

# Portland and Belite cement hydration acceleration by C-S-H seeds with variable w/c ratios

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## This file contains

### → Nine tables:

**Table S1.** Elemental composition (wt%) from XRF for the three anhydrous cements.

**Table S2.** Mineralogical composition (wt%) by Rietveld quantitative phase analysis from LXRPD, MoK $\alpha_1$  ( $\lambda=0.7093$  Å), for the three anhydrous cements.

**Table S3.** Textural analysis for the three anhydrous cements.

**Table S4.** RQPA results for PC-42.5-wc05 pastes.

**Table S5.** RQPA results for PC-42.5-wc04 pastes.

**Table S6.** RQPA results for BC-Buz-wc05 pastes.

**Table S7.** RQPA results for BC-Buz-wc04 pastes.

**Table S8.** RQPA results for BC-n.a.-wc05 pastes.

**Table S9.** RQPA results for BC-n.a.-wc04 pastes.

### → Detailed additional information:

◆ Theoretical calculations for (i) the free water content determination, (ii) the C-S-H gel content, and (iii) the remaining amorphous, other-AC<sub>n</sub>, content. All these calculations are based on the RQPA results by assuming some stoichiometries for the chemical reactions.

◆ Raw data availability.

### → Three figures:

**Figure S1.** Laboratory X-ray powder diffraction, MoK $\alpha_1$  ( $\lambda=0.7093$  Å), for pastes with w/c=0.40 at 28d: (a) PC-42.5-wc04-Ref and (b) PC-42.5-wc04-STE53.

**Figure S2.** Laboratory X-ray powder diffraction, MoK $\alpha_1$  ( $\lambda=0.7093$  Å), for pastes with w/c=0.40 at 28d: (a) BC-Buz-wc04-Ref and (b) BC-Buz-wc04-STE53.

**Figure S3.** Laboratory X-ray powder diffraction, MoK $\alpha_1$  ( $\lambda=0.7093$  Å), for pastes with w/c=0.40 at 28d: (a) BC-n.a.-wc04-Ref and (b) BC-n.a.-wc04-STE53.

**Table S1.** Elemental composition (wt%) from XRF for the three anhydrous cements.

	CaO	SiO <sub>2</sub>	SO <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	Others	LoI
<b>PC-42.5</b>	62.9	19.7	3.4	5.0	3.4	1.5	1.1	0.3	0.3	2.7
<b>BC-Buz</b>	59.3	21.4	4.8	4.3	2.8	2.7	0.9	0.2	0.9	2.9
<b>BC-n.a.</b>	60.1	24.4	2.8	2.9	4.8	1.2	0.5	0.1	1.3	2.0

**Table S2.** Mineralogical composition (wt%) by Rietveld quantitative phase analysis from LXRPD, MoK $\alpha$ 1 ( $\lambda=0.7093$  Å), for the three anhydrous cements.

	C <sub>3</sub> S*	$\beta$ -C <sub>2</sub> S	C <sub>4</sub> AF	C <sub>3</sub> A <sup>#</sup>	C <sub>4</sub> A <sub>3</sub> $\bar{S}$	MgO	C $\bar{C}$	CM $\bar{C}$ <sub>2</sub>	C $\bar{S}$ H <sub>2</sub>	C $\bar{S}$ H <sub>0.5</sub>	C $\bar{S}$	ACn
<b>PC-42.5</b>	54.2	9.3	9.8	6.8	-	-	4.2	0.7	1.0	1.1	-	13.0
<b>BC-Buz</b>	24.8	44.1	10.1	2.0	1.9	1.4	1.3	-	-	-	1.6	12.8
<b>BC-n.a.</b>	28.6	48.0	15.2	-	-	-	-	-	2.0	-	-	6.2

\*PC-42.5: C<sub>3</sub>S-M3; BC-Buz: 2.9 wt% C<sub>3</sub>S-M3 and 21.9 wt% C<sub>3</sub>S-M1; BC-n.a.: 1.8 wt% C<sub>3</sub>S-M3 and 26.8 wt% C<sub>3</sub>S-M1

#PC-42.5: o-C<sub>3</sub>A; BC-Buz: c-C<sub>3</sub>A

**Table S3.** Textural analysis for the three anhydrous cements.

	Density (g/cm <sup>3</sup> )	BET (m <sup>2</sup> /g)	Blaine (m <sup>2</sup> /Kg)	D <sub>v,10</sub> (μm)	D <sub>v,50</sub> (μm)	D <sub>v,90</sub> (μm)
<b>PC-42.5</b>	3.13	1.2	370	3.6	18.1	50.3
<b>BC-Buz</b>	3.17	1.4	502	1.5	12.8	55.2
<b>BC-n.a.</b>	3.23	1.5	466	1.1	7.1	38.4

**Table S4.** RQPA results for PC-42.5-wc05 pastes. The cement also contained at to 0.7 wt% of  $\text{C}\bar{\text{S}}\text{H}_2$  and 0.7 wt% of  $\text{C}\bar{\text{S}}\text{H}_{0.5}$ .

