**Supporting Information**

1. Overview of all the studies included in the review

**Table S1:** Compiled data from all the studies included in the review on release from nano-enabled products. Rows coloured in gray are relevant only for environmental exposure and are not relevant for consumer exposure estimation.

1. Algorithms for consumer exposure estimation

**Table S2a:** R.15 algorithms for exposure estimations and their basic assumptions (ECHA. 2012)

**Table S2b:** ECETOC TRA algorithms for exposure estimations and their basic assumptions (ECETOC. 2014)

**Table S2c:** ConsExpo algorithms for exposure estimations and their basic assumptions (Delmaar et al. 2005)

1. Consumer exposure estimation calculation input and results

**Table S3a:** Calculations for inhalation exposure assessment based on relevant literature

**Table S3b:** Calculations for dermal exposure assessment based on relevant literature using “Dermal A” scenario from R.15 (ECHA. 2012)

**Table S3c:** Calculations for dermal exposure assessment based on relevant literature using “Dermal B” scenario from R.15 (ECHA. 2012)

**Table S3d:** Calculations for oral exposure assessment based on relevant literature

1. Weight of products

**Table S4:** Mass of different products used for calculations (when product weight was not reported in the published studies)

1. References

# Overview of all the studies included in the review

**Table S1:** Compiled data from all the studies included in the review on release from nano-enabled products. Rows coloured in gray are relevant only for environmental exposure and are not relevant for consumer exposure estimation.

