## **Supporting Information**

Chlorinated Paraffins in Car Tires recycled to Rubber Granulates and Playground Tiles

Brandsma, Sicco H.1\*, Brits, Martin 1,2,3, Groenewoud, Quinn R.1, van Velzen, Martin J.M.1,

Leonards, Pim E.G.1, De Boer, Jacob 1

<sup>1</sup>Vrije Universiteit, Dept. Environment and Health, De Boelelaan 1085, 1081 HV, Amsterdam, the Netherlands, <sup>2</sup>National Metrology Institute of South Africa (NMISA), CSIR Campus, Meiring Naude Road, Pretoria 0040, South Africa, <sup>3</sup>Department of Chemistry, Faculty of Natural and Agricultural Sciences, University of Pretoria, Lynnwood Road, Pretoria 0002, South Africa

<sup>\*</sup>Corresponding author. +31 20 5989566; fax: +31 20 5989553; e-mail:sicco.brandsma@vu.nl

## Solvents, standards and materials

The following eight commercial available CP standard mixtures were used for the deconvolution of the SCCP, MCCP and LCCP pattern in the rubber samples;

- Chlorinated paraffin C10-C13 51.5%Cl (SCCP 51.5%Cl)
- Chlorinated paraffin C10-C13 55.5%Cl (SCCP 55.5%Cl)
- Chlorinated paraffin C10-C13 63% CI (SCCP 63%CI)
- Chlorinated paraffin C14-C17 42% CI (MCCP 42%CI)
- Chlorinated paraffin C14-C17 52% Cl (MCCP 52%Cl)
- Chlorinated paraffin C14-C17 57% CI (MCCP 57%CI)
- Chlorinated paraffin C18-C20 36% CI (LCCP 36%CI)
- Chlorinated paraffin C18-C20 49% CI (LCCP 49%CI)

The concentration of the eight commercial CP standard mixtures was 100 ng/ $\mu$ L and purchased from Dr. Ehrenstorfer GmbH (Augsburg, Germany). All solvents and chemicals used were HPLC analysis grade. N-hexane, acetone, and dichloromethane (DCM) from Promochem (Wesel, Germany) and toluene from VWR Chemicals , acetonitrile (ACN) from Biosolve (Valkenswaard, The Netherlands). were used for cleaning, extraction cleanup and analysis.  $^{13}$ C<sub>10</sub>-dechlorane plus was used as injection standard and was purchased from Cambridge Isotope Laboratories (Andover, MA, USA). Silicagel (70-230  $\mu$ m) and sodium sulphate (99%) and sulfuric acid (95-97%) was also purchased from Sigma Aldrich (Zwijndrecht , The Netherlands).

Table S1. Information (brand, year and country) of the car tires and playground tiles analyzed in this study.

| Sample code | Brand       | Year | Country  |
|-------------|-------------|------|----------|
| CT1         | Continental | 2010 | France   |
| CT2         | Kumho       | 2012 | China    |
| CT3         | Continental | 2012 | Portugal |
| CT4         | Dunlop      | 2014 | Germany  |
| CT5         | Pirelli     | 2008 | Turkey   |
| CT6         | Pirelli     | 2014 | Brazil   |
| CT7         | Michelin    | 2006 | Spain    |
| CT8         | Continental | 2012 | Romania  |
| CT9         | Goodyear    | 2011 | Slovenia |
| CT10        | Continental | 2013 | Czech    |

| Sample code | Year purchased | Country         |
|-------------|----------------|-----------------|
| PGT1        | 2018           | The Netherlands |
| PGT2        | 2018           | The Netherlands |
| PGT3        | 2018           | The Netherlands |
| PGT4        | 2018           | The Netherlands |
| PGT5        | 2018           | The Netherlands |
| PGT6        | 2018           | Spain           |

Table S2. Instrumental parameters LC-APCI-qTOF-MS.

| Instrument setting          | Value                                      |
|-----------------------------|--|
| Ionisation source           | APCI, negative mode                        |
| Eluent                      | Dichloromethane (10%, v/v) in acetonitrile |
| Run time                    | 4 min                                      |
| Isocratic flow              | 250 μL/min                                 |
| Vaporizer temperature       | 300°C                                      |
| Dry temperature             | 200°C                                      |
| Ion energy                  | 5.0 eV                                     |
| Collision energy (CE)       | 2.0 eV                                     |
| MS scan range               | 100-2000 m/z                               |
| End plate offset            | 500 V                                      |
| Capillary                   | 1000 V                                     |
| Corona                      | 6000 nA                                    |
| Nebulizer (N <sub>2</sub> ) | 2.0 L/min                                  |
| Dry Gas                     | 2.0 L/min                                  |

Table S3. Results of the spike experiments of the car tires (CT), rubber granulates (RG) and playground tiles (PGT).

