

# Supplementary of

## Termites: The Marvelous Cladder in Nature Using Nanocellulose-Reinforced Lignin/Sand Composite: A New Discovery

Sherif S. Hindi <sup>1,\*</sup>, Shatha Alqurashi <sup>2</sup>, Naimah Asid Alanazi <sup>3</sup> and Khalid A. Asiry <sup>1</sup>

<sup>1</sup> Department of Agriculture, Faculty of Environmental Sciences, King Abdullaziz University (KAU), Jeddah 21589, Saudi Arabia; [Kasiry@kau.edu.sa](mailto:Kasiry@kau.edu.sa)

<sup>2</sup> Department of Biology, College of Science, University of Jeddah, Jeddah, Saudi Arabia; [saaqurshi@uj.edu.sa](mailto:saaqurshi@uj.edu.sa)

<sup>3</sup> Department of Biology, Faculty of Science, University of Ha'il, P.O. Box 659, Ha'il 81421, Saudi Arabia; [N.alenezzy@uoh.edu.sa](mailto:N.alenezzy@uoh.edu.sa)

**This PDF contains:**

**Section 1.** Preparation of the experimental samples.

**Figure S1.** Schematic representation of the procedure used for preparation of the experimental samples: a) healthy wood ( $W_h$ ), and b) Termite nest skeleton (TNS) of the six tree species.

**Section S2.** Technical machinery and glassware used in the present investigation

**Figure S2.** Technical procedures, machinery and/or glassware used for characterization of the each of the healthy wood ( $W_h$ ) and/or termite nest skeleton (TNS): a) Soxhlet apparatus for extracting total extractives content (TEC) and alcohol benzene extractives (ABE), b) Refluxed Pyrex apparatus for chemical separation of Klason lignin content (KLC), c) Vacuum pump-assisted water-saturation of the  $W_h$ , d) Electric muffle furnace used for determination of ash content of  $W_h$ , and e) Porcelain crucibles containing  $W_h$  samples to be ashed within the muffle furnace.

**Section S3.** Determination of gross heat of combustion (GHC).

**Figure S3.** Gross heat of combustion determination (GHC): a) Parts of the oxygen bomb calorimeter used for measuring GHC of the healthy wood and the termite nest skeletons (TNS), and b) Typical temperature rising curve of a woody sample.

a

Discarded

Outer-zone wood and pith

1.8 Cm

30 Cm

1.8 Cm

30 Cm

Diametric strip

Discarded

Disc

bolt

Discarded (Pith)

20 Cm

20 Cm

Converted into sawdust and sieved

Samples for determinations of wood properties as follow:

