NATIONAL TECHNICAL UNIVERSITY OF ATHENS
SCHOOL OF CHEMICAL ENGINEER
Unit of Environmental Science and Technology

Presentation

The effect of perlite on food waste composting

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Points of Interest

- Composting
- Presentation of Prototype System
- Composting Process
- Evaluation of Final Product
- Conclusions

Prototype Composting System

Agitation system

Feeding compartment

Composting process compartment

Compost collection and removal compartment

Leachates collection and removal compartment

Experimental Procedure (I)

- Five(5) household composting systems were installed at the premises of the National Technical University of Athens
- kitchen waste as feedstock, in combination with additives such as sawdust (S), and perlite (P) on a continuous mode
- Retention time of the substrate into the system was 21days.
- Analyses were performed for the characterisation of the feed material & for the evaluation of the end product
- T, O2 and H2O content were monitored throughout the duration of the composting cycles

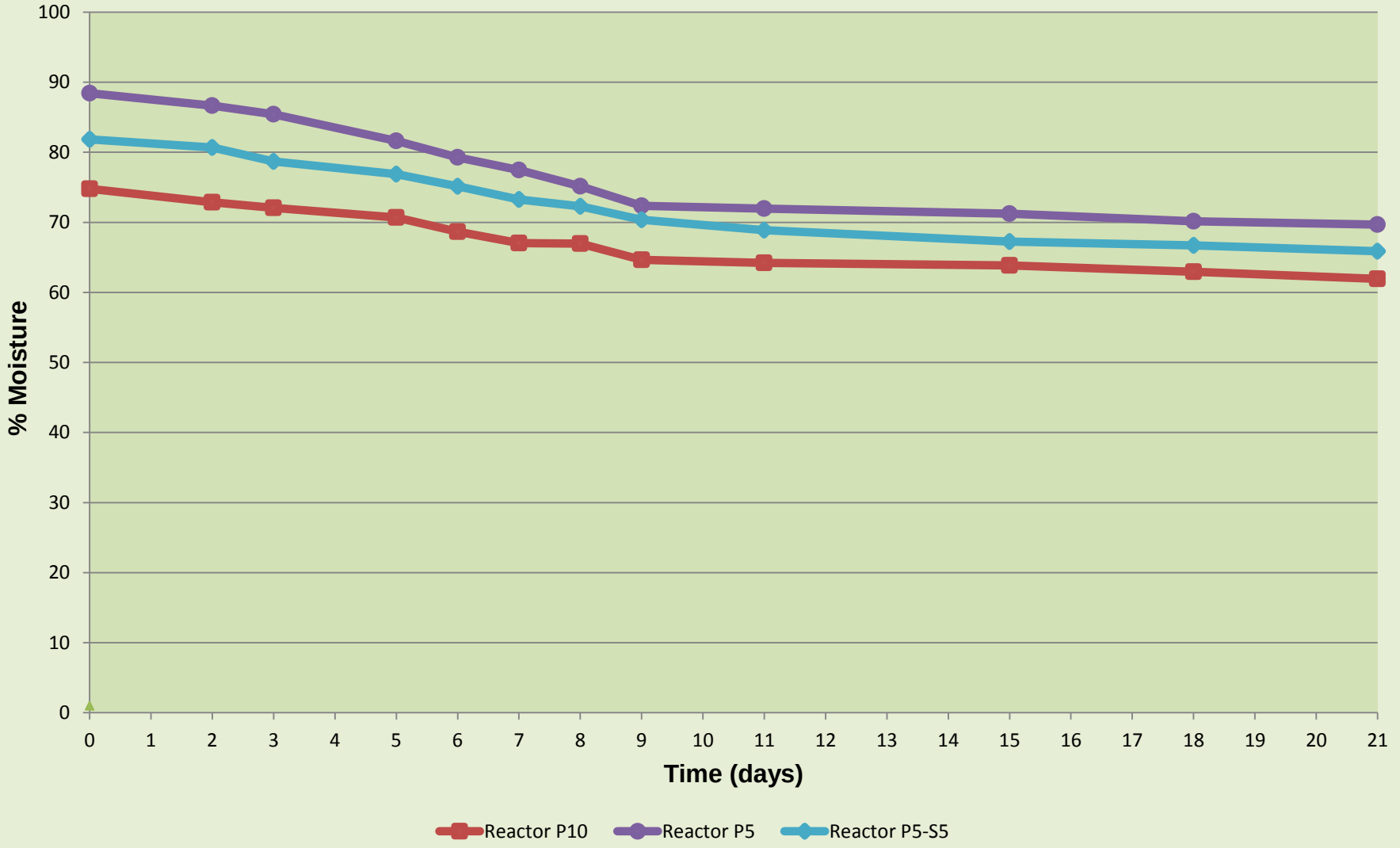
Experimental Procedure (II)

Trial	Sawdust (S) (% w.w.)	Zeolite (Z) (% w.w.)	Vermiculite (V) (% w.w.)	Perlite (P) (% w.w.)
Ractor P10	0	0	0	10
Reactor P5	0	0	0	5
Reactor P5-S5	5	0	0	5
Reactor P10-Z10	0	10	0	10
Reactor P10-V10	0	0	10	10