|      | Amount   | Measured | Recovery |                | Amount   | Measured | Recovery |                | Amount   | Measured | Recovery |                |
|------|----------|----------|----------|----------------|----------|----------|----------|----------------|----------|----------|----------|----------------|
|      | spike ng | spike ng | SCCPs    | R <sup>2</sup> | spike ng | spike ng | MCCPs    | R <sup>2</sup> | spike ng | spike ng | LCCPs    | R <sup>2</sup> |
| RG7  | 143      | 214      | 150%     | 0.97           | 700      | 849      | 121%     | 0.97           | 134      | 156      | 116%     | 0.99           |
| RG6  | 143      | 151      | 106%     | 0.99           | 700      | 571      | 82%      | 0.98           | 134      | 91       | 68%      | 1.00           |
| RG2  | 143      | 135      | 94%      | 0.93           | 700      | 589      | 84%      | 0.98           | 134      | 103      | 77%      | 1.00           |
| PGT2 | 143      | 182      | 127%     | 0.99           | 700      | 705      | 101%     | 0.98           | 134      | 129      | 96%      | 1.00           |
| PGT6 | 143      | 201      | 141%     | 0.81           | 700      | 797      | 114%     | 0.96           | 134      | 101      | 75%      | 0.99           |
| PGT4 | 143      | 215      | 150%     | 0.99           | 700      | 925      | 132%     | 0.97           | 134      | 178      | 132%     | 1.00           |
| СТ8  | 143      | 210      | 147%     | 0.99           | 700      | 909      | 130%     | 0.96           | 134      | 202      | 151%     | 1.00           |
| СТ9  | 143      | 173      | 121%     | 0.99           | 700      | 682      | 97%      | 0.96           | 134      | 138      | 103%     | 1.00           |
| CT5  | 143      | 181      | 127%     | 0.99           | 700      | 664      | 95%      | 0.97           | 134      | 133      | 99%      | 1.00           |
|      |          | Mean     | 129%     |                |          | Mean     | 106%     |                |          | Mean     | 102%     |                |
|      |          | RSD      | 15%      |                |          | RSD      | 18%      |                |          | RSD      | 27%      |                |

Table S4. CP levels in  $\mu g/g$  in the NIST SRM2585.

|       | ∑SCCPs (μg/g) | R <sup>2</sup> | %Cl   | ΣMCCPs (μg/g) | R <sup>2</sup> | %Cl   | ΣLCCPs (μg/g) | R <sup>2</sup> | %Cl   |
|-------|---------------|----------------|-------|---------------|----------------|-------|---------------|----------------|-------|
| SRM1  | 7.4           | 0.90           | 59.2% | 9.9           | 0.77           | 52.0% | 17            | 0.01           | 42.5% |
| SRM2  | 7.0           | 0.90           | 59.2% | 9.6           | 0.77           | 51.9% | 16            | 0.01           | 42.6% |
| SRM3  | 7.0           | 0.99           | 59.2% | 9.5           | 0.59           | 51.9% | 16            | 0.01           | 42.6% |
| Mean  | 7.1           |                |       | 9.7           |                |       | 16            |                |       |
| Stdev | 0.2           |                |       | 0.2           |                |       | 0.4           |                |       |

Table S5. Concentrations in  $\mu g/g$  for the SCCPs, MCCPs and LCCPs and percentage contribution of the congener carbon chain lengths. Goodness of fit (R²) below 0.5 are given in highlighted red with indicate that the reported values is tentative.