Phases	$t_0$	PC-42.5-wc05-Ref			PC-42.5-wc05-XS130			PC-42.5-wc05-STE53		
		1d	7d	28d	1d	7d	28d	1d	7d	28d
C <sub>3</sub> S	36.1	16.7	8.1	3.8	16.4	8.4	4.2	14.7	8.7	2.7
C <sub>2</sub> S	6.2	6.1	5.4	5.8	6.2	6.0	5.7	6.5	7.0	5.8
C <sub>4</sub> AF	6.6	6.1	4.6	3.3	5.4	3.6	2.1	5.4	3.8	2.3
C <sub>3</sub> A	4.5	4.2	2.0	0.5	3.5	1.8	0.6	3.3	1.6	0.5
C $\bar{\text{C}}$	2.8	4.9	5.2	3.1	6.6	4.3	2.4	5.9	2.4	2.2
CM $\bar{\text{C}}_2$	0.5	0.4	0.7	0.9	0.4	0.7	0.7	0.4	0.8	0.6
CH	-	6.5	10.2	12.3	5.7	8.9	11.1	7.1	10.0	10.8
AFt	-	5.0	8.4	8.0	6.1	9.0	8.5	5.8	7.5	7.0
AFm-Hc	-	-	-	-	-	1.1	0.9	-	0.7	0.7
AFm-Mc	-	-	-	1.2	-	-	1.1	-	-	1.8
ACn	8.7	24.4	33.8	42.9	25.5	36.8	45.4	25.4	37.8	49.9
FW <sub>TA</sub> <sup>#</sup>	33.3	25.5	21.4	18.1	24.0	19.4	17.3	25.3	19.8	15.8
<i>C-S-H</i> <sup>§</sup>	-	19.9	29.6	33.5	20.1	28.5	33.2	21.4	26.9	34.6
<i>Other ACn</i> <sup>§</sup>	8.7	5.4	9.2	15.9	5.9	11.7	18.1	7.2	14.5	20.4
<i>FW</i> <sup>§</sup>	33.3	24.6	16.3	11.6	23.5	15.9	11.4	22.1	16.2	10.7

<sup>#</sup> FW (free water) content determined from thermal data; <sup>§</sup> In italics, calculated data of the chemical reaction

**Table S5.** RQPA results for PC-42.5-wc04 pastes. The cement also contained at to 0.7 wt% of  $\text{C}\bar{\text{S}}\text{H}_2$  and 0.8 wt% of  $\text{C}\bar{\text{S}}\text{H}_{0.5}$ .

Phases	$t_0$	PC-42.5-wc04-Ref			PC-42.5-wc04-XS130			PC-42.5-wc04-STE53		
		1d	7d	28d	1d	7d	28d	1d	7d	28d
C <sub>3</sub> S	38.7	18.2	8.6	4.5	17.6	9.8	6.7	16.8	9.5	4.9
C <sub>2</sub> S	6.6	6.9	6.7	7.2	7.0	7.1	7.1	7.1	7.8	7.5
C <sub>4</sub> AF	7.0	6.4	5.0	4.3	5.6	3.9	3.5	5.9	3.8	2.6
C <sub>3</sub> A	4.8	4.5	2.0	0.8	3.6	1.4	0.8	3.7	1.2	0.3
C $\bar{\text{C}}$	3.0	5.4	5.7	4.5	5.7	3.6	3.1	5.6	3.6	2.3
CM $\bar{\text{C}}_2$	0.5	0.5	0.3	0.4	0.6	0.6	0.5	0.6	0.8	0.9
CH	-	6.7	9.9	11.3	6.2	7.9	9.5	7.2	9.2	10.3
AFt	-	5.1	8.2	8.2	6.2	7.0	6.3	5.5	6.3	5.8
AFm-Hc	-	-	-	0.3	-	0.7	0.3	-	1.0	0.4
AFm-Mc	-	-	-	1.2	-	1.3	1.5	-	-	2.0
ACn	9.3	26.4	38.9	45.1	28.5	42.0	49.4	28.7	42.8	52.9
FW <sub>TA</sub> <sup>#</sup>	28.6	19.7	14.8	12.3	19.1	14.7	11.4	18.8	14.0	10.2
<i>C-S-H</i> <sup>§</sup>	-	20.9	30.7	34.9	21.5	29.5	32.6	22.3	29.8	34.5
<i>Other ACn</i> <sup>§</sup>	9.3	5.8	12.4	16.0	8.8	17.7	21.1	7.9	18.0	23.6
<i>FW</i> <sup>§</sup>	28.6	19.4	10.6	6.5	17.3	9.5	7.1	17.2	9.0	5.1

<sup>#</sup> FW (free water) content determined from thermal data; <sup>§</sup> In italics, calculated data of the chemical reaction