1

2

3

4

5

6

7

8

9

10

11

12

13

14

For total extractive content

For lignin content

For alcohol benzene extractive content

For ash content

Discarded

Branch

20 Cm

30 Cm

10 cm

Discarded

Outer-zone wood

20 Cm

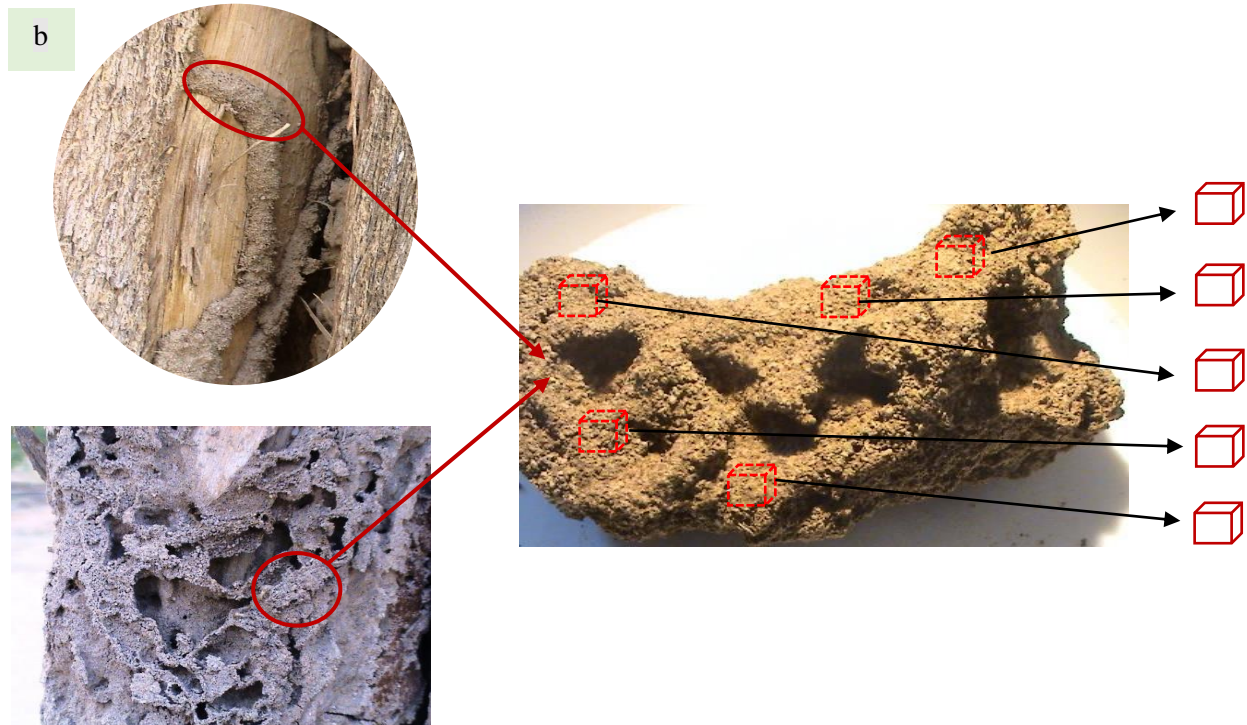
Disc

Discarded Stem

a- 4 samples for determination of total extractives content, then 3 randomly taken samples of them was used for lignin content.