|  |   | C10<br>(%)  | C11<br>(%)   | C12<br>(%)  | C13<br>(%)   | ∑SCCPs<br>(µg/g)   | R <sup>2</sup>   | C14<br>(%)  | C15<br>(%)   | C16<br>(%)   | C17<br>(%)   | ∑MCCPs<br>(µg/g)  | R <sup>2</sup>  |  |  |
|--|---|---|--|---|--|--|--|---|--|--|--|---|---|--|--|
|  | RG1   | 7%  | 25%  | 33%   | 35%  | 4.8  | 0.6  | 45%   | 27%  | 17%  | 11%  | 45%   | 0.8   |  |  |
|  | RG2   | 6%  | 23%  | 33%   | 37%  | 9.1  | 0.2  | 39%   | 33%  | 18%  | 10%  | 39%   | 0.8   |  |  |
|  | RG3   | 7%  | 18%  | 31%   | 44%  | 2.2  | 0.8  | 46%   | 24%  | 18%  | 13%  | 46%   | 0.9   |  |  |
|  | RG4.1   | 10%   | 33%  | 34%   | 22%  | 7.2  | 0.1  | 48%   | 27%  | 14%  | 10%  | 48%   | 0.9   |  |  |
|  | RG4.2   | 10%   | 28%  | 30%   | 31%  | 6.1  | 0.3  | 44%   | 25%  | 17%  | 14%  | 44%   | 0.9   |  |  |
|  | RG5   | 5%  | 20%  | 28%   | 47%  | 2.1  | 0.8  | 41%   | 23%  | 18%  | 17%  | 41%   | 0.8   |  |  |
|  | RG6   | 6%  | 20%  | 26%   | 48%  | 2.3  | 0.8  | 39%   | 24%  | 20%  | 17%  | 39%   | 0.7   |  |  |
|  | RG7   | 6%  | 20%  | 29%   | 46%  | 6.2  | 0.8  | 41%   | 25%  | 19%  | 14%  | 41%   | 0.8   |  |  |
|  | RG8   | 6%  | 17%  | 22%   | 55%  | 7.8  | 0.7  | 40%   | 27%  | 18%  | 15%  | 40%   | 0.8   |  |  |
|  | RG9   | 6%  | 21%  | 25%   | 48%  | 2.7  | 0.8  | 37%   | 27%  | 21%  | 16%  | 37%   | 0.7   |  |  |
|  | PGT1  | 6%  | 18%  | 32%   | 44%  | 1.9  | 0.8  | 43%   | 25%  | 18%  | 14%  | 43%   | 0.8   |  |  |
|  | PGT2  | 12%   | 31%  | 11%   | 46%  | 2.6  | 0.6  | 47%   | 27%  | 15%  | 11%  | 47%   | 0.9   |  |  |
|  | PGT3  | 2%  | 14%  | 24%   | 60%  | 4.8  | 0.7  | 55%   | 24%  | 11%  | 9%   | 55%   | 1.0   |  |  |
|  | PGT4  | 5%  | 24%  | 27%   | 45%  | 4.7  | 0.8  | 50%   | 25%  | 14%  | 11%  | 50%   | 0.9   |  |  |
|  | PGT5.1  | 4%  | 18%  | 23%   | 55%  | 6.3  | 0.5  | 53%   | 26%  | 13%  | 9%   | 53%   | 1.0   |  |  |
|  | PGT5.2  | 2%  | 8%   | 11%   | 79%  | 6.5  | 0.4  | 55%   | 27%  | 11%  | 6%   | 55%   | 1.0   |  |  |
|  | PGT6  | 12%   | 21%  | 24%   | 43%  | 25   | 0.8  | 46%   | 23%  | 15%  | 16%  | 46%   | 0.9   |  |  |
|  | CT1   | 15%   | 31%  | 28%   | 26%  | 0.8  | 0.8  | 45%   | 28%  | 17%  | 10%  | 45%   | 0.9   |  |  |
|  | CT2.1   | 20%   | 36%  | 16%   | 28%  | 0.4  | 0.5  | 49%   | 30%  | 13%  | 8%   | 49%   | 0.9   |  |  |
|  | CT2.2   | 19%   | 34%  | 21%   | 26%  | 0.5  | 0.6  | 38%   | 34%  | 19%  | 8%<br>10%  | 38%   | 0.8   |  |  |
|  | CT3   | 10%   | 30%  | 26%   | 34%  | <0.2   | 0.8  | 44%   | 28%  | 18%  | 10%  | 44%   | 0.8   |  |  |
|  | CT4   | 14%   | 26%<br>24%   | 27%   | 32%<br>35%   | <0.2   | 0.8  | 45%   | 27%  | 18%  | 10%  | 45%   | 0.9   |  |  |
|  | CT5<br>CT6  | 12%<br>16%  | 29%  | 28%<br>23%  | 32%  | 0.7<br>0.3   | 0.8<br>0.6   | 38%<br>42%  | 29%<br>19%   | 19%<br>19%   | 14%  | 38%<br>42%  | 0.8<br>0.8  |  |  |
|  | CT7   | 7%  | 26%  | 32%   | 35%  | 1.8  | 0.8  | 42%<br>39%  | 32%  | 19%  | 21%<br>10%   | 39%   | 0.8   |  |  |
|  | CT8   | 4%  | 26%  | 28%   | 41%  | 0.6  | 0.8  | 39%   | 29%  | 19%  | 12%  | 39%   | 0.8   |  |  |
|  | CT9   | 26%   | 26%  | 21%   | 27%  | 0.6  | 0.4  | 49%   | 28%  | 15%  | 9%   | 49%   | 0.9   |  |  |
|  | CT10  | 0%  | 32%  | 35%   | 33%  | 0.3  | 0.9  | 41%   | 30%  | 19%  | 10%  | 41%   | 0.8   |  |  |
|  | CITO  | 070   | 32/0   | 3370  | 3370   | 0.5  | 0.5  | 11/0  | 3070   | 1370   | 10/0   | 11/0  | 0.0   |  |  |
|  |   |   |  |   |  |  |  |   |  |  |  |   |   |  |  |
|  | C18<br>(%)  | C19<br>(%)  | C20<br>(%)   | C21<br>(%)  | C22<br>(%)   | C23<br>(%)   | C24<br>(%)   | C25<br>(%)  | C26<br>(%)   | C27<br>(%)   | C28<br>(%)   | C29<br>(%)  | C30<br>(%)  | ∑LCCPs   | R <sup>2</sup>   |
|  | (%)   |   |  |   | C22<br>(%)<br>5%   | C23<br>(%)<br>7%   | (%)  |   | C26<br>(%)<br>7%   | C27<br>(%)<br>6%   | C28<br>(%)<br>3%   |   | (%)   | ∑LCCPs   |  |
| RG1<br>RG2   |   | (%)   | (%)  | (%)   | (%)  | (%)  |  | (%)   | (%)  | (%)  | (%)  | (%)   |   |  | R <sup>2</sup> 0.8 0.8   |
|  | (%)<br>35%  | (%)<br>14%  | (%)<br>4%  | (%)<br>4%   | (%)<br>5%  | (%)<br>7%  | (%)<br>2%  | (%)<br>8%   | (%)<br>7%  | (%)<br>6%  | (%)<br>3%  | (%)<br>4%   | (%)<br>1%   | 35%  | 0.8  |
| RG2  | (%)<br>35%<br>38%   | (%)<br>14%<br>13%   | (%)<br>4%<br>4%  | (%)<br>4%<br>3%   | (%)<br>5%<br>4%  | (%)<br>7%<br>6%  | (%)<br>2%<br>2%  | (%)<br>8%<br>8%   | (%)<br>7%<br>7%  | (%)<br>6%<br>6%  | (%)<br>3%<br>4%  | (%)<br>4%<br>2%   | (%)<br>1%<br>2%   | 35%<br>38%   | 0.8  |
| RG2<br>RG3   | (%)<br>35%<br>38%<br>67%  | (%)<br>14%<br>13%<br>18%  | (%)<br>4%<br>4%<br>6%  | (%)<br>4%<br>3%<br>0%   | (%)<br>5%<br>4%<br>0%  | (%)<br>7%<br>6%<br>2%  | (%)<br>2%<br>2%<br>2%  | (%)<br>8%<br>8%<br>3%   | (%)<br>7%<br>7%<br>1%  | (%)<br>6%<br>6%<br>2%  | (%)<br>3%<br>4%<br>0%  | (%)<br>4%<br>2%<br>0%   | (%)<br>1%<br>2%<br>0%   | 35%<br>38%<br>67%  | 0.8<br>0.8<br>0.9  |
| RG2<br>RG3<br>RG4.1  | (%)<br>35%<br>38%<br>67%<br>39%   | (%)<br>14%<br>13%<br>18%<br>8%  | (%)<br>4%<br>4%<br>6%<br>4%  | (%)<br>4%<br>3%<br>0%<br>3%   | (%)<br>5%<br>4%<br>0%<br>3%  | (%)<br>7%<br>6%<br>2%<br>6%  | (%)<br>2%<br>2%<br>2%<br>1%  | (%)<br>8%<br>8%<br>3%<br>9%   | (%)<br>7%<br>7%<br>1%<br>11%   | (%)<br>6%<br>6%<br>2%<br>8%  | (%)<br>3%<br>4%<br>0%<br>3%  | (%)<br>4%<br>2%<br>0%<br>2%   | (%)<br>1%<br>2%<br>0%<br>1%   | 35%<br>38%<br>67%<br>39%   | 0.8<br>0.8<br>0.9<br>0.6   |