**Table S6.** RQPA results for BC-Buz-wc05 pastes. The cement also contained at  $t_0$  1.0 wt% of  $C\bar{S}$ .

Phases	$t_0$	BC-Buz-wc05-Ref			BC-Buz-wc05-XS130			BC-Buz-wc05-STE53		
		1d	7d	28d	1d	7d	28d	1d	7d	28d
C <sub>3</sub> S	16.6	5.4	4.2	3.6	5.3	4.2	2.8	5.0	3.4	2.6
C <sub>2</sub> S	29.4	33.5	28.0	18.7	32.0	23.8	16.0	31.8	27.7	18.1
C <sub>4</sub> AF	6.7	5.5	4.0	1.7	3.3	1.7	1.1	3.1	1.6	0.9
C <sub>3</sub> A	1.3	0.4	-	-	-	-	-	-	-	-
C <sub>4</sub> A <sub>3</sub> $\bar{S}$	1.2	0.7	-	-	-	-	-	0.3	-	-
C $\bar{C}$	0.9	3.1	0.9	1.2	2.6	1.3	0.9	2.7	0.9	0.5
MgO	0.9	1.1	0.9	0.8	1.0	0.9	0.9	1.0	0.9	0.7
CH	-	2.1	3.5	4.0	1.5	2.9	3.5	1.7	3.1	3.7
AFt	-	7.1	8.9	13.1	9.6	12.9	12.5	9.4	9.0	11.4
AFm-Hc	-	-	0.5	0.7	1.4	2.4	1.7	1.0	0.9	1.7
AFm-Mc	-	-	-	1.2	-	-	-	-	1.9	2.3
Katoite	-	-	0.5	0.8	-	0.5	0.5	-	0.5	0.5
ACn	8.6	15.1	26.5	34.1	18.5	28.5	42.1	19.1	29.2	40.4
FW <sub>TA</sub> <sup>#</sup>	33.3	26.0	22.1	20.1	24.9	21.0	18.0	25.0	21.1	17.1
<i>C-S-H</i> <sup>§</sup>	-	<i>11.4</i>	<i>14.5</i>	<i>27.7</i>	<i>11.5</i>	<i>20.2</i>	<i>32.2</i>	<i>11.8</i>	<i>15.8</i>	<i>29.5</i>
<i>Other ACn</i> <sup>§</sup>	<i>8.6</i>	<i>3.6</i>	<i>11.2</i>	<i>9.0</i>	<i>8.3</i>	<i>9.3</i>	<i>12.2</i>	<i>8.5</i>	<i>13.2</i>	<i>11.5</i>
<i>FW</i> <sup>§</sup>	<i>33.3</i>	<i>26.1</i>	<i>22.8</i>	<i>17.5</i>	<i>23.6</i>	<i>20.0</i>	<i>15.8</i>	<i>23.7</i>	<i>21.4</i>	<i>16.5</i>

<sup>#</sup> FW (free water) content determined from thermal data; <sup>§</sup> In italics, calculated data of the chemical reaction

**Table S7.** RQPA results for BC-Buz-wc04 pastes. The cement also contained at  $t_0$  1.1 wt% of  $C\bar{S}$ .

Phases	$t_0$	BC-Buz-wc04-Ref			BC-Buz-wc04-XS130			BC-Buz-wc04-STE53		
		1d	7d	28d	1d	7d	28d	1d	7d	28d
C <sub>3</sub> S	17.7	6.1	3.7	2.7	6.3	3.4	3.0	5.9	3.4	3.2
C <sub>2</sub> S	31.5	35.9	28.9	19.9	35.9	30.4	21.2	36.0	34.7	21.1
C <sub>4</sub> AF	7.2	6.1	3.5	1.9	2.9	2.1	1.5	2.9	1.8	0.8
C <sub>3</sub> A	1.4	0.6	-	-	0.3	-	-	-	-	-
C <sub>4</sub> A <sub>3</sub> $\bar{S}$	1.3	0.8	-	-	-	-	-	0.3	-	-
C $\bar{C}$	0.9	3.3	5.7	3.8	2.4	0.6	0.3	2.4	0.3	-
MgO	1.0	1.1	0.9	0.9	1.2	1.2	1.0	1.2	1.2	1.0
CH	-	2.0	3.3	4.2	1.0	1.5	2.7	1.5	1.6	3.2
AFt	-	6.8	10.0	11.0	9.2	12.3	8.9	8.2	11.2	8.8
AFm-Hc	-	-	-	0.2	1.3	2.8	1.2	1.1	2.5	1.3
AFm-Mc	-	-	1.1	2.1	-	-	-	-	-	-
Katoite	-	-	0.5	0.7	-	0.5	0.7	-	0.4	0.5
ACn	9.2	15.7	24.7	38.0	19.8	29.8	47.3	21.5	26.5	47.9
FW <sub>TA</sub> <sup>#</sup>	28.6	21.5	17.8	14.6	19.7	15.5	12.2	19.0	16.4	12.2
<i>C-S-H</i> <sup>§</sup>	-	<i>11.8</i>	<i>17.8</i>	<i>31.0</i>	<i>11.6</i>	<i>16.1</i>	<i>28.9</i>	<i>12.0</i>	<i>14.6</i>	<i>28.8</i>
<i>Other ACn</i> <sup>§</sup>	<i>9.2</i>	<i>3.9</i>	<i>8.5</i>	<i>10.4</i>	<i>9.2</i>	<i>13.0</i>	<i>18.9</i>	<i>10.1</i>	<i>11.8</i>	<i>19.8</i>
<i>FW</i> <sup>§</sup>	<i>28.6</i>	<i>21.4</i>	<i>16.2</i>	<i>11.2</i>	<i>18.7</i>	<i>16.2</i>	<i>11.7</i>	<i>18.4</i>	<i>16.5</i>	<i>11.5</i>