| **ENM** | **Product category** | **Product category** | **Release setup** | **Potential exposure scenario** | **Analysis** | **Total content in product** | **ENM in product** | **Quantified total release** | **ENM released** | **Ref.** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ag** | PC9a | Paint, façade panel | Leaching | Environmental | ICP-MS  TEM  XRD |  | | | | (Kaegi et al. 2010) |
| **Ag** | AC5 | Fabrics (lab A1) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | GF-AAS  SEM-EDS  TEM-EDS | 36.12 ± 22.42 mg kg-1 | Not measured | 21.01 ± 4.13 mg kg-1 | Not measured | (Kulthong et al. 2010) |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | 15.53 ± 3.62 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | 34.27 ± 2.88 mg kg-1 | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | 35.83 ± 19.68 mg kg-1 | Not measured |
| **Ag** | AC5 | Fabrics (lab A2) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | 56.57 ± 34.28 mg kg-1 | Not measured | 33.39 ± 15.80 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | 28.81 ± 10.34 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | 66.54 ± 46.29 mg kg-1 | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | 77.96 ± 23.80 mg kg-1 | Not measured |
| **Ag** | AC5 | Fabrics (lab A3) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | 95.12 ± 33.12 mg kg-1 | Not measured | 70.15 ± 37.29 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | 72.69 ± 11.99 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | 82.22 ± 26.99 mg kg-1 | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | 152.20 ± 36.54 mg kg-1 | Not measured |
| **Ag** | AC5 | Fabrics (lab A4) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | 425.21 ± 93.73 mg kg-1 | 200nm | 217.61 ± 81.32 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | 177.13 ± 57.13 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | 268.31 ± 131.15 mg kg-1 | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | 322.21 ± 87.00 mg kg-1 | Not measured |
| **Ag** | AC5 | Fabrics (commercial E) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | 15.16 ± 9.90 mg kg-1 | 200nm | 0.08 ± 0.05 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | 0.01 ± 0.01 mg kg-1 | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | 0.50 ± 0.30 mg kg-1 | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | 0.36 ± 0.10 mg kg-1 | Not measured |
| **Ag** | AC5 | Fabrics (commercial F) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | 1.22 ± 0.87 mg kg-1 | Not measured | ND | Not measured |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | ND | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | ND | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | 0.05 ± 0.00 mg kg-1 | Not measured |
| **Ag** | AC5 | Fabrics (commercial G) | Leaching in sweat (AATCC pH 4.3, 24h at 37°C) | Dermal | 0.99 ± 1.53 mg kg-1 | Not measured | ND | Not measured |
| Leaching in sweat (ISO pH 5.5, 24h at 37°C) | Dermal | ND | Not measured |
| Leaching in sweat (ISO pH 8.0, 24h at 37°C) | Dermal | ND | Not measured |
| Leaching in sweat (EN pH 6.5, 24h at 37°C) | Dermal | ND | Not measured |
| **Ag** | AC5 | Fabrics (cotton - lab made) | Leaching by washing (3x1h washes) | Environmental, Dermal | UV-Vis  AAS  SEM  TEM-EDS | 0.31 g g-1 | 4 ±2 nm | 12.394 % | 8 – 20 nm | (Pasricha et al. 2012) |