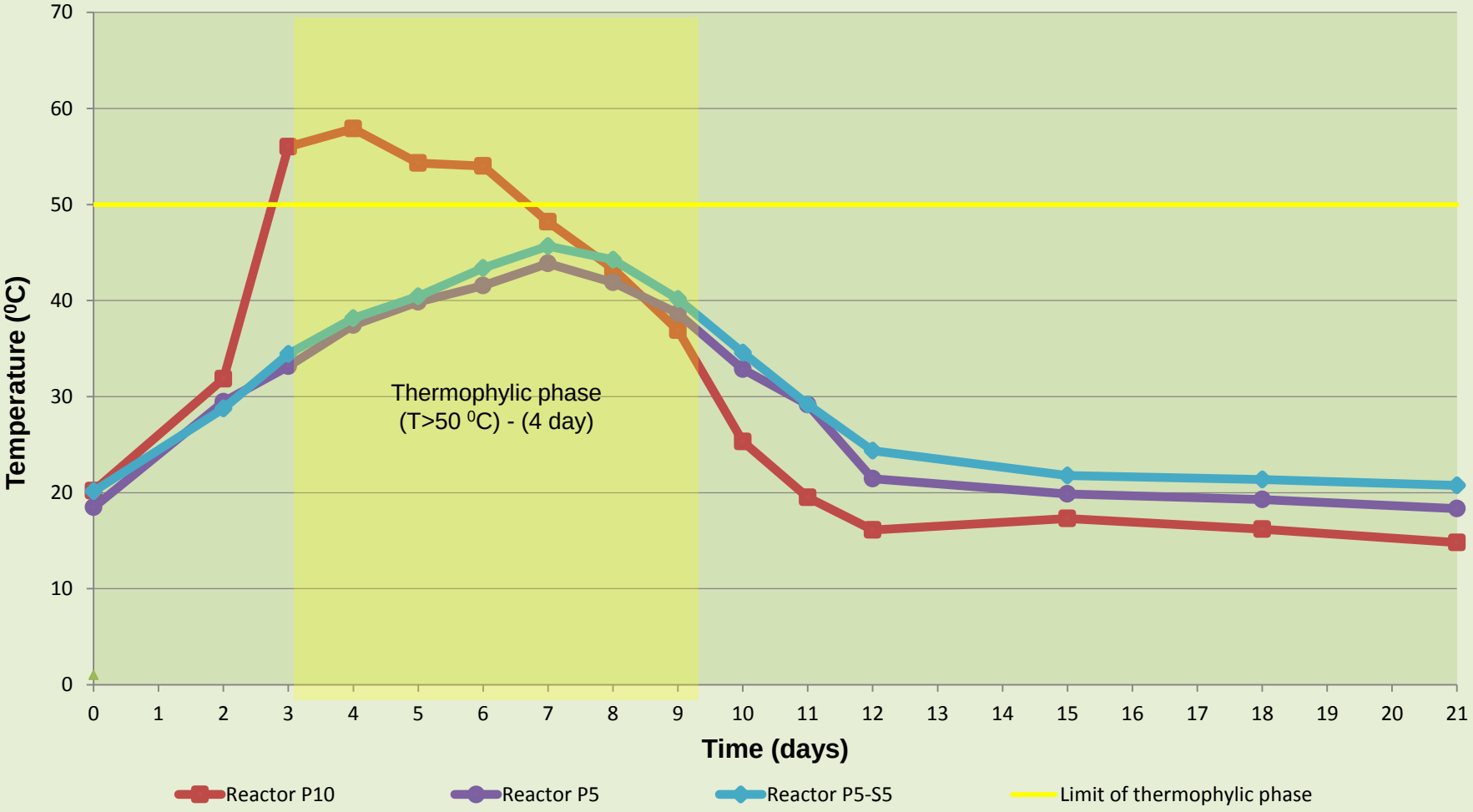
Studied Parameters

- Temperature
- pH
- Moisture
- TOC
- TKN
- C/N
- Metals
- Phytotoxicity

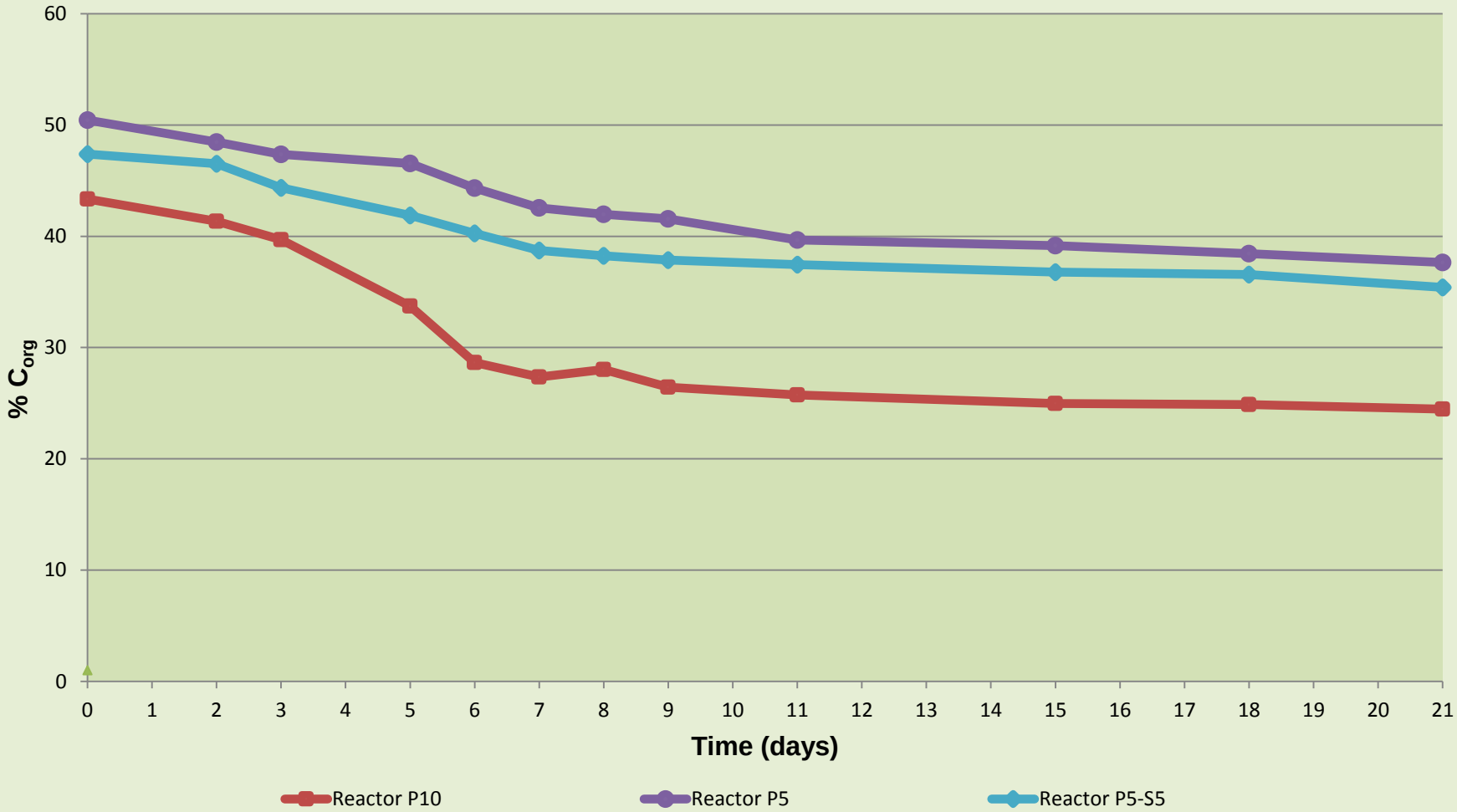
Moisture – Trial (I)