<sup>#</sup> FW (free water) content determined from thermal data; <sup>§</sup> In italics, calculated data of the chemical reaction

**Table S8.** RQPA results for BC-n.a.-wc05 pastes.

Phases	$t_0$	BC-n.a.-wc05-Ref			BC-n.a.-wc05-XS130			BC-n.a.-wc05-STE53		
		1d	7d	28d	1d	7d	28d	1d	7d	28d
C <sub>3</sub> S	19.0	6.9	2.4	1.7	8.1	2.3	1.2	6.9	3.0	1.3
C <sub>2</sub> S	32.1	33.1	34.5	24.9	34.2	33.7	17.9	31.8	34.4	21.9
C <sub>4</sub> AF	10.1	9.0	6.4	6.7	6.5	5.3	2.9	7.7	5.9	3.1
C $\bar{S}$ H <sub>2</sub>	1.4	0.4	0.3	0.4	0.4	0.3	0.5	0.5	0.5	0.6
C $\bar{C}$	-	2.2	-	-	1.8	-	-	1.2	-	-
CH	-	3.0	5.0	4.9	2.2	4.2	5.1	3.1	4.9	4.7
AFt	-	4.0	5.2	3.0	4.0	4.8	4.3	4.5	4.9	3.9
AFm-Hc	-	-	0.3	0.4	-	0.4	0.6	-	0.3	0.7
ACn	4.1	14.0	21.6	37.6	16.2	24.9	47.6	17.3	21.6	43.6
FW <sub>TA</sub> <sup>#</sup>	33.3	27.5	24.3	20.4	26.6	24.1	19.9	27.0	24.4	20.2
<i>C-S-H</i> <sup>§</sup>	-	12.3	16.9	27.4	11.1	17.0	37.3	12.3	16.3	31.8
<i>Other ACn</i> <sup>§</sup>	4.1	1.3	4.1	9.0	4.4	7.7	13.5	4.7	4.7	13.4
<i>FW</i> <sup>§</sup>	33.3	27.9	24.9	21.6	27.3	24.4	16.7	27.3	24.9	18.6

<sup>#</sup> FW (free water) content determined from thermal data; <sup>§</sup> In italics, calculated data of the chemical reaction

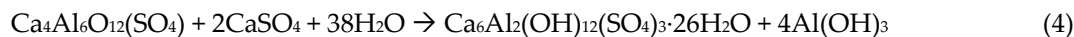
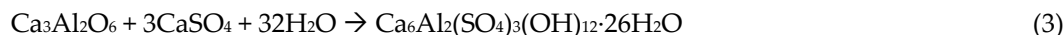
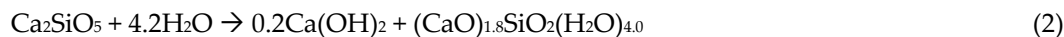
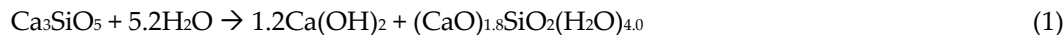
**Table S9.** RQPA results for BC-n.a.-wc04 pastes.

Phases	$t_0$	BC-n.a.-wc04-Ref			BC-n.a.-wc04-XS130			BC-n.a.-wc04-STE53		
		1d	7d	28d	1d	7d	28d	1d	7d	28d
C <sub>3</sub> S	20.4	8.5	3.6	1.5	10.4	2.9	3.1	7.5	2.8	2.5
C <sub>2</sub> S	34.2	35.9	35.4	27.9	35.5	35.4	20.6	35.4	37.2	24.9
C <sub>4</sub> AF	10.9	9.2	7.3	6.7	8.2	5.6	2.9	8.6	6.0	2.6
C $\bar{S}$ H <sub>2</sub>	1.5	0.5	0.7	0.5	0.6	0.6	0.6	0.4	0.5	0.7
C $\bar{C}$	-	1.8	-	-	0.6	-	-	0.4	-	-
CH	-	3.9	4.4	4.5	2.1	5.3	5.0	3.2	5.5	6.5
AFt	-	3.8	5.0	3.8	5.1	5.0	3.6	5.7	4.9	3.5
AFm-Hc	-	-	0.4	0.6	-	-	0.4	-	-	0.6
ACn	4.4	14.0	23.8	39.3	15.2	26.2	50.5	17.3	23.9	44.7
FW <sub>TA</sub> <sup>#</sup>	28.6	22.5	19.4	15.2	22.4	19.0	13.3	21.6	19.2	14.1
<i>C-S-H</i> <sup>§</sup>	-	12.1	17.1	27.8	10.2	17.9	36.0	13.2	18.0	30.8
<i>Other ACn</i> <sup>§</sup>	4.4	1.4	5.9	10.4	4.1	8.2	15.7	2.4	5.9	14.4
<i>FW</i> <sup>§</sup>	28.6	23.0	20.2	16.3	23.3	19.1	12.1	23.3	19.3	13.6

<sup>#</sup> FW (free water) content determined from thermal data; <sup>§</sup> In italics, calculated data of the chemical reaction

♦ **Theoretical calculations of the free water, the C-S-H gel, and the other ACn contents based on chemical reactions and the RQPA results.**

For the theoretical calculation of free water, equations (1) to (5) were used; equations (1) and (2) were been used for the calculation of C-S-H gel



**Detailed example for free water (FW) calculation.** The FW at a given hydration time was calculated for each sample and age, using the initial free water and considering the bounded water according to the stoichiometry of reactions (1) to (5).