| **Ag** | AC5 | Fabrics (nylon -lab made) | Leaching by washing (3x1h washes) | Environmental, Dermal | 0.11 g g-1 | 4 ±2 nm | 13.773 % | 8 – 20 nm |
| **Ag** | AC5 | Fabrics (wool - lab made) | Leaching by washing (3x1h washes) | Environmental, Dermal | 0.10 g g-1 | 4 ±2 nm | 25.165 % | 8 – 20 nm |
| **Ag** | AC5 | Fabrics (X-STATIC – commeracial) | Leaching by washing | Environmental, Dermal | ICP-OES  ISE | 21.6 mg g-1 | Several µm | 1st cycle: 314  2nd cycle: 129  Bleach: 172 µg g-1 | Large particulate Ag found | (Geranio et al. 2009) |
| **Ag** | AC5 | Fabrics (PLASMA-NP – commercial) | Leaching by washing | Environmental, Dermal | 0.39 mg g-1 | 100 nm | 1st cycle: 67 µg g-1 | Particles <450 nm found |
| **Ag** | AC5 | Fabrics (AgCl – lab made) | Leaching by washing | Environmental, Dermal | 0.008 mg g-1 | ~200 nm (AgCl) | 1st cycle: 2.7  2nd cycle: 1.8  Bleach: 3.6 µg g-1 | Particles <450 nm found |
| **Ag** | AC5 | Fabrics (AgCl-BINDER – lab made) | Leaching by washing | Environmental, Dermal | 0.012 mg g-1 | ~200 nm (AgCl) | 1st cycle: 2.4  2nd cycle: 0.9  Bleach: 3.2 µg g-1 | Particles <450 nm found |
| **Ag** | AC5 | Fabrics (NP-PES-SURF – lab made) | Leaching by washing | Environmental, Dermal | 0.029 mg g-1 | NR | 1st cycle: 10.1 µg g-1 | Large particulate Ag found |
| **Ag** | AC5 | Fabrics (NP-PES – lab made) | Leaching by washing | Environmental, Dermal | 0.099 mg g-1 | NR | 1st cycle: 1.3  2nd cycle: 0.35  Bleach: 2.7 µg g-1 | Large particulate Ag found |
| **Ag** | AC5 | Fabrics (NP-PES/PA – lab made) | Leaching by washing | Environmental, Dermal | 0.242 mg g-1 | NR | 1st cycle: 4.3  2nd cycle: 1.6  Bleach: 10.3 µg g-1 | Particles <450 nm found |
| **Ag** | AC5 | Fabrics (X-SYSTEMS – commercial) | Leaching by washing | Environmental, Dermal | 0.003 mg g-1 | NR | NR | Large particulate Ag found |
| **Ag** | AC5 | Fabrics (AgKilBact – commercial) | Leaching by washing | Environmental, Dermal | 2.66 mg g-1 | NR | 1st cycle: 377  2nd cycle: 99  Bleach: 184 µg g-1 | Most Ag in dissolved form |
| **Ag** | AC5 | Fabrics | Leaching in sweat (pH 3, 4h) | Dermal | ICP-OES  SEM  XRD  DLS | 0.17 g g-1 | 60 nm | 0.90 µg g-1 | 500 – 800 nm | (Yan et al. 2012) |
| Leaching in sweat (pH 8.5, 4h) | Dermal | 0.32 µg g-1 | ND |
| Leaching in sweat (pH 8, 4h) | Dermal | 0.65 µg g-1 | 100 – 250 nm |
| **Ag** | AC5 | Fabrics (socks - commercial) | Leaching by washing | Environmental, Dermal | ICP-OES  XRF  TSEM  STEM | 18 ± 2 µg g-1 | NR | BDL | NR | (Lorenz et al. 2012) |
| **Ag** | AC5 | Fabrics (socks - commercial) | Leaching by washing | Environmental, Dermal | 1.5 ± 0.9 µg g-1 | NR | BDL | NR |
| **Ag** | AC5 | Fabrics (socks - commercial) | Leaching by washing | Environmental, Dermal | 761 ± 31 µg g-1 | Ag wires | BDL | NR |
| **Ag** | AC5 | Fabrics (T-shirt – commercial) | Leaching by washing | Environmental, Dermal | 183 ± 10 µg g-1 | AgNPs | Wash: 16.5 %  Rinse: 3.5% | Mostly >450 nm NPs found |
| **Ag** | AC5 | Fabrics (T-shirt – commercial) | Leaching by washing | Environmental, Dermal | 45 ± 8.0 µg g-1 | NR | Wash: 10.8 %  Rinse: 3.9 % | Mostly >450 nm NPs found |