| RG2<br>RG3<br>RG4.1<br>RG4.2   | (%)<br>35%<br>38%<br>67%<br>39%<br>46%  | (%)<br>14%<br>13%<br>18%<br>8%<br>15%   | (%)<br>4%<br>4%<br>6%<br>4%<br>3%  | (%)<br>4%<br>3%<br>0%<br>3%<br>1%   | (%)<br>5%<br>4%<br>0%<br>3%<br>2%  | (%) 7% 6% 2% 6% 5%   | (%)<br>2%<br>2%<br>2%<br>1%<br>0%  | (%)<br>8%<br>8%<br>3%<br>9%<br>7%   | (%) 7% 7% 1% 11% 6%  | (%)<br>6%<br>6%<br>2%<br>8%<br>5%  | (%)<br>3%<br>4%<br>0%<br>3%<br>2%  | (%)<br>4%<br>2%<br>0%<br>2%<br>4%   | (%)<br>1%<br>2%<br>0%<br>1%<br>3%                                   | 35%<br>38%<br>67%<br>39%<br>46%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7  |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5  | (%)<br>35%<br>38%<br>67%<br>39%<br>46%<br>67%   | (%)<br>14%<br>13%<br>18%<br>8%<br>15%<br>21%  | (%)<br>4%<br>4%<br>6%<br>4%<br>3%<br>7%  | (%)<br>4%<br>3%<br>0%<br>3%<br>1%<br>1%                                       | (%)<br>5%<br>4%<br>0%<br>3%<br>2%<br>2%  | (%) 7% 6% 2% 6% 5% 2%  | (%)<br>2%<br>2%<br>2%<br>1%<br>0%  | (%)<br>8%<br>8%<br>3%<br>9%<br>7%<br>0%   | (%) 7% 7% 1% 11% 6% 0%   | (%)<br>6%<br>6%<br>2%<br>8%<br>5%<br>1%                                      | (%)<br>3%<br>4%<br>0%<br>3%<br>2%<br>0%  | (%)<br>4%<br>2%<br>0%<br>2%<br>4%<br>0%                                     | (%)<br>1%<br>2%<br>0%<br>1%<br>3%<br>0%                             | 35%<br>38%<br>67%<br>39%<br>46%<br>67%   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8   | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65%   | (%) 14% 13% 18% 8% 15% 21% 13% 18% 22%  | (%)<br>4%<br>4%<br>6%<br>4%<br>3%<br>7%<br>5%  | (%)<br>4%<br>3%<br>0%<br>3%<br>1%<br>1%<br>2%                                 | (%) 5% 4% 0% 3% 2% 2%  | (%) 7% 6% 2% 6% 5% 2% 6%   | (%) 2% 2% 2% 1% 0% 0%  | (%)  8%  8%  3%  9%  7%  0%  7%  4%  1%   | (%) 7% 7% 1% 11% 6% 0% 7%  | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0%   | (%)<br>3%<br>4%<br>0%<br>3%<br>2%<br>0%<br>4%  | (%) 4% 2% 0% 2% 4% 0% 2% 2% 0%  | (%)  1% 2% 0% 1% 3% 0% 11% 11% 0%                                   | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9  |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60%   | (%) 14% 13% 18% 8% 15% 21% 13% 18% 22% 23%  | (%) 4% 4% 6% 4% 3% 7% 5% 6% 6% 7%  | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3%   | (%) 5% 4% 0% 3% 2% 2% 2% 2% 2% 2% 2%   | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1%   | (%) 2% 2% 2% 1% 0% 0% 1% 0% 11%  | (%)  8%  8%  3%  9%  7%  0%  7%  4%  1%   | (%) 7% 7% 1% 6% 0% 7% 4% 1% 1%   | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0%   | (%) 3% 4% 0% 3% 2% 0% 4% 1% 0% 1%  | (%) 4% 2% 0% 2% 4% 0% 2% 6% 0% 0%   | (%)  1% 2% 0% 1% 3% 0% 11% 0% 0% 0%                                 | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60%   | (%) 14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 26%  | (%) 4% 4% 6% 4% 3% 7% 6% 6% 6% 6%  | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0%   | (%) 5% 4% 0% 3% 2% 2% 2% 2% 2% 0%  | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0%  | (%) 2% 2% 2% 1% 0% 0% 0% 1% 0% 1% 0%   | (%)  8%  8%  3%  9%  7%  0%  4%  1%  1%  0%   | (%) 7% 7% 1% 11% 6% 0% 7% 4% 1% 1% 0%  | (%)<br>6%<br>6%<br>2%<br>8%<br>5%<br>1%<br>5%<br>3%<br>0%<br>0%              | (%) 3% 4% 0% 3% 2% 0% 4% 1% 0% 1% 0%   | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0%   | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0%                               | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>1.0  |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25%   | (%) 14% 13% 18% 8% 15% 21% 13% 22% 23% 26% 7%   | (%) 4% 4% 6% 4% 5% 6% 6% 7% 6% 6% 7% 6% 3%   | (%) 4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 1%                                       | (%) 5% 4% 0% 3% 2% 2% 2% 2% 3% 2% 3% 2% 3% 3%  | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 7%                                     | (%) 2% 2% 2% 1% 0% 0% 1% 0% 1% 0% 2%   | (%)  8%  8%  3%  9%  7%  0%  7%  4%  1%  1%  0%  11%                                      | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  1%  1%  0%  10%  | (%)<br>6%<br>6%<br>2%<br>8%<br>5%<br>1%<br>5%<br>3%<br>0%<br>0%<br>0%        | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%   | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 6%  | (%) 1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0%                             | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%   | 0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>1.0   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48%   | (%) 14% 13% 18% 8% 15% 21% 13% 22% 23% 26% 7% 11%   | (%) 4% 4% 6% 4% 3% 7% 5% 6% 6% 6% 10%  | (%) 4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 1% 6%                                    | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 3% 10%  | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 7%  | (%) 2% 2% 2% 1% 0% 0% 1% 0% 1% 0% 2% 0% 1% 0% 0%   | (%)  8%  8%  3%  9%  7%  0%  1%  1%  1%  1%  3%   | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  1%  0%  44%  | (%)<br>6%<br>6%<br>2%<br>8%<br>5%<br>1%<br>5%<br>3%<br>0%<br>0%<br>0%<br>12% | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%   | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 6% 0%  | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0%                         | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.9<br>1.0<br>0.5  |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48%   | (%) 14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 26% 7% 11% 19%                                 | (%) 4% 4% 6% 4% 3% 7% 5% 6% 6% 10% 8%  | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 1% 6% 3%                                | (%) 5% 4% 0% 3% 2% 2% 2% 2% 3% 2% 10% 3% 10% 2%  | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 7% 5%                                     | (%) 2% 2% 2% 1% 0% 0% 1% 0% 4 0% 2% 0% 4 0% 3%   | (%)  8%  8%  3%  9%  7%  0%  7%  4%  1%  1%  0%  11%  3%  4%                              | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  1%  0%  1%  4%  8%   | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 12% 12% 1% 0%                              | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  01%  | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 6% 0% 0%                                     | (%)  1% 2% 0% 1% 3% 0% 1% 0% 0% 0% 0% 0% 0%                         | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>48%   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73%                                 | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 26% 7% 11% 19% 