The calculations for BC-Buz-wc04-Ref at 28d are detailed next as an example; see Table S7.

I. C<sub>3</sub>S: There is 2.7 wt% of unreacted C<sub>3</sub>S. This means that 15.0 wt% (C<sub>3</sub>S<sub>initial</sub> – C<sub>3</sub>S<sub>final</sub>) has reacted. According to reaction (1), 6.1 wt% of free water has been consumed.

II. C<sub>2</sub>S: There is 19.9 wt% of unreacted C<sub>2</sub>S. This means that 11.6 wt% (C<sub>2</sub>S<sub>initial</sub> – C<sub>2</sub>S<sub>final</sub>) has reacted. According to reaction (2), 5.1 wt% of free water has been consumed.

III. C<sub>3</sub>A: All C<sub>3</sub>A has been dissolved at this age. This means that 1.4 wt% (C<sub>3</sub>A<sub>initial</sub> – C<sub>3</sub>A<sub>final</sub>) has reacted. According to reaction (3), 2.4 wt% of free water has been consumed.

IV. C<sub>4</sub>A<sub>3</sub> $\bar{\text{S}}$ : All C<sub>4</sub>A<sub>3</sub> $\bar{\text{S}}$  has been dissolved at this age. This means that 1.3 wt% (C<sub>4</sub>A<sub>3</sub> $\bar{\text{S}}$ <sub>initial</sub> – C<sub>4</sub>A<sub>3</sub> $\bar{\text{S}}$ <sub>final</sub>) has reacted. According to reaction (4), 1.5 wt% of free water has been consumed.

V. C<sub>4</sub>AF: There is 1.9 wt% of unreacted C<sub>4</sub>AF. This means that 5.3 wt% (C<sub>4</sub>AF<sub>initial</sub> – C<sub>4</sub>AF<sub>final</sub>) has reacted. According to reaction (5), 2.3 wt% of free water has been consumed.

The calculated free water content for BC-Buz-wc04-Ref at 28d is **11.2 wt%** (28.6 wt% - 6.1 wt% - 5.1 wt% - 2.4 wt% - 1.5 wt% - 2.3 wt%)

**Detailed example for C-S-H gel calculation.** C-S-H gel was calculated according to reactions (1) and (2). The calculations for BC-Buz-wc04-Ref at 28d are detailed as an example; see Table S7.

I. C<sub>3</sub>S: There is 2.7 wt% of unreacted C<sub>3</sub>S. This means that 15.0 wt% (C<sub>3</sub>S<sub>initial</sub> – C<sub>3</sub>S<sub>final</sub>) has reacted. According to reaction (1), 15.3 wt% of C-S-H gel has been formed.

II. C<sub>2</sub>S: There is 19.9 wt% of unreacted C<sub>2</sub>S. This means that 11.6 wt% (C<sub>2</sub>S<sub>initial</sub> – C<sub>2</sub>S<sub>final</sub>) has reacted. According to reaction (2), 15.7 wt% of C-S-H gel has been formed.

A total of **31.0 wt%** of C-S-H gel has been formed.

**Detailed example for other-ACn calculation.** The calculated FW and C-S-H gel should be close to the total ACn content. Differences between total ACn and calculated C-S-H and FW are considered to be other-ACn (such as AFm-type, iron-siliceous hydrogarnet, and the remaining fraction of amorphous phase(s) within the unreacted clinker components).

BC-Buz-wc04-Ref at 28d is used as an example; see Table S7.

The difference of total ACn obtained by internal standard (52.6 wt%) and free water (11.2 wt%) and the calculated C-S-H gel (31.0 wt%) give the other-ACn contents (52.6 wt% - 11.2 wt% - 31.0 wt% = **10.4 wt%** other-ACn)

### ◆ Raw data availability.

Raw data from the following techniques have been deposited: Calorimetry (excel file), LXRPD (txt file) MIP (excel file), TA (TA Universal Analysis software file). Data can be accessed at: <https://doi.org/10.5281/zenodo.6335735>

#### Calorimetry

PC-42.5-wc05-Ref (1 file)  
 PC-42.5-wc05-XS130 (1 file)  
 PC-42.5-wc05-STE53 (1 file)  
 PC-42.5-wc04-Ref (1 file)  
 PC-42.5-wc04-XS130 (1 file)  
 PC-42.5-wc04-STE53 (1 file)  
 BC-Buz-wc05-Ref (1 file)  
 BC-Buz-wc05-XS130 (1 file)  
 BC-Buz-wc05-STE53 (1 file)  
 BC-Buz-wc04-Ref (1 file)  
 BC-Buz-wc04-XS130 (1 file)  
 BC-Buz-wc04-STE53 (1 file)  
 BC-n.a.-wc05-Ref (1 file)  
 BC-n.a.-wc05-XS130 (1 file)  
 BC-n.a.-wc05-STE53 (1 file)  
 BC-n.a.-wc04-Ref (1 file)  
 BC-n.a.-wc04-XS130 (1 file)  
 BC-n.a.-wc04-STE53 (1 file)