| **Ag** | AC5 | Fabrics (socks - commercial) | Leaching by washing | Environmental, Dermal | 2925 ± 19 µg g-1 | NR | Wash: 19.7 %  Rinse: 3.9 % | Mostly < 450 nm NPs found |
| **Ag** | AC5 | Fabrics (trousers – commercial) | Leaching by washing | Environmental, Dermal | 41 ± 0.4 µg g-1 | AgCl NPs | Wash: 11.4 %  Rinse: 6.2 % | Mostly >450 nm NPs found |
| **Ag** | AC5 | Fabrics (T-25-25 – lab made) | Leaching by washing (one wash cycle) | Environmental, Dermal | TEM-EDS  ICP-MS | 14.6 µg g-1 (AgCl) | >100 nm | ~34% | 3.2% of total Ag released was in nano form | (Mitrano et al. 2014) |
| **Ag** | AC5 | Fabrics (X-Static – lab made) | Leaching by washing (one wash cycle) | Environmental, Dermal | 14500 µg g-1 | Fiber | < 1% | 0.05% of total Ag released was in nano form |
| **Ag** | AC5 | Fabrics (JMAC – lad made) | Leaching by washing (one wash cycle) | Environmental, Dermal | 19.5 µg g-1 (AgCl) | Composite | ~9% | 2.0% of total Ag released was in nano form |
| **Ag** | AC5 | Fabrics (#382280 – lab made) | Leaching by washing (one wash cycle) | Environmental, Dermal | 67.6 µg g-1 | Composite | ~16% | 3.2% of total Ag released was in nano form |
| **Ag** | AC5 | Fabrics (HVAC glove – commercial) | Leaching in sweat (24h) | Dermal | DLS  UV-Vis  SEM-EDS  TEM-EDS  ICP-AES  CPE | 1095 ± 292 mg kg-1 | 83 ± 37 nm | 0.03 ± 0.01 % | NR | (Stefaniak et al. 2014) |
| Leaching in saliva (24h) | Oral | 0.02 ± 0.00 % | NR |
| Leaching in SSFL (pH 5.3, 36°C, 24h) | Dermal | 0.02 ± 0.00 % | NR |
| Leaching in SSFL (pH 4.5, 36°C, 24h) | Dermal | 0.01 ± 0.00 % | NR |
| Leaching in SSFL (pH 5.3, 45°C, 24h) | Dermal | 0.02 ± 0.00 % | NR |
| Leaching in SSFL (pH 4.5, 45°C, 24h) | Dermal | 0.02 ± 0.00 % | NR |
| Leaching in SSFL (pH 5.3, 36°C, no Vit E, 24h) | Dermal | 0.02 ± 0.00 % | NR |
| **Ag** | AC5 | Fabrics (SilverMax underwear – commercial) | Leaching in sweat (24h) | Dermal | 3.8 ± 1.5 mg kg-1 (cuffs)  1070 ± 140 mg kg-1 (palms) | >100 nm | 0.11 ± 0.04 % | NR |
| Leaching in saliva (24h) | Oral | 0.05 ± 0.01 % | NR |
| Leaching in SSFL (pH 5.3, 36°C, 24h) | Dermal | 0.11 ± 0.04 % | NR |
| Leaching in SSFL (pH 4.5, 36°C, 24h) | Dermal | 0.05 ± 0.01 % | NR |
| Leaching in SSFL (pH 5.3, 45°C, 24h) | Dermal | 0.08 ± 0.02 % | NR |
| Leaching in SSFL (pH 4.5, 45°C, 24h) | Dermal | 0.11 ± 0.04 % | NR |
| Leaching in SSFL (pH 5.3, 36°C, no Vit E, 24h) | Dermal | 0.11 ± 0.04 % | NR |
| **Ag** | AC5 | Fabrics (socks, Sharper Image) | Leaching in water (4x24h) | Environmental, Dermal | ICP-OES  SEM  TEM  ISE | 25.8 µg g-1 | NR | 836 µg | AgNPs detected | (Benn and Westerhoff. 2008) |
| **Ag** | AC5 | Fabrics (socks, Sharper Image) | Leaching in water (4x24h) | Environmental, Dermal | 57.8 µg g-1 | NR | 1845 µg | AgNPs detected |
| Leaching in water (3x1h) | Environmental, Dermal | 1st: 145 µg  2nd: 275 µg  3rd: 600 µg | 1st: 93% < 100nm  2nd: 91% < 100nm  3rd: 83% < 100nm |
| **Ag** | AC5 | Fabrics (socks, Sharper Image) | Leaching in water (4x24h) | Environmental, Dermal | 2.1 µg g-1 | NR | BDL | NR |
| **Ag** | AC5 | Fabrics (socks, Fox River) | Leaching in water (4x24h) | Environmental, Dermal | 1358.3 µg g-1 | NR | 165 µg | AgNPs detected |
| Leaching in water (3x1h) | Environmental, Dermal | 1st: 80 µg  2nd: 160 µg  3rd: 150 µg | 1st: 3% < 100nm  2nd: 53% < 100nm  3rd: 90% < 100nm |