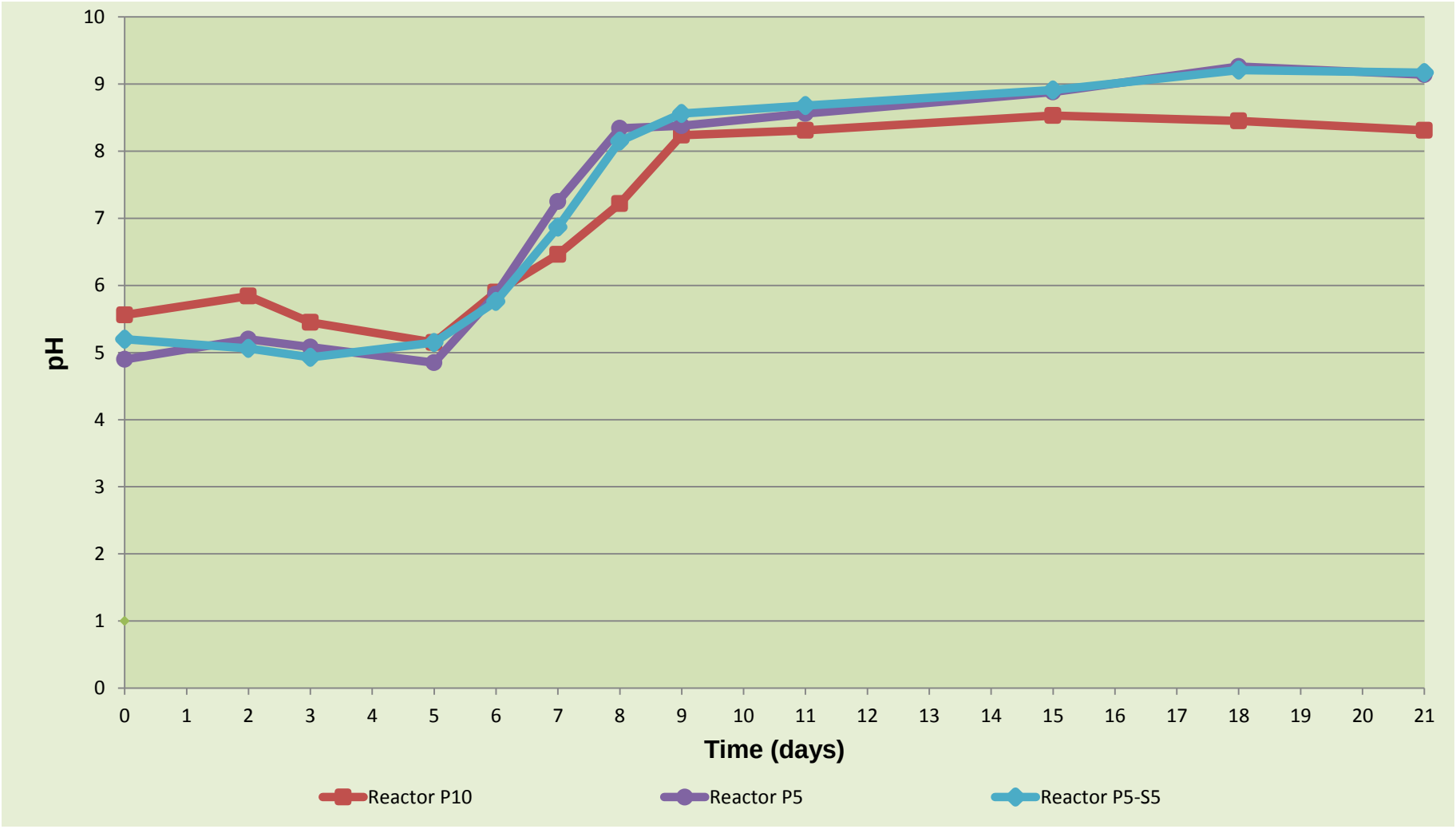
Temperature Trial (I)



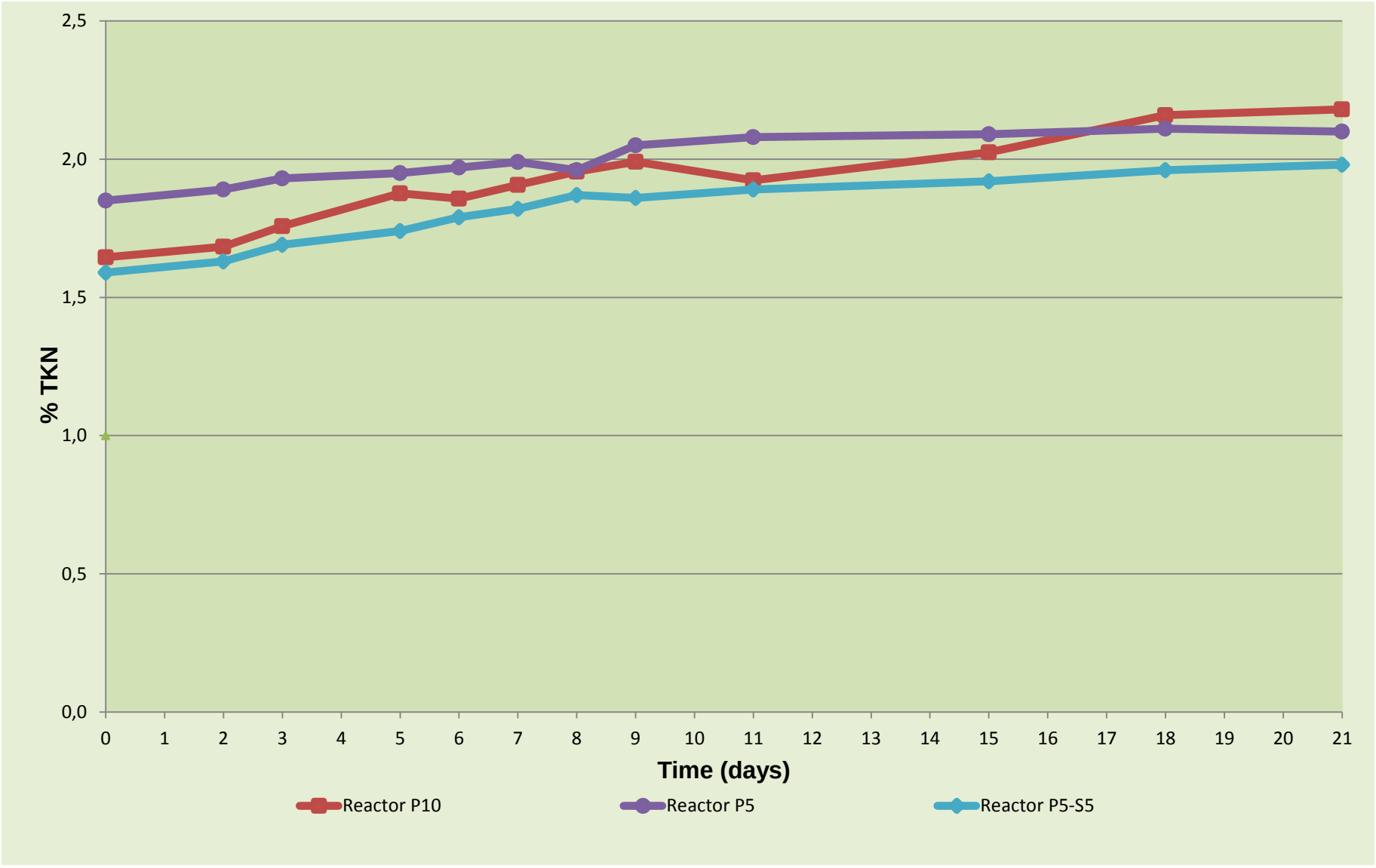
TOC


60
50
40
30
20
10
0
% C_{org}
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Time (days)
Reactor P10
Reactor P5
Reactor P5-S5