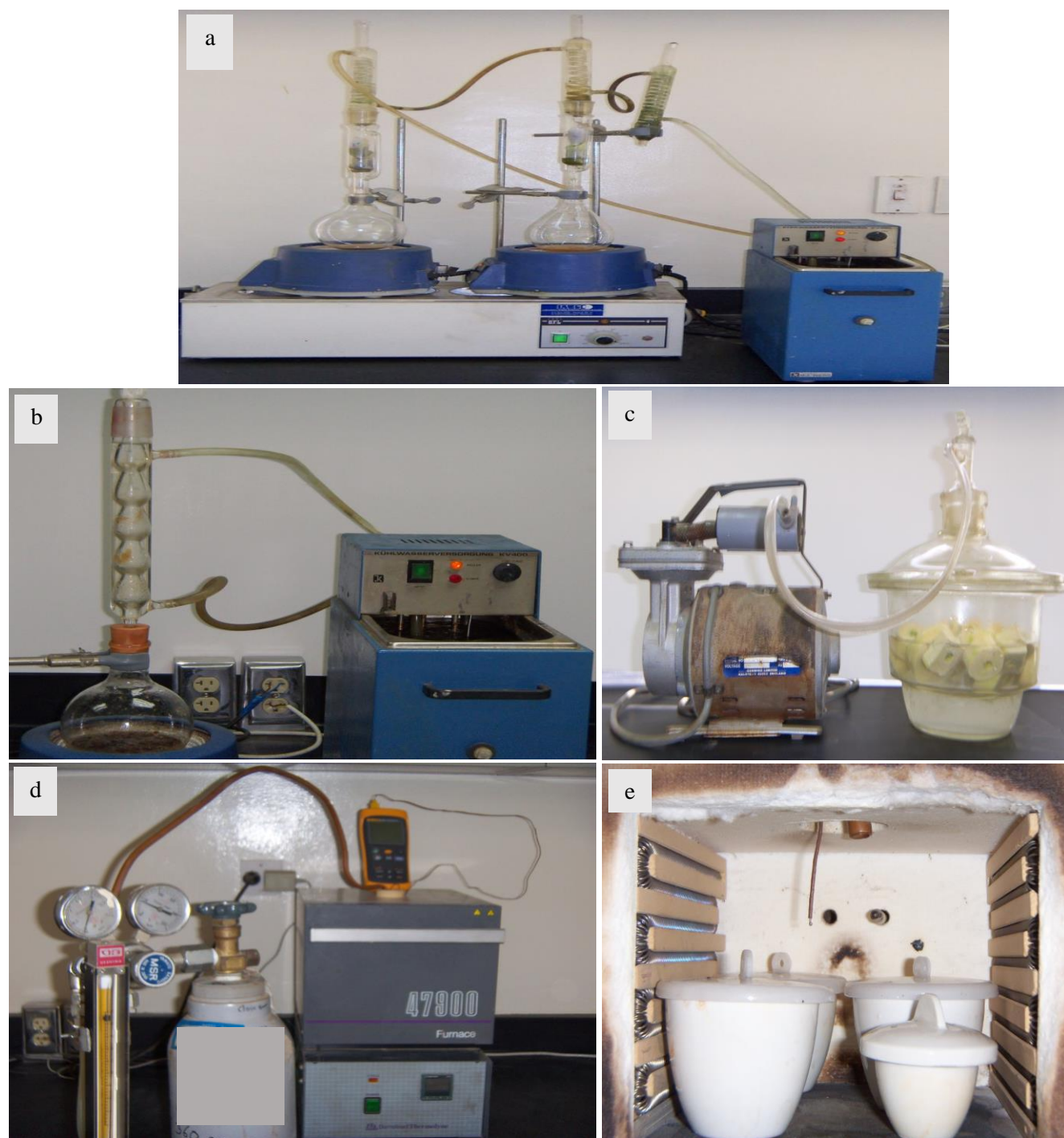
b- 4 samples for alcohol-benzene extractives content.

c- 3 samples for ash content determination.



**Figure S1.** Schematic representation of the procedure used for preparation of the experimental samples: a) healthy wood ( $W_h$ ), and b) Termite nest skeleton (TNS) of the six tree species.