| **Ag** | AC5 | Fabrics (socks, Arctic Shield) | Leaching in water (4x24h) | Environmental, Dermal | 35.9 µg g-1 | NR | BDL | NR |
| **Ag** | AC5 | Fabrics (socks, Zenash) | Leaching in water (4x24h) | Environmental, Dermal | BDL | NR | BDL | NR |
| **Ag** | AC5 | Fabrics (socks, AgActive London) | Leaching in water (4x24h) | Environmental, Dermal | 0.9 µg g-1 | NR | 19 µg | NR |
| **Ag** | AC5 | Fabrics (sock, Thorlon Xstatic Mini Moderate) | Leaching by washing (24min) | Environmental, Dermal | XAS  XANES | NR | NR | NR | Significant amount of the AgNPs were converted to AgCl | (Impellitteri et al. 2009) |
| **Ag** | AC5 | Fabrics (athletic shirt) | Leaching in tap water (1h) | Dermal | ICP-OES  SEM-EDS | 30 ± 5.4 µg g-1 | NR | 0.56 ± 0.01 µg g-1 | <100nm: 20 ± 0.5 µg  <20nm: 11 ± 1.2 µg | (Benn et al. 2010) |
| **Ag** | AC5 | Fabrics (cloth) | Leaching in tap water (1h) | Dermal | 44 ± 2.4 µg g-1 | NR | 0.5 µg g-1 | <100nm: 12 µg  <20nm: 12 µg |
| **Ag** | AC5 | Fabrics (cloth) | Leaching in tap water (1h) | Dermal | 44 ± 2.4 µg g-1 | NR | 1.1 µg g-1 | <100nm: 16 µg  <20nm: 13 µg |
| **Ag** | AC5 | Fabrics (medical mask) | Leaching in tap water (1h) | Dermal, Oral | 270000 ± 67000 µg g-1 | NR | 11 µg g-1 | <100nm: 14.8 µg  <20nm: 14.8 µg |
| **Ag** | AC5 | Fabrics (medical cloth) | Leaching in tap water (1h) | Dermal | 230000 ± 69000 µg g-1 | NR | 46 µg g-1 | <100nm: 13.3 µg  <20nm: 13.3 µg |
| **Ag** | PC39 | Toothpaste | Leaching in tap water (1h) | Dermal | 7.6 ± 9.8 µg g-1 | NR | 18 µg g-1 | <100nm: 14.8 µg  <20nm: 4.3 µg |
| **Ag** | PC39 | Shampoo | Leaching in tap water (1h) | Dermal | 1.4 ± 0.02 µg g-1 | NR | 0.9 µg g-1 | <100nm: 4.8 µg  <20nm: 3.8 µg |
| **Ag** | PC35 | Detergent | Leaching in tap water (1h) | Environmental | 3.4 ± 0.06 µg g-1 | NR | 1.8 µg g-1 | <100nm: 6.8 µg  <20nm: 1.7 µg |
| **Ag** | AC5 | Fabrics (cloth) | Leaching in tap water (1h) | Dermal | 270 ± 80 µg g-1 | NR | <0.1 µg g-1 | <100nm: <5 µg  <20nm: <5 µg |
| **Ag** | AC5 | Teddy bear | Leaching in tap water (1h) | Dermal | 70 ± 30 µg g-1 | NR | <0.2 µg g-1 | <100nm: <5 µg  <20nm: <5 µg |
| **Ag** | PC3 | Small humidifier | Leaching in tap water (1h) | Inhalation | 60 ± 4.6 µg g-1 | NR | 0.11 ± 0.04 µg h-1 | NR |
| **Ag** | PC3 | Large humidifier | Leaching in tap water (1h) | Inhalation | 1.2 ± 1.7 µg g-1 | NR | 0.08 µg h-1 | NR |
| **Ag** | AC5 | Plush toy (interior foam) | Leaching in tap water (2h) | Dermal | ICP-MS  SEM-EDS  SMPS | 48.2 ± 5.0 mg kg-1 | NR | 0.24 ± 0.02 mg kg-1 | NR | (Quadros et al. 2013) |
| Leaching in saliva (2h) | Oral | 1.77 ± 0.03 mg kg-1 | NR |
| Leaching in sweat (2h) | Dermal | 18.5 ± 1.1 mg kg-1 | NR |
| Leaching in urine (2h) | Dermal | 17.4 ± 0.8 mg kg-1 | NR |
| **Ag** | AC5 | Plush toy (exterior fur) | Leaching in tap water (2h) | Dermal | 0.6 ± 0.1 mg kg-1 | NR | ND | NR |
| Leaching in saliva (2h) | Oral | 0.03 ± 0.001 mg kg-1 | NR |
| Leaching in sweat (2h) | Dermal | 0.14 ± 0.002 mg kg-1 | NR |
| Leaching in urine (2h) | Dermal | ND | NR |
| Adsorbed to dermal wipes | Dermal | 13.8 ± 8.4 µg m-2 | NR |
| **Ag** | AC5 | Baby blanket | Leaching in tap water (2h) | Dermal | 109.8 ± 4.1 mg kg-1 | ~500 nm particles found | 1.6 ± 0.3 mg kg-1 | NR |