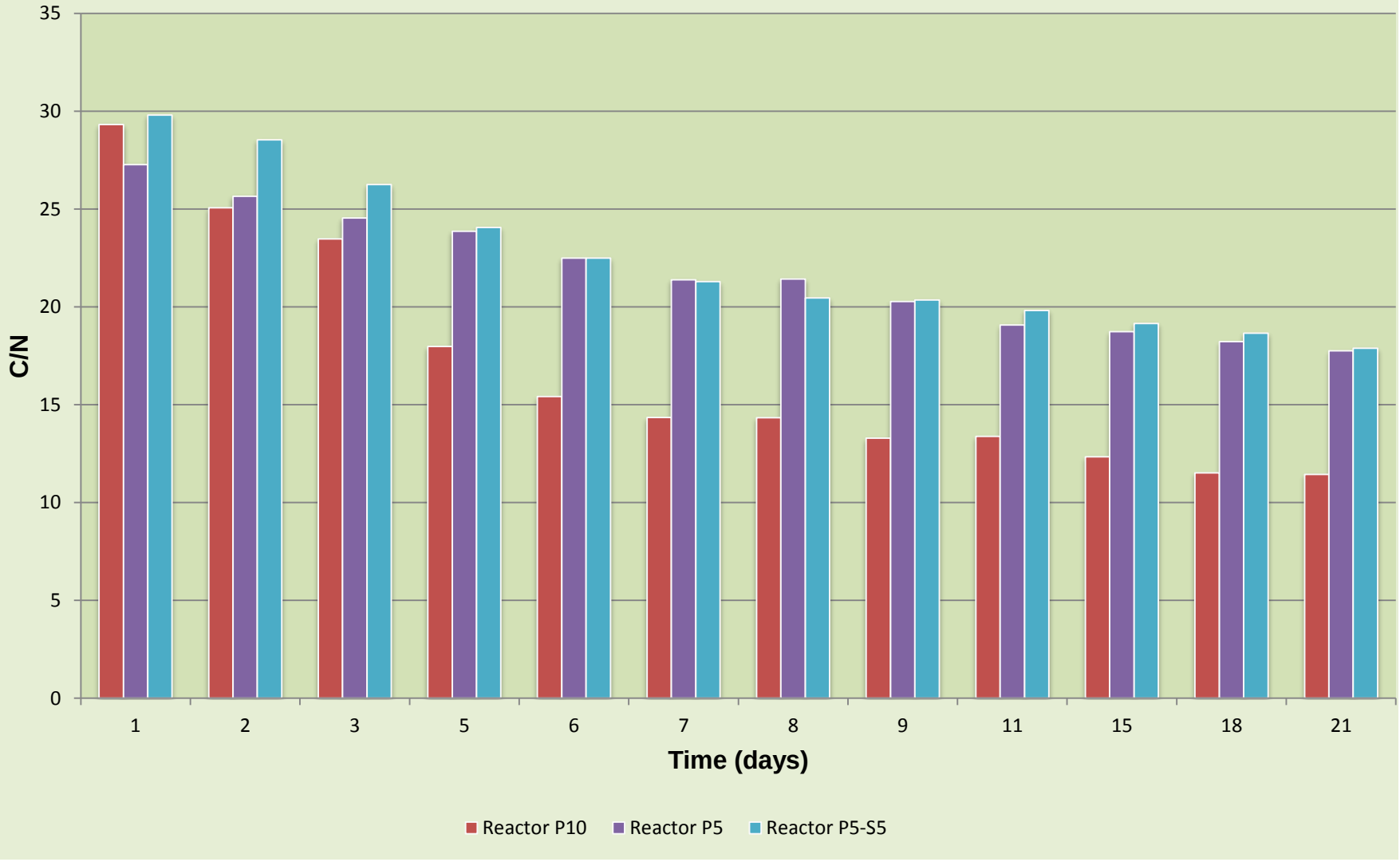
pH


pH
10
9
8
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Time (days)
Reactor P10
Reactor P5
Reactor P5-S5

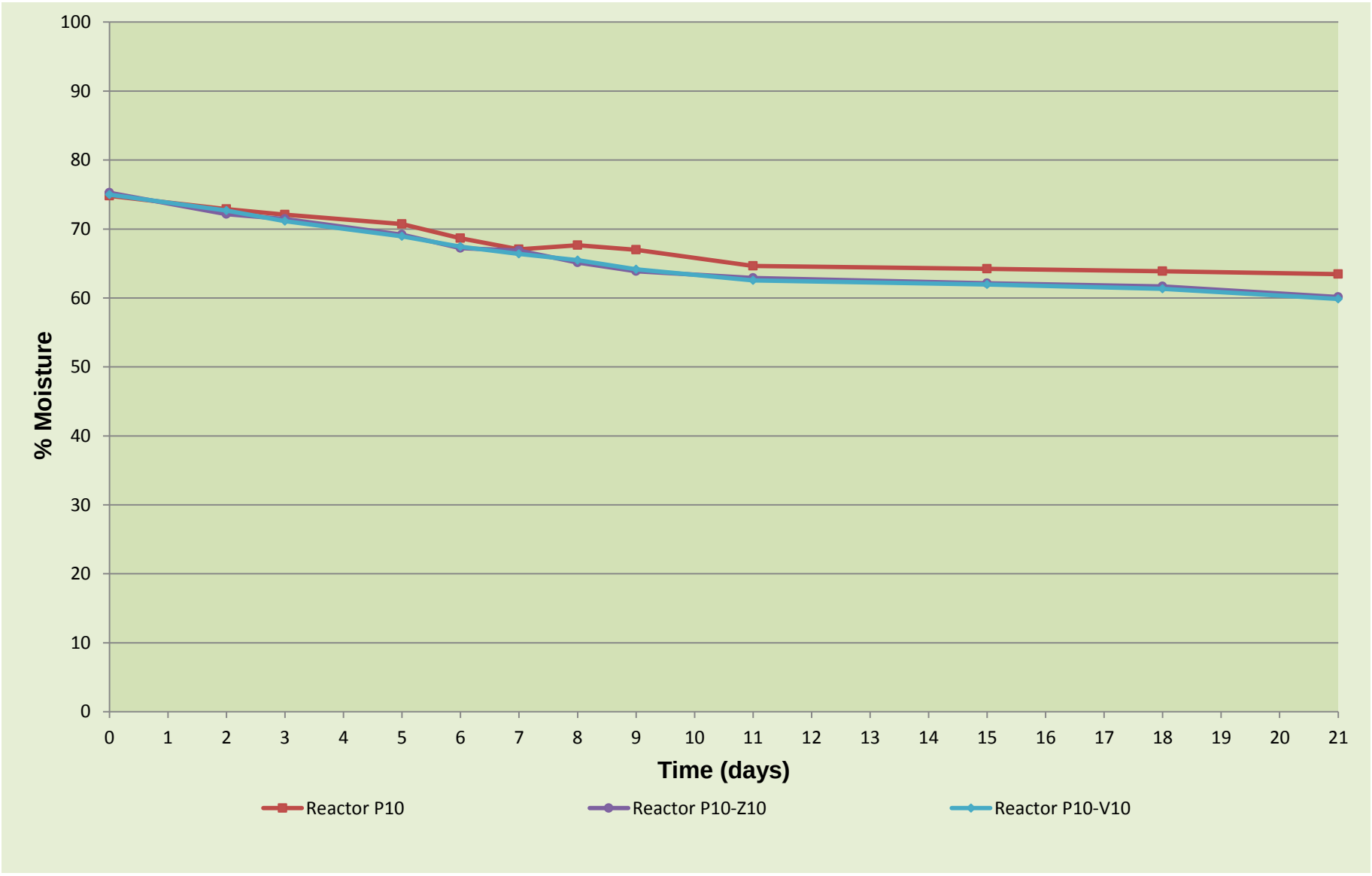
TKN


2,5
2,0
1,5
1,0
0,5
0,0
% TKN
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Time (days)
Reactor P10
Reactor P5
Reactor P5-S5