#### LXRPD

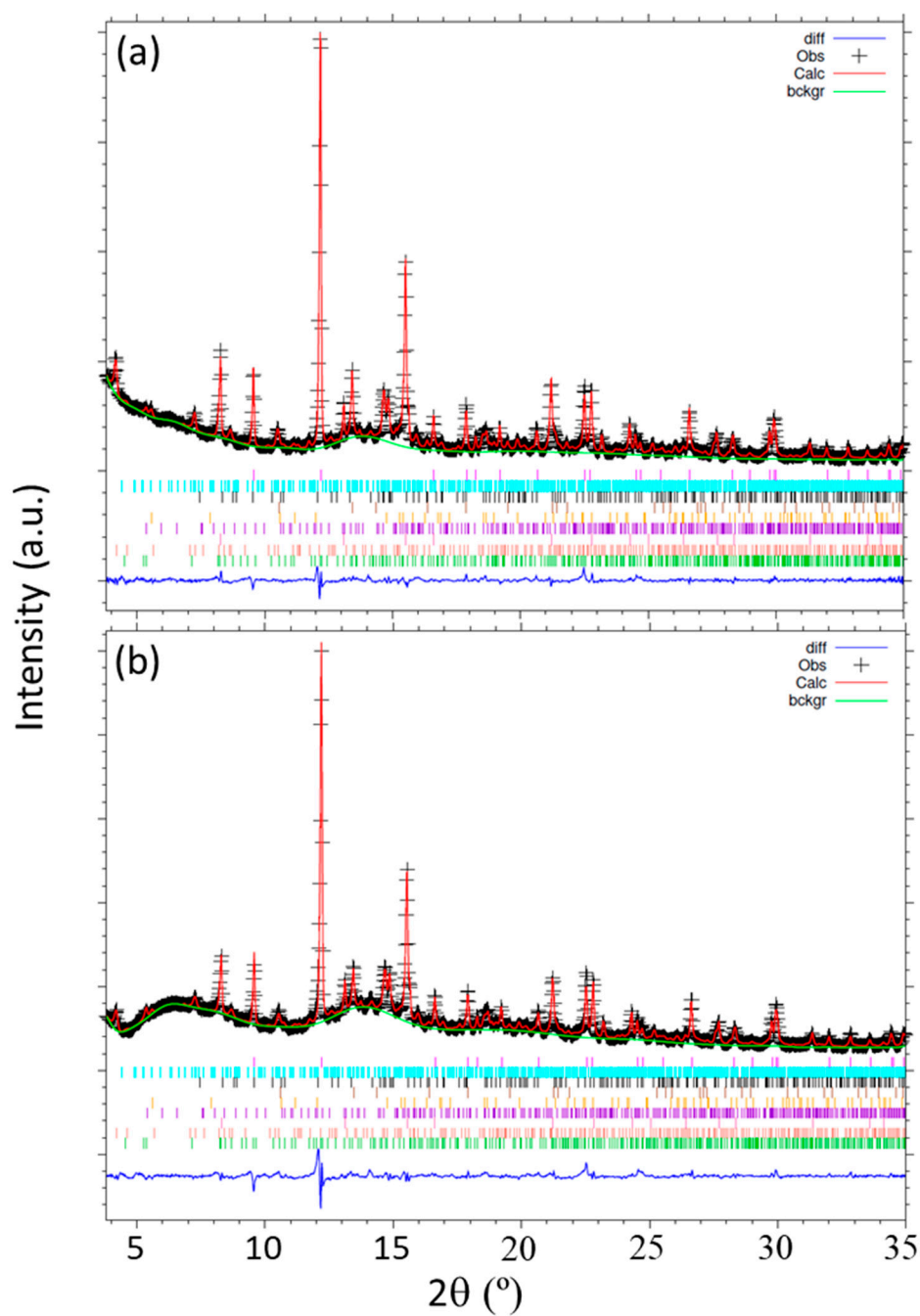
PC-42.5-Anh (1 file)  
 PC-42.5-wc05-Ref-Serie (3 files)  
 PC-42.5-wc05-XS130-Serie (3 files)  
 PC-42.5-wc05-STE53-Serie (3 files)  
 PC-42.5-wc04-Ref-Serie (3 files)  
 PC-42.5-wc04-XS130-Serie (3 files)  
 PC-42.5-wc04-STE53-Serie (3 files)  
 BC-Buz-Anh (1 file)  
 BC-Buz-wc05-Ref-Serie (3 files)  
 BC-Buz-wc05-XS130-Serie (3 files)  
 BC-Buz-wc05-STE53-Serie (3 files)  
 BC-Buz-wc04-Ref-Serie (3 files)  
 BC-Buz-wc04-XS130-Serie (3 files)  
 BC-Buz-wc04-STE53-Serie (3 files)  
 BC-n.a.-Anh (1 file)  
 BC-n.a.-wc05-Ref-Serie (3 files)  
 BC-n.a.-wc05-XS130-Serie (3 files)  
 BC-n.a.-wc05-STE53-Serie (3 files)  
 BC-n.a.-wc04-Ref-Serie (3 files)  
 BC-n.a.-wc04-XS130-Serie (3 files)  
 BC-n.a.-wc04-STE53-Serie (3 files)