| Leaching in saliva (2h) | Oral | 1.2 ± 0.1 mg kg-1 | NR |
| Leaching in sweat (2h) | Dermal | 4.8 ± 0.3 mg kg-1 | NR |
| Leaching in urine (2h) | Dermal | 3.7 ± 0.3 mg kg-1 | NR |
| Adsorbed to dermal wipes | Dermal | 23.0 ± 1.4 µg m-2 | NR |
| Leaching in HCl (2h) | Dermal | 4.7 ± 0.0 mg kg-1 | NR |
| Leaching in saline (2h) | Dermal | 4.0 ± 0.0 mg kg-1 | NR |
| **Ag** | AC13 | Sippy cup (rubber ring) | Leaching in milk formula (24h) | Oral | 24.3 ± 2.9 mg kg-1 | NR | ND | NR |
| Leaching in orange juice (3d) | Oral | 0.41 ± 0.01 mg kg-1 | NR |
| **Ag** | AC13 | Sippy cup (transparent cap) | Leaching in milk formula (24h) | Oral | 9.4 ± 1.0 mg kg-1 | NR | ND | NR |
| Leaching in orange juice (3d) | Oral | 0.07 ± 0.01 mg kg-1 | NR |
| **Ag** | AC13 | Sippy cup (spout cover) | Leaching in milk formula (24h) | Oral | 2.1 ± 1.5 mg kg-1 | NR | 0.93 ± 0.02 mg kg-1 | NR |
| Leaching in orange juice (3d) | Oral | ND | NR |
| **Ag** | AC13 | Breast milk storage bags | Milk formula (24h) | Oral | 0.9 ± 0.6 ppb | NR | ND | NR |
| **Ag** | PC8 | Disinfecting spray | Adsorbed to dermal wipes | Dermal | 27.1 ± 0.6 mg kg-1 | NR | 9.0 ± 2.8 µg m-2 | NR |
| **Ag** | ÀC5 | Surface wipes | Adsorbed to dermal wipes | Dermal | 4.5 ± 3 mg kg-1 | NR | 2.3 ± 0.1 µg m-2 | NR |
| **Ag** | AC13 | Kitchen scrubber | Adsorbed to dermal wipes | Dermal | 4.6 ± 0.3 mg kg-1 | NR | 0.3 ± 0.1 µg m-2 | NR |
| **Ag** | PC29 | Wound dressings (ACTICOAT) | Leaching in water (3d) | Dermal | ICP-MS  SEM-EDS | 1.4 mg cm-2 | 200-450 nm | 68.84 ± 5.47 µg g-1 | NR | (Rigo et al. 2012) |
| Leaching in saline solution (3d) | Dermal | 4.21 ± 1.25 µg g-1 | NR |
| Leaching in human serum (3d) | Dermal | 107.23 ± 3.73 µg g-1 | NR |
| **Ag** | PC29 | Wound dressings (Mepilex) | Leaching in water (7d) | Dermal | 0.11 mg cm-2 | NR | 188.64 ± 1.65 µg g-1 | NR |
| Leaching in saline solution (7d) | Dermal | 4.49 ± 1.77 µg g-1 | NR |
| Leaching in human serum (7d) | Dermal | 131.04 ± 4.78 µg g-1 | NR |
| **Ag** | PC29 | Wound dressings (ACTISORB) | Leaching in water (7d) | Dermal | 0.99 mg cm-2 | NR | 0.30 ± 0.02 µg g-1 | NR |
| Leaching in saline solution (7d) | Dermal | 0.27 ± 0.02 µg g-1 | NR |
| Leaching in human serum (7d) | Dermal | 3.36 ± 0.04 µg g-1 | NR |
| **Ag** | PC29 | Wound dressings (AQUACEL) | Leaching in water (14d) | Dermal | 26.6 mg cm-2 | NR | 73.35 ± 25.78 µg g-1 | NR |
| Leaching in saline solution (14d) | Dermal | 13.17 ± 1.59 µg g-1 | NR |
| Leaching in human serum (14d) | Dermal | 41.01 ± 3.48 µg g-1 | NR |
| **Ag** | AC4 | Ceramic filters | Leaching in 10% TSB, 1.2 g/L TOC followed by 109 CFU/mL *E. coli* in 10% TSB followed by 10.5 g/L NaOCl (2h) | Oral | QCM  DLS  TEM | 1 µg | 45 – 115 nm | NR | NR | (Bielefeldt et al. 2013) |
| 5 µg | 45 – 115 nm | NR | NR |
| 10 µg | 45 – 115 nm | NR | NR |
| Leachnig in 1% phosphate buffered saline followed by 105 CFU/mL *E. coli* in 1% PBS followed by 10.5 g/L NaOCl(2h) | Oral | 1 µg | 45 – 115 nm | NR | NR |
| 5 µg | 45 – 115 nm | NR | NR |
| 10 µg | 45 – 115 nm | NR | NR |
| Leachnig in water (milipore, 2h) | Oral | 1 µg | 45 – 115 nm | 20% | NR |
| Leachnig in water (pH 4.8, 2h) | Oral | 1 µg | 45 – 115 nm | 24% | NR |
| Leachnig in water (pH 9.3, 2h) | Oral | 1 µg | 45 – 115 nm | BDL | NR |
