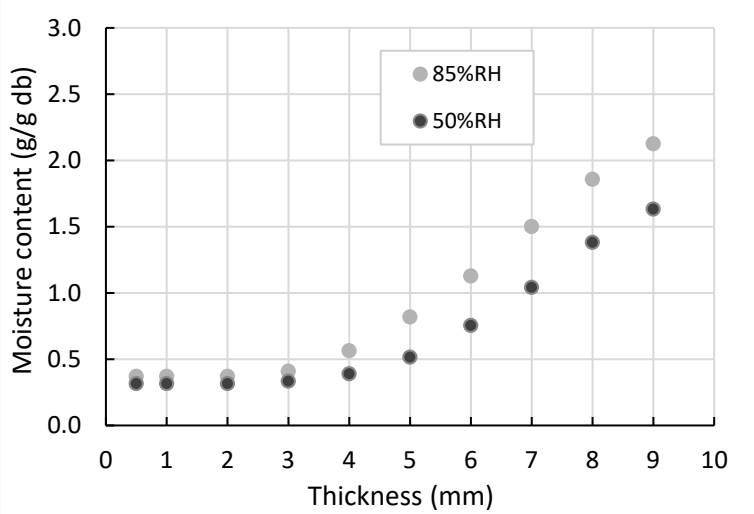
Description of Data

Moisture content after 24 hours of drying as a function of the sample thickness and relative humidity

Wet Basis



Dry Basis

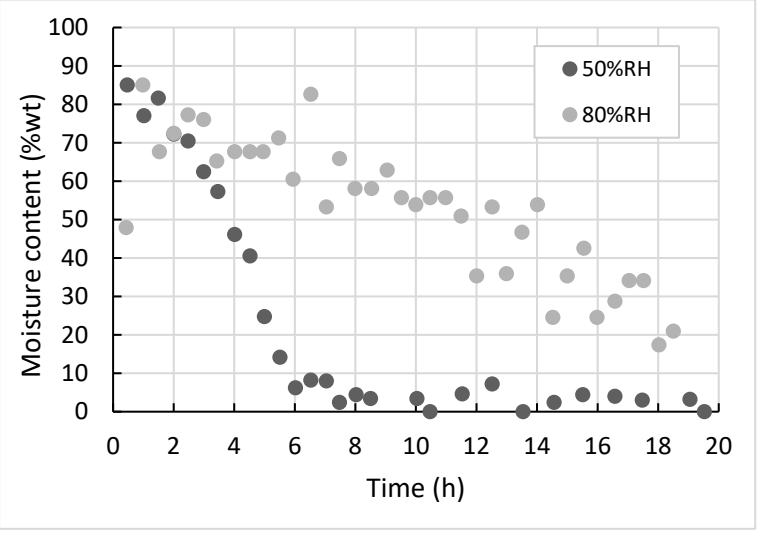


Observations

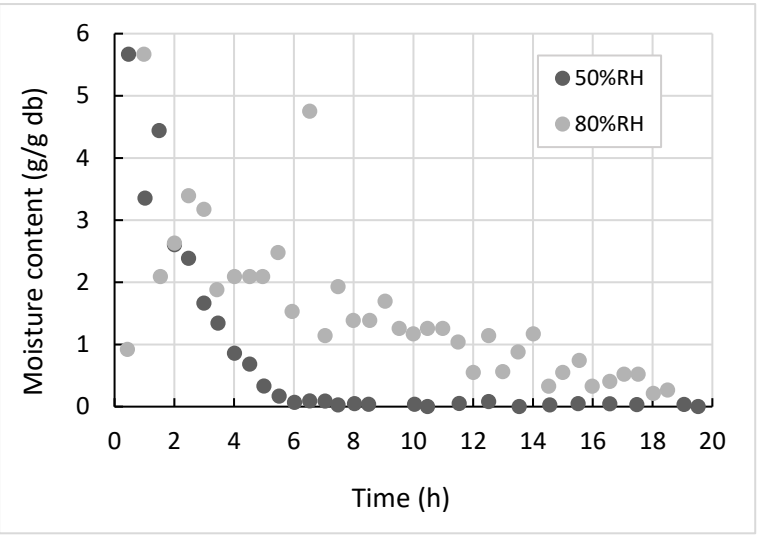
- Decrease of final moisture content by decreasing the thickness of the sample
- Below 3 mm thickness, same final moisture content (25-30%wt, which could be the equilibrium moisture content)

Moisture content as a function of time and relative humidity at 50%

Wet Basis



Dry Basis



Observations

- Considerably faster drying at a relative humidity of 50% compared to 80%

General information	
Type of data	Drying time
Place of experimentation	Chemical Engineering & Applied Chemistry, University of Toronto (Canada)
Dates of the experiments	2012
Feedstock	
Type of faecal material	Fresh faeces
Location of collection	Ontario, Canada
Age before collection	A few days
Moisture content	~ 85%wt
Total solids content	~ 15%wt
Volatile solids content	Not measured
Ash content	Not measured
Presence of trash?	No
Pre-treatment	Mixing
Experimental Procedure	
Drying experimental setup	Oven
Drying time	Until achieving 55%wt moisture content
Operating conditions	○ Temperature: 28ºC ○ Air flowrate: 900 – 2100 L/min (air velocities of 1.9 – 4.6 m/s) ○ Relative humidity: 50 and 85%
Sample form in the dryer	Thin layer of 1 to 8 mm thickness
Analysed parameters	Drying time
Employed methods	Measurement of time
Publications	
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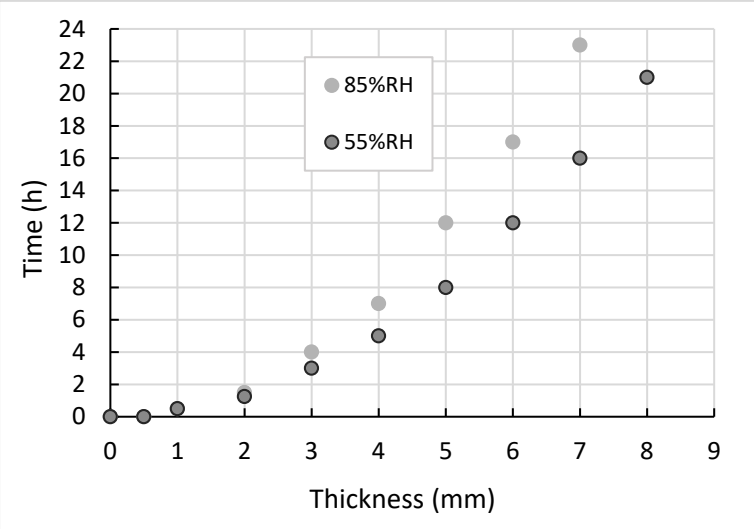
Data source files
https://www.dropbox.com/s/hloxql9ixp462re/2012%20Drying%20Kinetics%20of%20Human%20faeces_Toronto%20University.xlsx?dl=0
Additional Notes
Fresh faeces collected from voluntary and anonymous donations
Description of Data

Drying time to reduce the moisture content from 83 (initial value) to 55%wt (final value) as a function of the sample thickness and relative humidity



Observations

- Increase of drying time by increasing the thickness of the sample