16%                            | (%) 4% 4% 6% 4% 3% 7% 5% 6% 6% 10% 8% 8%   | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 1% 6% 3% 0%                             | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 3% 2% 2% 0% 3% 10% 2% 0%                                | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 7% 5% 0%                                  | (%) 2% 2% 2% 1% 0% 0% 1% 0% 4 0% 2% 0% 3% 0%   | (%)  8%  8%  3%  9%  7%  0%  7%  4%  1%  1%  0%  11%  3%  4%  0%                          | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  1%  0%  10%  4%  8%  3%  | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 12% 14% 0% 0%                              | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  01%  0%  | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0%                                     | (%)  1% 2% 0% 1% 3% 0% 1% 0% 0% 0% 0% 0% 0%                         | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>48%<br>73%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73% 79%                             | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 26% 7% 11% 19% 16% 12%                        | (%) 4% 4% 6% 4% 3% 7% 5% 6% 6% 10% 8% 8% 0%  | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 1% 6% 3% 0% 0%                          | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 3% 2% 0% 3% 10% 2% 0% 0%                                | (%) 7% 6% 2% 6% 5% 6% 1% 1% 0% 7% 7% 5% 0%                               | (%) 2% 2% 2% 1% 0% 0% 1% 0% 4 0% 1% 0% 2% 0% 3% 0% 0%  | (%)  8%  8%  3%  9%  7%  0%  1%  1%  1%  0%  11%  3%  4%  0%  2%                          | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  1%  0%  10%  4%  8%  3%  3%                                    | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 12% 1% 0% 0% 0%                            | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  01%  44%   | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0%                               | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0%                      | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>48%<br>73%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.8  |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>PGT5.2  | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73% 79% 24%                         | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 26% 7% 11% 19% 16% 12% 23%                    | (%)  4%  4%  6%  4%  3%  7%  5%  6%  6%  7%  6%  3%  10%  8%  8%  0%  21%                                | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 1% 6% 3% 0% 144%                        | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 0% 3% 10% 2% 0% 10%                                     | (%) 7% 6% 2% 6% 5% 6% 1% 1% 0% 7% 5% 0% 6%                               | (%) 2% 2% 2% 1% 0% 0% 1% 0% 4 0% 2% 0% 4 0% 0% 0% 0% 0% 0%                                     | (%)  8%  8%  3%  9%  7%  0%  1%  1%  1%  0%  21%  2%                                      | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  1%  0%  10%  4%  8%  3%  3%  1%                                | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 12% 1% 0% 0% 0% 0%                         | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  44%  0%  0%  | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0%                            | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0%                | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>48%<br>73%<br>79%<br>24%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1   | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73% 79% 24% 70%                     | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 7% 11% 19% 16% 12% 23% 16%                        | (%)  4%  4%  6%  4%  3%  7%  5%  6%  6%  7%  6%  3%  10%  8%  8%  0%  21%  9%                            | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 11% 6% 33% 0% 14% 5%                    | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 0% 3% 10% 2% 0% 0% 10% 0%                               | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 7% 5% 0% 6% 0%                         | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  3%  0%  0%  0%  0%  0%                            | (%)  8%  8%  3%  9%  7%  0%  1%  1%  0%  114  3%  4%  0%  2%  2%  0%                      | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  10%  44%  88%  3%  3%  1%  0%                                      | (%) 6% 6% 2% 8% 5% 1% 5% 0% 0% 12% 1% 0% 0% 0% 0%                            | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  044%  0%  0%  0%                                       | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0%                         | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0%             | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9<br>0.5  |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1   | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73% 79% 24% 70% 44%                 | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 12% 23% 16% 18%                           | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 6% 10% 8% 8% 0% 21% 9% 16%   | (%)  4% 3% 0% 3% 1% 1% 2% 2% 2% 3% 0% 11% 6% 3% 0% 14% 5% 16%                 | (%)  5% 4% 0% 3% 2% 2% 2% 3% 2% 0% 3% 10% 2% 0% 0% 10% 0%                              | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 7% 5% 0% 6% 0% 6%                      | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  3%  0%  0%  0%  0%  0%  0%                        | (%)  8%  8%  3%  9%  7%  0%  1%  1%  0%  1114  3%  444  0%  2%  0%  0%                    | (%)  7%  7%  1%  11%  6%  0%  4%  1%  10%  44%  44%  33%  34%  176  076  076                                 | (%) 6% 6% 2% 8% 5% 1% 5% 0% 0% 0% 0% 0% 0% 0% 0%                             | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  