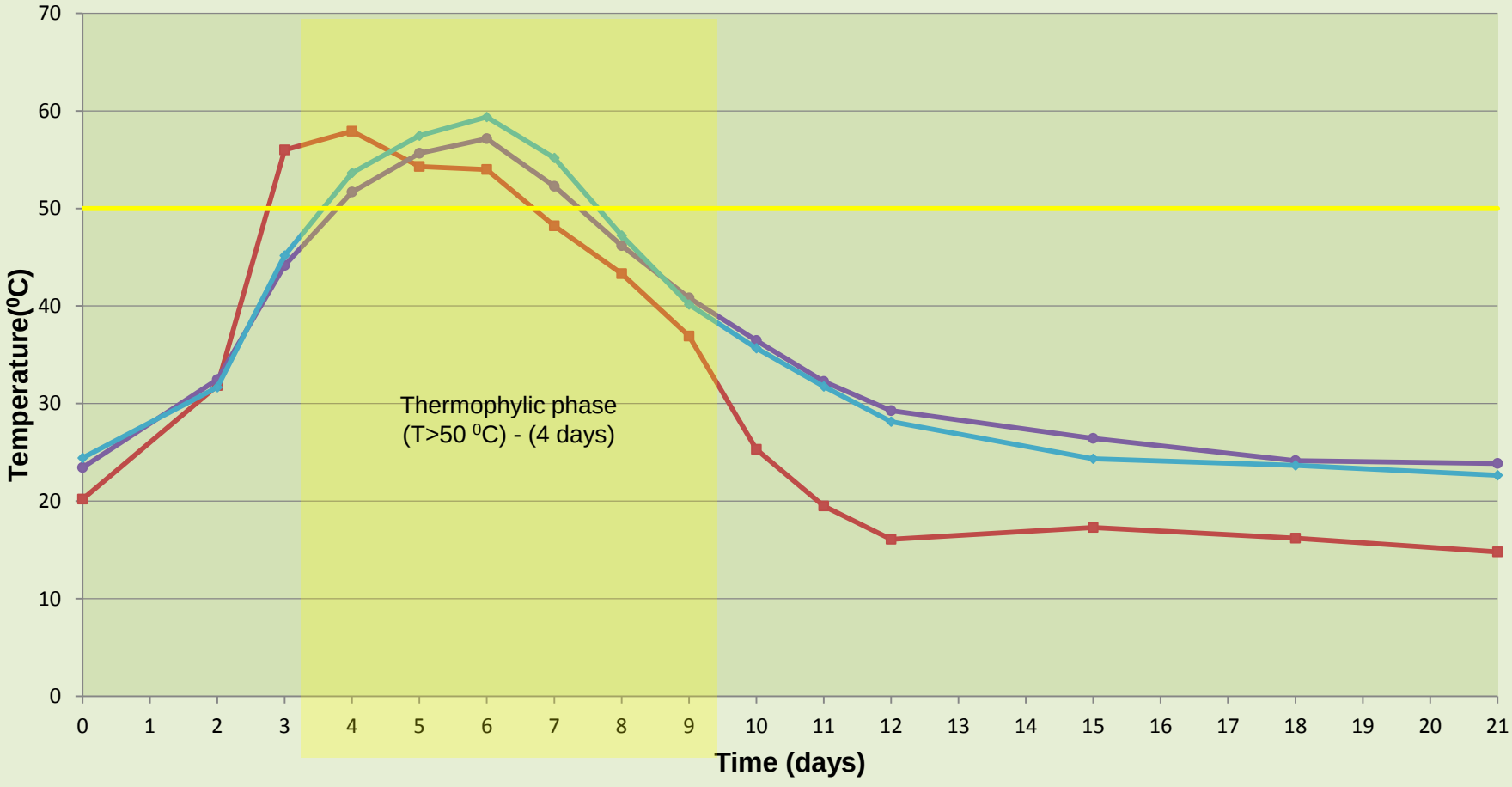
C/N


35
30
25
20
15
10
5
0
C/N
1
2
3
5
6
7
8
9
11
15
18
21
Time (days)
Reactor P10
Reactor P5
Reactor P5-S5

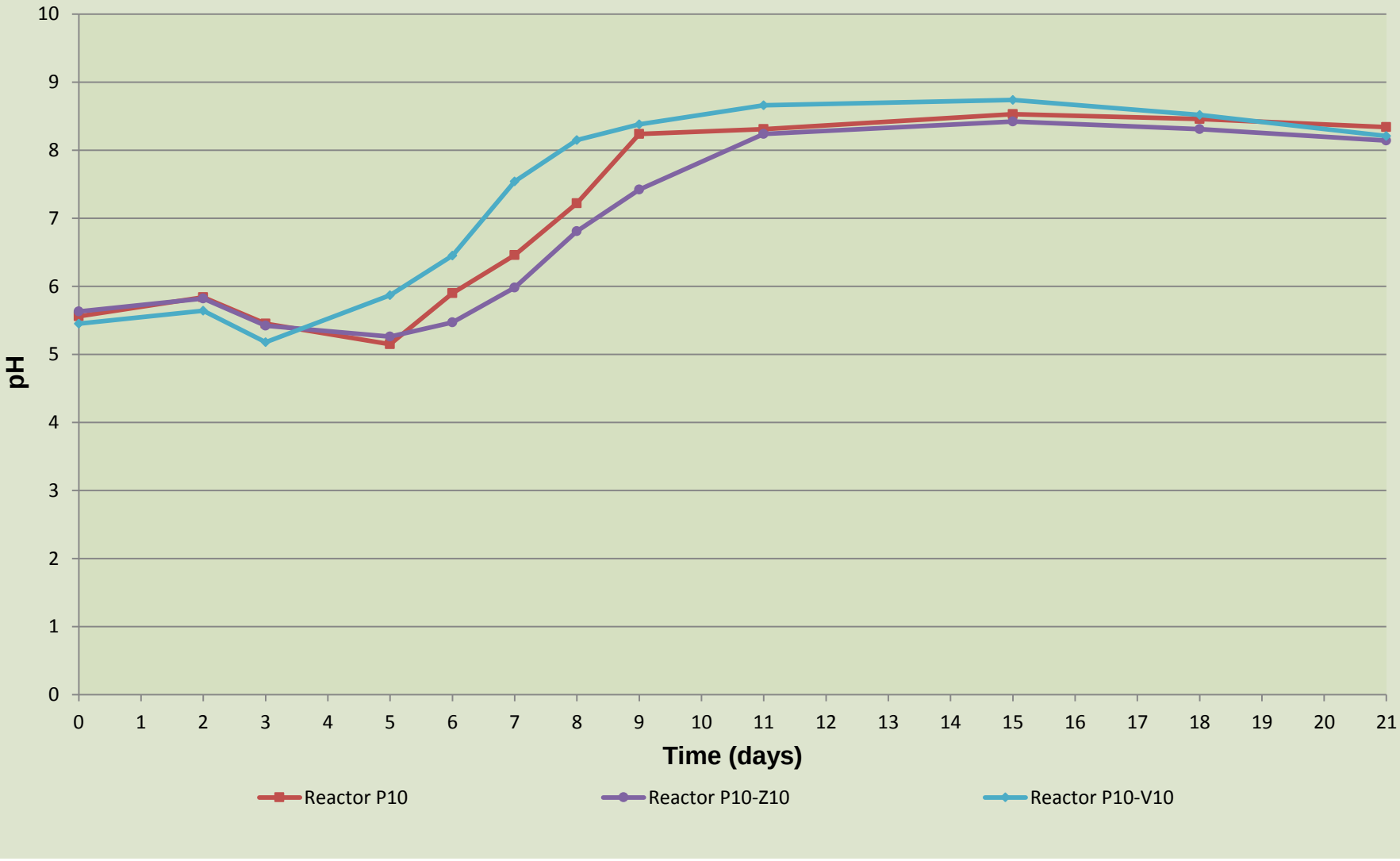
Moisture – Trial (II)