#### MIP

PC-42.5-wc05-Ref-Serie (3 files)  
 PC-42.5-wc05-XS130-Serie (3 files)  
 PC-42.5-wc05-STE53-Serie (3 files)  
 PC-42.5-wc04-Ref-Serie (3 files)  
 PC-42.5-wc04-XS130-Serie (3 files)  
 PC-42.5-wc04-STE53-Serie (3 files)  
 BC-Buz-wc05-Ref-Serie (3 files)  
 BC-Buz-wc05-XS130-Serie (3 files)  
 BC-Buz-wc05-STE53-Serie (3 files)  
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 BC-n.a.-wc05-Ref-Serie (3 files)  
 BC-n.a.-wc05-XS130-Serie (3 files)  
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 BC-n.a.-wc04-STE53-Serie (3 files)

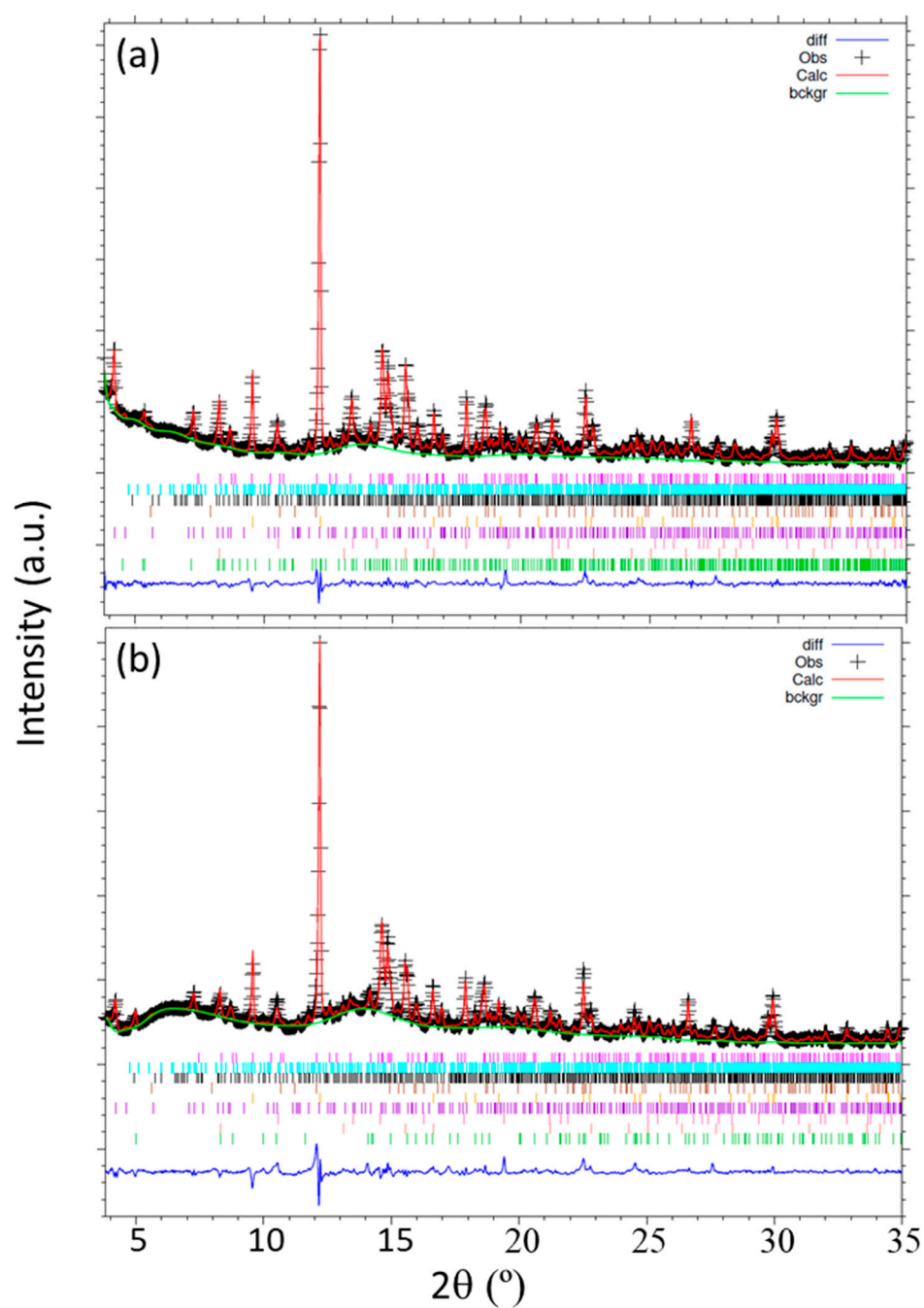
#### TA

PC-42.5-wc05-Ref-Serie (3 files)  
 PC-42.5-wc05-XS130-Serie (3 files)  
 PC-42.5-wc05-STE53-Serie (3 files)  
 PC-42.5-wc04-Ref-Serie (3 files)  
 PC-42.5-wc04-XS130-Serie (3 files)  
 PC-42.5-wc04-STE53-Serie (3 files)  
 BC-Buz-wc05-Ref-Serie (3 files)  
 BC-Buz-wc05-XS130-Serie (3 files)  
 BC-Buz-wc05-STE53-Serie (3 files)  
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 BC-n.a.-wc05-Ref-Serie (3 files)  
 BC-n.a.-wc05-XS130-Serie (3 files)  
 BC-n.a.-wc05-STE53-Serie (3 files)  
 BC-n.a.-wc04-Ref-Serie (3 files)  
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 BC-n.a.-wc04-STE53-Serie (3 files)