44%  0%  0%  0%                                    | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%                      | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0%             | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%  | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9<br>0.5<br>0.9   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1   | (%)  35% 38% 67% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73% 79% 24% 70% 44% 15%                | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 11% 12% 23% 16% 18% 12%                   | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 6% 6% 10% 8% 8% 00% 21% 9% 16% 15%                                       | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 14% 5% 16% 16%                             | (%)  5%  4%  0%  3%  2%  2%  2%  3%  2%  0%  10%  0%  10%  0%  10%  0%  18%            | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 7% 5% 0% 6% 0% 6% 11%                  | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  0%  0%  0%  0%  0%  0%  0                         | (%)  8%  8%  3%  9%  7%  0%  1%  1%  0%  111%  3%  4%  0%  2%  0%  0%  6%                 | (%)  7%  7%  11%  6%  0%  7%  4%  1%  10%  44%  84%  33%  34%  10%  0%  55%                                  | (%) 6% 6% 2% 8% 5% 1% 5% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%                       | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%                   | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%          | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9<br>0.5<br>0.9   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1<br>CT2.1                                      | (%) 35% 38% 67% 46% 67% 46% 50% 65% 60% 67% 25% 48% 48% 73% 79% 24% 70% 44% 15% 77%             | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 11% 19% 16% 12% 23% 16% 18% 12% 6%        | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 6% 6% 10% 8% 8% 10% 884 884 006 21% 9% 16% 15% 8%                        | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 14% 5% 16% 16% 3%                          | (%)  5%  4%  0%  3%  2%  2%  2%  2%  3%  2%  0%  0%  10%  0%  10%  0%  18%  5%         | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 5% 0% 6% 11% 0%                        | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  0%  0%  0%  0%  0%  0%  0                         | (%)  8%  8%  3%  9%  7%  0%  1%  1%  0%  111%  3%  4%  0%  2%  0%  0%  6%  0%             | (%)  7%  7%  11%  6%  0%  7%  4%  1%  10%  44%  84%  33%  34%  10%  0%  5%  0%                               | (%) 6% 6% 2% 8% 5% 1% 5% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%                       | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%                | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%    | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%                                   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9<br>0.5<br>0.9   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>CT2.1<br>CT2.1<br>CT2.2<br>CT3<br>CT4                               | (%) 35% 38% 67% 46% 67% 46% 50% 65% 60% 67% 25% 48% 73% 79% 24% 70% 44% 15% 77% 78%             | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 11% 19% 16% 12% 6% 12%                    | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 10% 8% 8% 10% 88 88 21% 9% 16% 15% 8% 3%                                 | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 6% 3% 6% 14% 5% 16% 16% 3% 7%              | (%)  5%  4%  0%  3%  2%  2%  2%  2%  3%  2%  0%  0%  10%  0%  10%  0%  18%  5%  0%     | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 7% 5% 0% 6% 11% 0% 6% 11% 0% 0%        | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  0%  1%  0%  0%  0%  0%  0%  0%  0                 | (%)  8%  8%  3%  9%  7%  0%  1%  1%  0%  111%  3%  4%  0%  2%  0%  0%  6%  0%  0%         | (%)  7%  7%  11%  6%  0%  7%  4%  1%  10%  44%  8%  33%  11%  0%  0%  5%  0%  0%                             | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%           | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 2% 0% 0% 0% 6% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%       | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%                                   | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9<br>0.5<br>0.9<br>0.9   |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>CT2.1<br>CT2.1<br>CT2.2<br>CT3<br>CT4<br>CT5                        | (%) 35% 38% 67% 46% 67% 46% 50% 65% 60% 48% 73% 79% 24% 70% 44% 15% 77% 78% 56%                 | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 11% 19% 16% 12% 23% 16% 12% 24%           | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 10% 8% 8% 10% 88 84 00% 21% 9% 16% 15% 8% 3% 6%                          | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 6% 3% 6% 16% 16% 36% 16% 37% 3%            | (%)  5%  4%  0%  3%  2%  2%  2%  3%  2%  0%  10%  0%  10%  0%  10%  0%  4%             | (%) 7% 6% 2% 6% 5% 2% 6% 1% 1% 0% 7% 5% 0% 6% 11% 0% 6% 11% 0% 6% 2%     | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  1%  0%  0%  1%  0%  0%  0%  0%  0                 | (%)  8%  8%  8%  3%  9%  7%  0%  1%  1%  0%  111%  3%  4%  0%  2%  0%  0%  6%  0%  0%  2% | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  1%  0%  4%  8%  3%  3%  1%  0%  0%  5%  0%  0%  1%                 | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%           | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 2% 0% 0% 0% 6% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%    | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%<br>78%<br>56%                     | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>1.0<br>0.5<br>0.8<br>0.9<br>0.5<br>0.9<br>0.7<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9        |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT5.1<br>CT2.1<br>CT2.1<br>CT2.2<br>CT3<br>CT4<br>CT5<br>CT6                         | (%) 35% 38% 67% 46% 67% 46% 50% 65% 60% 48% 73% 79% 24% 70% 44% 15% 77% 78% 56% 6%              | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 19% 16% 12% 23% 16% 12% 4%                | (%)  4%  4%  6%  4%  3%  7%  6%  6%  3%  10%  8%  8%  0%  21%  9%  16%  15%  8%  3%  6%  5%              | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 6% 3% 6% 16% 34% 16% 36% 36% 38% 76% 38%   | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 0% 10% 0% 10% 0% 18% 5% 0% 4% 9%                        | (%) 7% 6% 2% 6% 5% 2% 6% 5% 1% 1% 0% 7% 5% 0% 6% 11% 0% 6% 11%           | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  3%  0%  0%  0%  0%  1%  0%  0%  1%  0%  1%  0%  0 | (%)  8%  8%  8%  9%  7%  0%  7%  4%  1%  1%  0%  22%  0%  0%  6%  0%  0%  15%             | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  10%  4%  8%  3%  31%  0%  0%  5%  0%  0%  11%  15%                 | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%           | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 6% 0% 0% 6% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%<br>78%<br>56%<br>6%               | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.5<br>0.9<br>0.7<br>0.2<br>0.9<br>0.9<br>0.5<br>0.9                                    |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1<br>CT2.1<br>CT2.2<br>CT3<br>CT4<br>CT5<br>CT6         | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 48% 73% 79% 24% 70% 44% 15% 77% 78% 56% 6% 58%      | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 11% 12% 6% 12% 24% 4% 25%                 | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 10% 8% 8% 10% 88 86 5% 88 88   | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 1% 6% 3% 0% 14% 5% 16% 16% 3% 7% 3% 8% 2%  | (%)  5%  4%  0%  3%  2%  2%  2%  3%  2%  0%  10%  0%  10%  0%  18%  5%  0%  4%  9%  2% | (%)  7% 6% 2% 6% 5% 2% 6% 5% 1% 1% 0% 7% 6% 0% 6% 11% 0% 2% 11% 1%       | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  3%  0%  0%  0%  1%  0%  0%  1%  0%  0%  0         | (%)  8%  8%  8%  9%  7%  0%  7%  4%  1%  1%  0%  22%  0%  0%  6%  0%  0%  15%  1%         | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  10%  10%  4%  8%  3%  31%  0%  0%  5%  0%  1%  15%  1%             | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%           | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%             | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%<br>78%<br>56%<br>6%<br>58%        | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>1.0<br>0.5<br>0.8<br>0.9<br>0.5<br>0.9<br>0.7<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9        |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT4<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1<br>CT2.1<br>CT2.2<br>CT3<br>CT4<br>CT5<br>CT6 | (%)  35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 48% 73% 79% 24% 70% 44% 15% 77% 78% 56% 6% 58% 38% | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 26% 7% 11% 16% 12% 23% 16% 12% 24% 4% 25% 16% | (%)  4%  4%  6%  4%  3%  7%  6%  6%  7%  6%  3%  10%  8%  0%  21%  9%  16%  15%  8%  3%  6%  5%  8%  14% | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 6% 3% 6% 16% 36% 16% 36% 77% 38% 88% 2% 8% | (%) 5% 4% 0% 3% 2% 2% 2% 3% 2% 0% 10% 0% 10% 0% 10% 0% 4% 9% 2% 10%                    | (%)  7% 6% 2% 6% 5% 2% 6% 5% 1% 1% 0% 7% 5% 0% 6% 11% 0% 6% 11% 1% 1% 6% | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  0%  3%  0%  0%  0%  1%  0%  0%  1%  0%  0%  0     | (%)  8%  8%  8%  9%  7%  0%  7%  4%  1%  1%  0%  22%  0%  0%  6%  0%  0%  215%  11%  33%  | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  10%  10%  4%  8%  3%  3%  11%  0%  0%  5%  0%  0%  1%  15%  1%  3% | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 12% 11% 0%   | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  4%  0%  0%  0%  14%  0%  0%  14%  0%  0%  14%  15% | (%) 4% 2% 0% 2% 4% 0% 2% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%          | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%<br>78%<br>56%<br>6%<br>58%<br>38% | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>0.5<br>0.8<br>0.9<br>0.7<br>0.2<br>0.9<br>0.7<br>0.2<br>0.9<br>0.7<br>0.9                                    |
| RG2<br>RG3<br>RG4.1<br>RG4.2<br>RG5<br>RG6<br>RG7<br>RG8<br>RG9<br>PGT1<br>PGT2<br>PGT3<br>PGT5.1<br>PGT5.2<br>PGT6<br>CT1<br>CT2.1<br>CT2.2<br>CT3<br>CT4<br>CT5<br>CT6         | (%) 35% 38% 67% 39% 46% 67% 46% 50% 65% 60% 48% 73% 79% 24% 70% 44% 15% 77% 78% 56% 6% 58%      | (%)  14% 13% 18% 8% 15% 21% 13% 18% 22% 23% 16% 11% 12% 6% 12% 24% 4% 25%                 | (%)  4% 4% 6% 4% 3% 7% 6% 6% 6% 10% 8% 8% 10% 88 86 5% 88 88   | (%)  4% 3% 0% 3% 1% 1% 2% 2% 3% 0% 1% 6% 3% 0% 14% 5% 16% 16% 3% 7% 3% 8% 2%  | (%)  5%  4%  0%  3%  2%  2%  2%  3%  2%  0%  10%  0%  10%  0%  18%  5%  0%  4%  9%  2% | (%)  7% 6% 2% 6% 5% 2% 6% 5% 1% 1% 0% 7% 6% 0% 6% 11% 0% 2% 11% 1%       | (%)  2%  2%  2%  1%  0%  0%  1%  0%  2%  0%  3%  0%  0%  0%  1%  0%  0%  1%  0%  0%  0         | (%)  8%  8%  8%  9%  7%  0%  7%  4%  1%  1%  0%  22%  0%  0%  6%  0%  0%  15%  1%         | (%)  7%  7%  1%  11%  6%  0%  7%  4%  1%  10%  10%  4%  8%  3%  31%  0%  0%  5%  0%  1%  15%  1%             | (%) 6% 6% 2% 8% 5% 1% 5% 3% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%           | (%)  3%  4%  0%  3%  2%  0%  4%  1%  0%  11%  0%  0%  0%  0%  0%  0%                                     | (%) 4% 2% 0% 2% 4% 0% 2% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%             | (%)  1% 2% 0% 1% 3% 0% 1% 1% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% | 35%<br>38%<br>67%<br>39%<br>46%<br>67%<br>46%<br>50%<br>65%<br>60%<br>67%<br>25%<br>48%<br>73%<br>79%<br>24%<br>70%<br>44%<br>15%<br>77%<br>78%<br>56%<br>6%<br>58%        | 0.8<br>0.8<br>0.9<br>0.6<br>0.7<br>1.0<br>0.9<br>1.0<br>1.0<br>0.5<br>0.8<br>0.9<br>0.9<br>0.5<br>0.9<br>0.7<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9 |