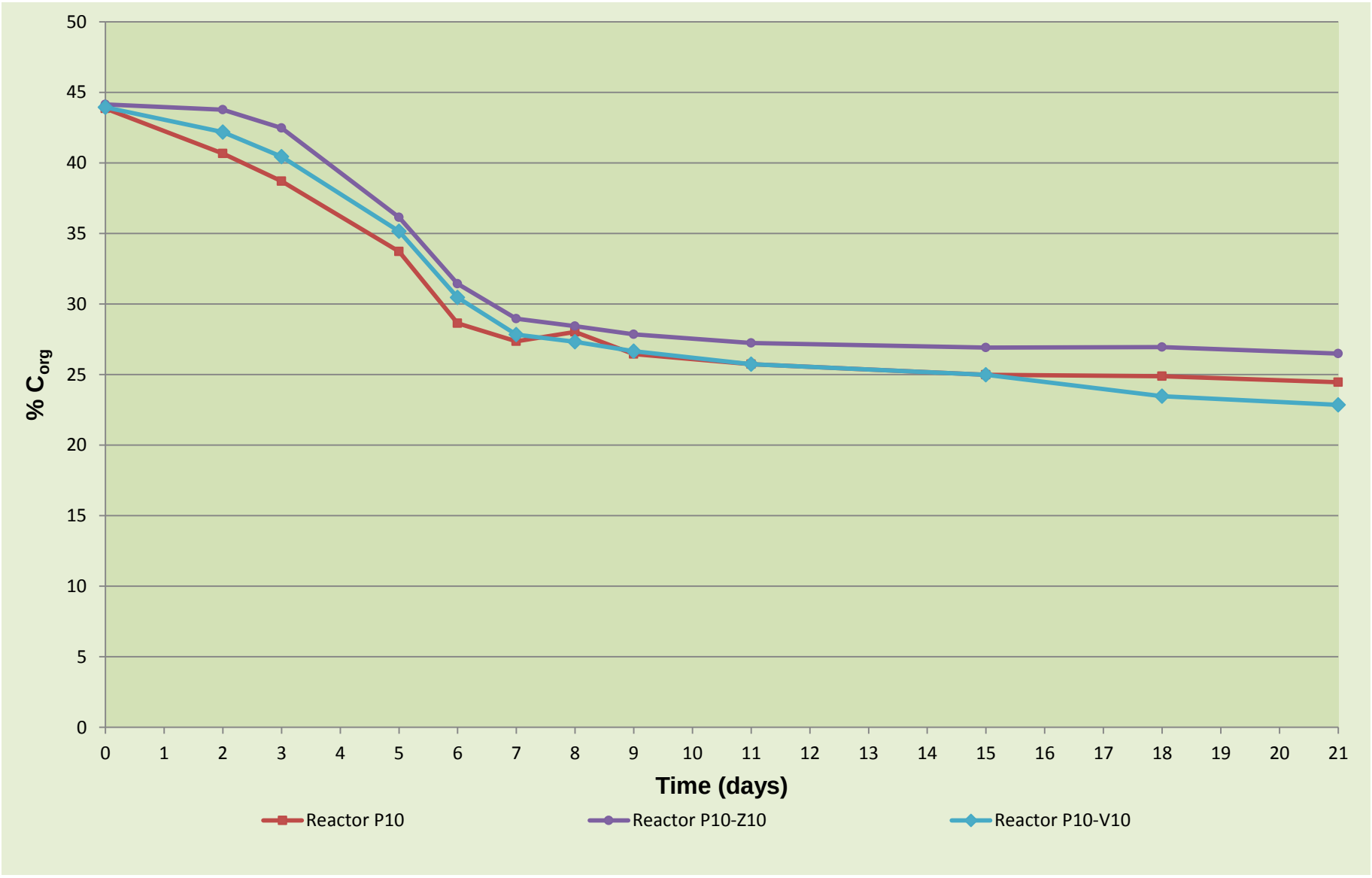
Temperature– Trial (II)



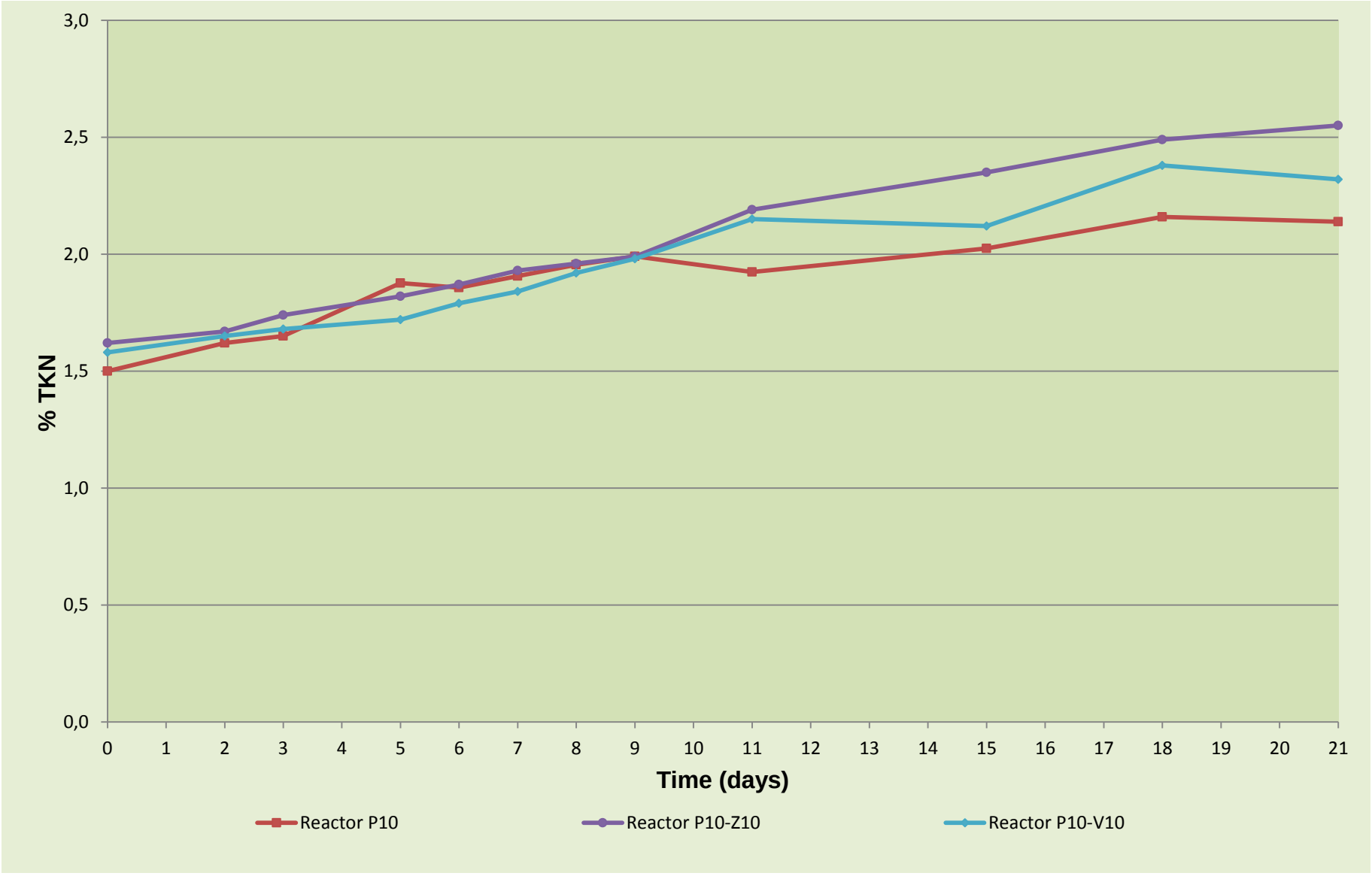
pH– Trial (II)