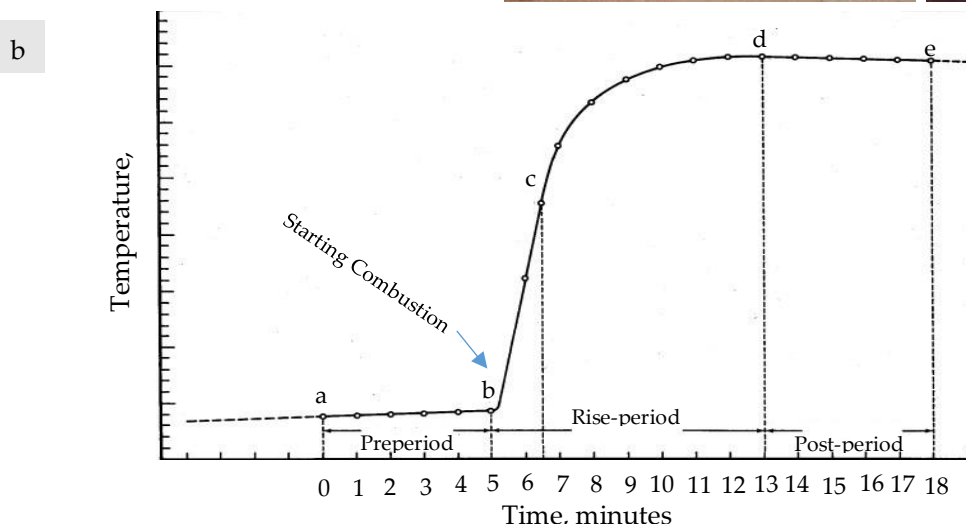
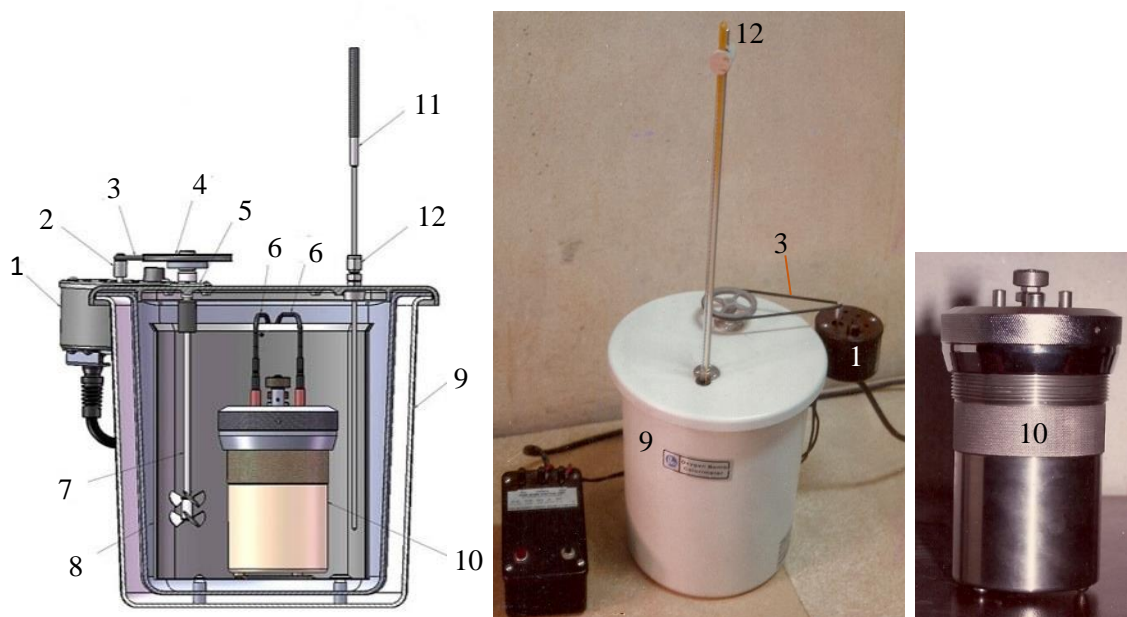
**Section S2.** Technical machinery and glassware used in the present investigation



**Figure S2.** Technical procedures, machinery and/or glassware used for characterization of the each of the healthy wood ( $W_h$ ) and/or termite nest skeleton (TNS): a) Soxhlet apparatus for extracting total extractives content (TEC) and alcohol benzene extractives (ABE), b) Refluxed Pyrex apparatus for chemical separation of Klason lignin content (KLC), c) Vacuum pump-assisted water-saturation of the  $W_h$ , d) Electric muffle furnace used for determination of ash content of  $W_h$ , and e) Porcelain crucibles containing  $W_h$  samples to be ashed within the muffle furnace.

### Section S3. Determination of gross heat of combustion (GHC).

- a
- |   |                                   |
|---|-----------------------------------|
| 1- Motor Assembly with pulley, 230V 50/60 Hz. | 7- Stirrer shaft with impeller.   |
| 2- Motor pulley.                              | 8- Oval bucket.                   |
| 3- Stirrer drive belt.                        | 9- Calorimeter jacket with cover. |
| 4- Stirrer pulley.                            | 10- Oxygen combustion vessel.     |
| 5- Stirrer bearing assembly.                  | 11- Male connector.               |
| 6- Ignition wire.                             | 12- Thermometer.                  |



**Figure S3.** Gross heat of combustion determination (GHC): a) Parts of the oxygen bomb calorimeter used for measuring GHC of the healthy wood and the termite nest skeletons (TNS), and b) Typical temperature rising curve of a woody sample.