Table S6. Calculated chlorination degrees for the eight technical CP mixtures.

|                 | T .                  |
|-----------------|----------------------|
|                 | Calculated Cl-degree |
| SCCP (51.5% CI) | 55.2% Cl             |
| SCCP (55.5% CI) | 58.4% Cl             |
| SCCP (63% CI)   | 63.4% Cl             |
| MCCP (42% CI)   | 48.7% Cl             |
| MCCP (52% CI)   | 54.1% Cl             |
| MCCP (57% CI)   | 57.4% Cl             |
| LCCP (36% CI)   | 41.3% Cl             |
| LCCP (49% CI)   | 49.9% Cl             |

Figure S1. Measured and reconstructed CP pattern in rubber granulate (RG7) for the SCCPs, in the playground tile (PGT4) for the MCCPs and in the car tire (CT5) for the LCCPs. The goodness of fit (R2) of the deconvolution is given in the figure.

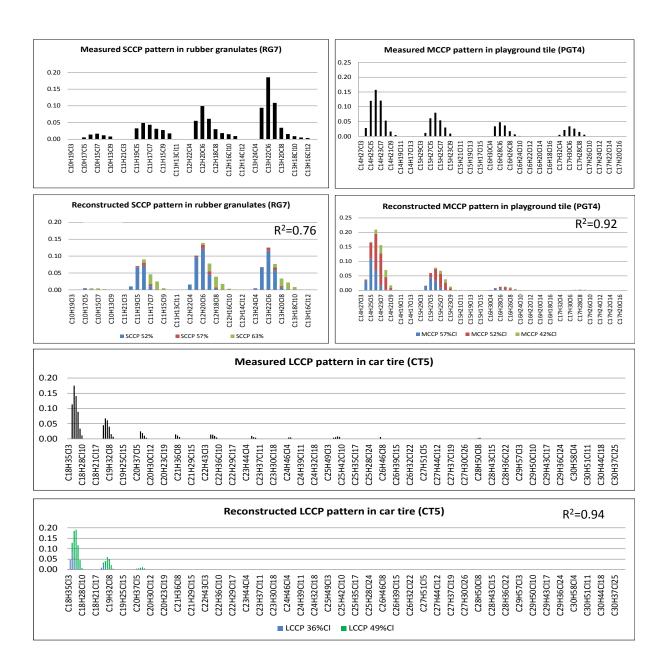


Figure S2. Measured SCCP pattern in playground tile sample PGT6, including the presence of C9.