10
9
8
7
6
5
4
3
2
1
0
pH
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Time (days)
Reactor P10
Reactor P10-Z10
Reactor P10-V10

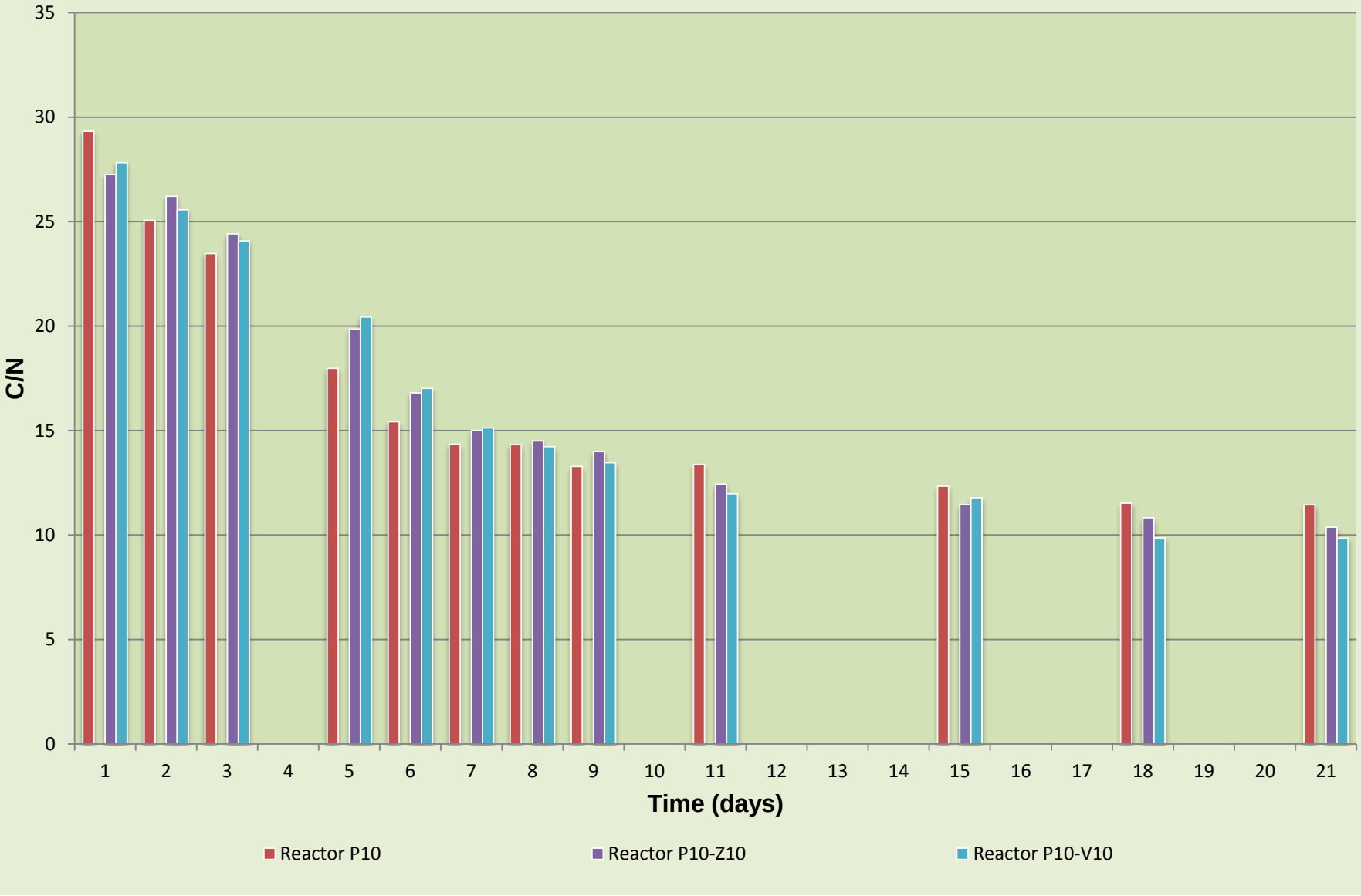
TOC– Trial (II)


50
45
40
35
30
25
20
15
10
5
0
% C_{org}
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Time (days)
Reactor P10
Reactor P10-Z10
Reactor P10-V10