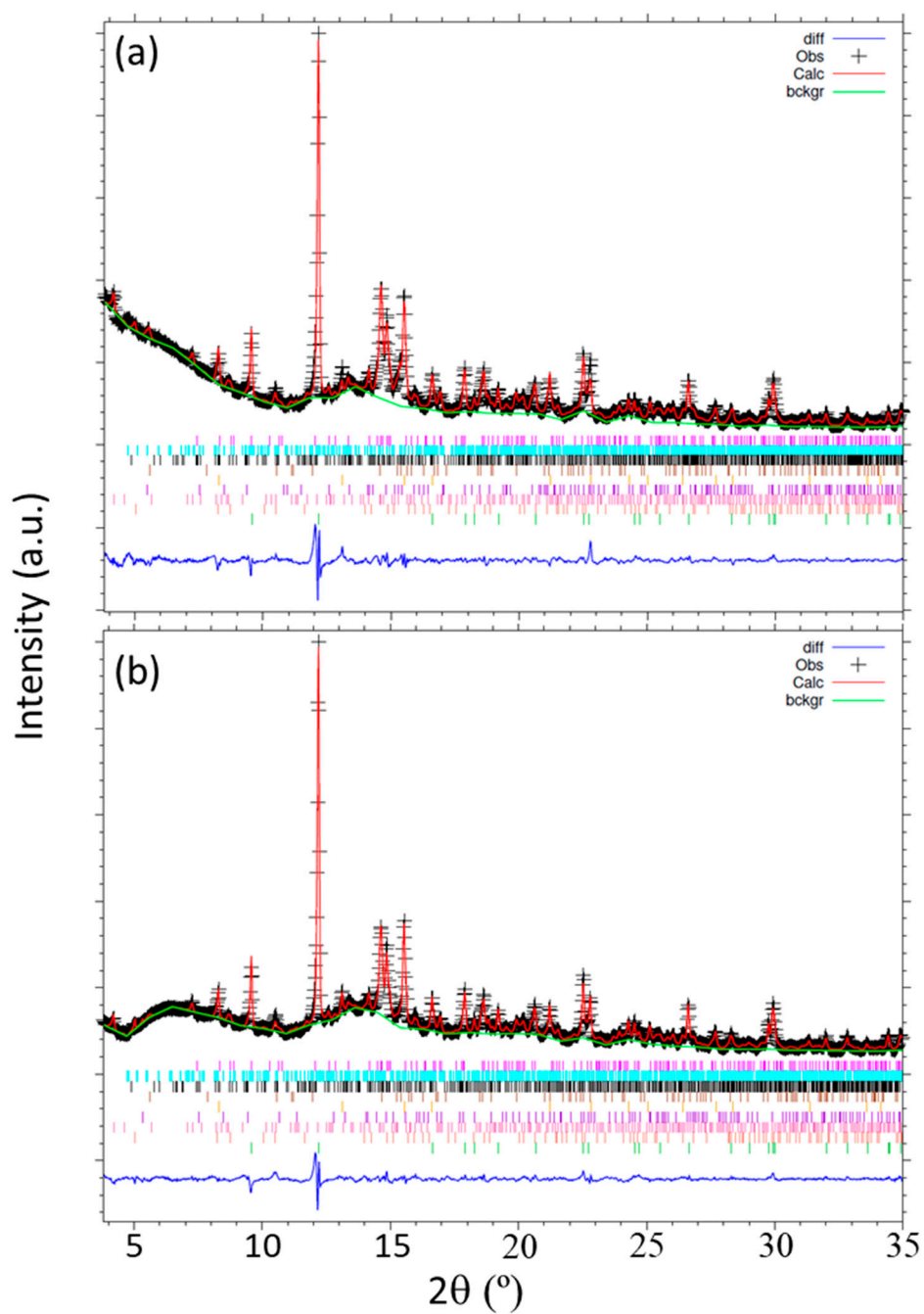


**Figure S1.** Laboratory X-ray powder diffraction,  $\text{MoK}\alpha_1$  ( $\lambda=0.7093 \text{ \AA}$ ), for pastes with  $w/c=0.40$  at 28d: (a) PC-42.5-wc04-Ref and (b) PC-42.5-wc04-STE53.





**Figure S2.** Laboratory X-ray powder diffraction,  $\text{MoK}\alpha_1$  ( $\lambda=0.7093 \text{ \AA}$ ), for pastes with  $w/c=0.40$  at 28d: (a) BC-Buz-wc04-Ref and (b) BC-Buz-wc04-STE53.



**Figure S3.** Laboratory X-ray powder diffraction,  $\text{MoK}\alpha_1$  ( $\lambda=0.7093 \text{ \AA}$ ), for pastes with  $w/c=0.40$  at 28d: (a) BC-n.a.-wc04-Ref and (b) BC-n.a.-wc04-STE53.