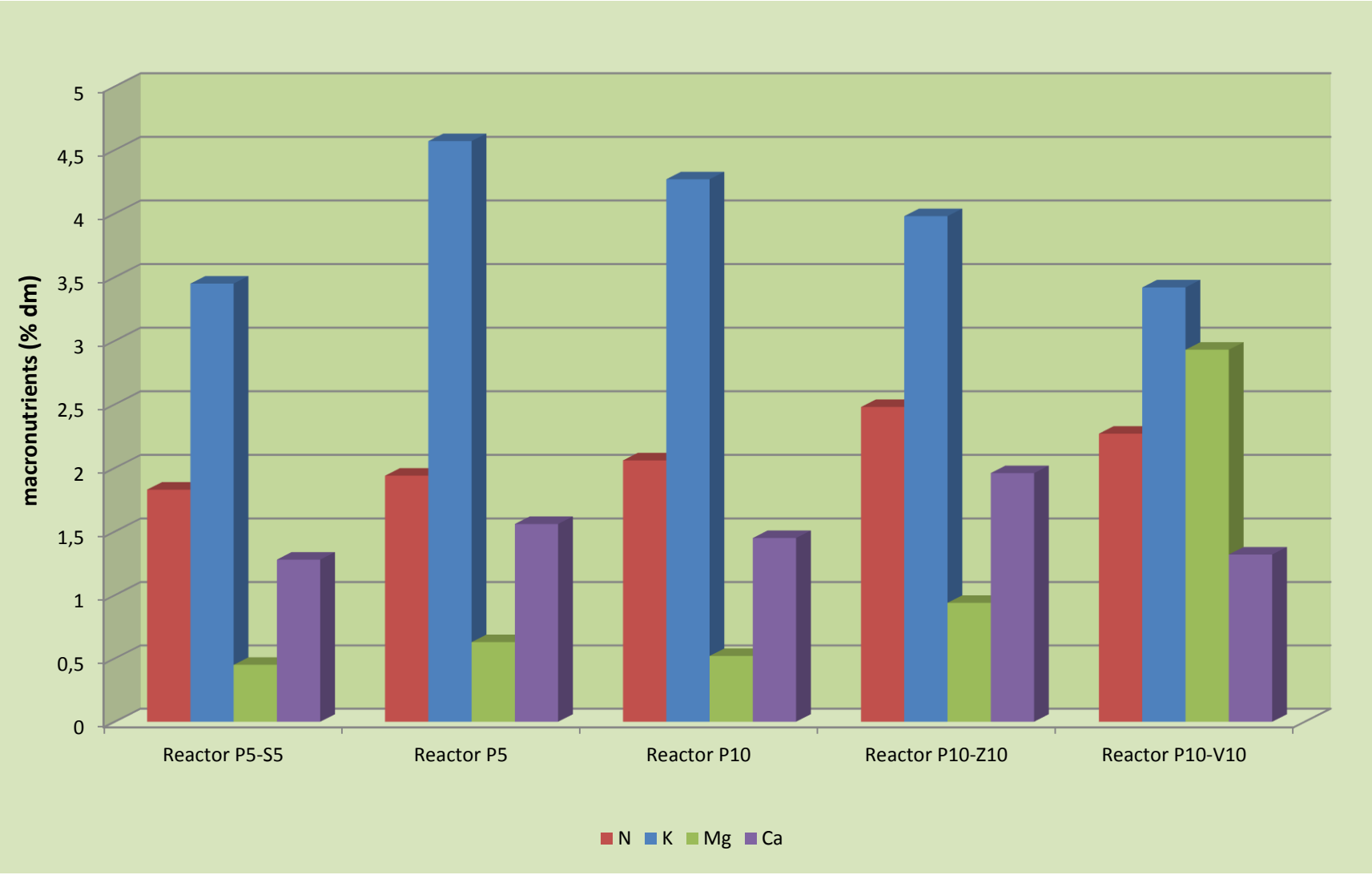
TKN– Trial (II)


3,0
2,5
2,0
1,5
1,0
0,5
0,0
% TKN
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Time (days)
Reactor P10
Reactor P10-Z10
Reactor P10-V10

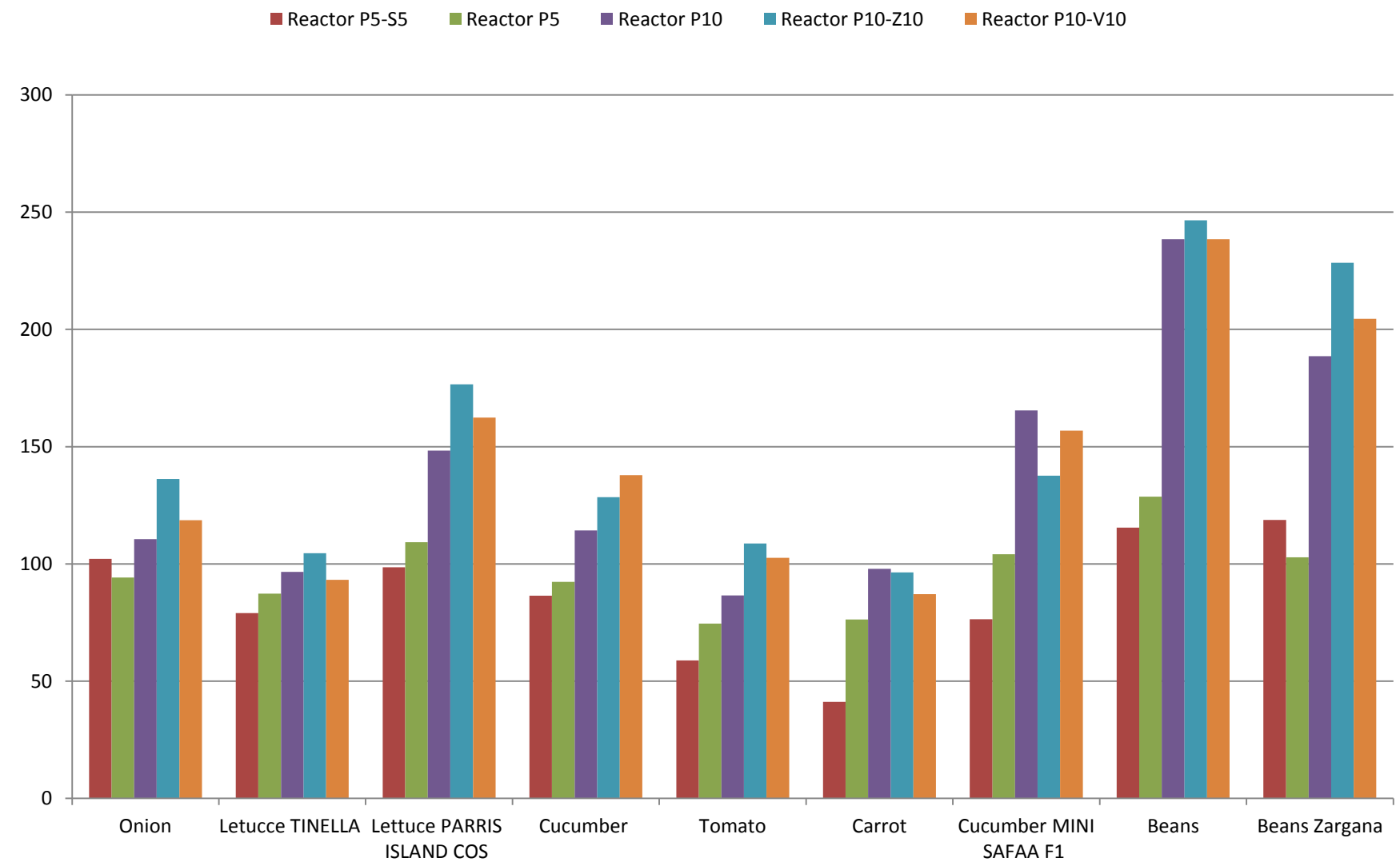
C/N– Trial (II)


35
30
25
20
15
10
5
0
C/N
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Time (days)
Reactor P10
Reactor P10-Z10
Reactor P10-V10

Final Product - Metals



Final Product - Phytotoxicity



Conclusions

- The developed prototype household system has a good performance with respect to the composting process and the operational characteristics
- The end product presented good quality characteristics
- An ordinary household can manage its kitchen waste at source and can potentially produce high quality compost using an appropriate household composting system
- With respect to the use of zeolite, vermiculite and perlite it was concluded that the use of additives enhance the biodegradation of the organic fraction as shown by the higher reduction rate of the total carbon content by increasing the porosity of the substrate.
- The process was better developed in the reactor where 10% w/w perlite was added.
- Home composting has the potential to significantly contribute towards:
  - diversion of the organic fraction of MSW from landfills
  - recycling essential nutrients and organic matter back to soil

Thank you

for your attention!