| Leachnig in water (turbidity 51.5 NTU kaolin, 2h) | Oral | 1 µg | 45 – 115 nm | BDL | NR |
| Leachnig in water (ionic strength NaNO3, 2h) | Oral | 1 µg | 45 – 115 nm | BDL | NR |
| Leachnig in water (ionic strength Ca(NO3)2, 2h) | Oral | 1 µg | 45 – 115 nm | BDL | NR |
| Leachnig in water (NaOCl 8.8 mg/L, 2h) | Oral | 1 µg | 45 – 115 nm | 83% | NR |
| Leachnig in water (NaOCl cleaning 525 mg/L, 2h) | Oral | 1 µg | 45 – 115 nm | 86% | NR |
| Leachnig in water (DOM-TOC 15 mg/L, 2h) | Oral | 1 µg | 45 – 115 nm | 21% | NR |
| **Ag** | AC4 | Ceramic filters (prepared by dipping) | Leaching in moderately hard synthetic water (6h) | Oral | DLS  TEM  AAS | 2.76 mg | 15.8 nm | 1.5%, Effluent conc. <0.01 – 10 mg L-1 | NR | (Ren and Smith. 2013) |
| **Ag** | AC4 | Ceramic filters (prepared by painting) | Leaching in moderately hard synthetic water (6h) | Oral | 2.76 mg | 15.8 nm | 1.3%, Effluent conc. <0.01 – 10 mg L-1 | NR |
| **Ag** | AC4 | Ceramic filters (prepared by dipping) | Leaching in moderately hard synthetic water with increased ionic strength (6h) | Oral | 2.76 mg | 15.8 nm | 0.25%, Effluent conc. 0.015 - 5 mg L-1 | NR |
| **Ag** | AC4 | Ceramic filters (prepared by painting) | Leaching in moderately hard synthetic water with increased ionic strength (6h) | Oral | 2.76 mg | 15.8 nm | 0.2%, Effluent conc. 0.015 - 5 mg L-1 | NR |
| **Ag** | AC4 | Ceramic filters (prepared by fire in) | Leaching in moderately hard synthetic water (6h) | Oral | 2.76 mg | 15.8 nm | 0.0045%, Effluent conc. <0.02 mg L-1 6h-1 | NR |
| **Ag** | AC4 | Ceramic filters (prepared by fire in) | Leaching in moderately hard synthetic water (6h) | Oral | 27.6 mg | 15.8 nm | 0.001%, Effluent conc. <0.02 mg L-1 | NR |
| **Ag** | Washing machine | Washing machine | Leaching by washing | Environmental | spICP-MS  ICP-MS  FFF-ICP-MS  ISE  TEM-EDS  STEM  NTA | NR | NR | Effluent avg. 10.9 (±7.1) µg L-1 | <20 nm (spICP-MS)  10 nm (TEM)  60– 130 nm (NTA) | (Farkas et al. 2011) |
| Washing T-shirts | Dermal | Ag in T-shirts after washing:  0.67 µg g-1  3.25 µg g-1  4.73 µg g-1 | NR |
| **Ag** | AC13 | Food containers (Kinetic Go Green Basic, A1) | Leaching in food simulants (3% acetic acid, 10d) | Oral | spICP-MS  LA-ICP-MS  ICP-MS  AFM  SEM-EDS  ED | 11.9 ±2.4 µg g-1 | NR | 9.5 ng cm-2 | 20 – 100 nm | (von Goetz et al. 2013b) |
| Leaching in food simulants (10% ethanol, 10d) | Oral | ~6.5 ng cm-2 | 20 – 100 nm |
| Leaching in food simulants (water, 10d) | Oral | ~5 ng cm-2 | 20 – 100 nm |
| Leaching in food simulants (olive oil, 10d) |  | BDL | NR |
| **Ag** | AC13 | Food containers ( Kinetic Go Green Basic, A2) | Leaching in food simulants (3% acetic acid, 2x10d) | Oral | 9.7 ± 1.6 µg g-1 | NR | 2.0–2.9% | 20 – 100 nm |
| **Ag** | AC13 | Food containers ( Kinetic Go Green Basic, A3) | Leaching in food simulants (3% acetic acid, 2x10d) | Oral | 23 ± 5.1 µg g-1 | NR | First use: 30 ng cm-2  Reused container: 2 ng cm-2  After 2 times use:1.8-1.9% | 20 – 100 nm |
| **Ag** | AC13 | Food containers ( Kinetic Go Green Premium, B) | Leaching in food simulants (3% acetic acid, 10d) | Oral | <0.1 µg g-1 | NR | NR | NR |
| Leaching in food simulants (10% ethanol, 10d) | Oral | NR | NR |
| Leaching in food simulants (water, 10d) | Oral | NR | NR |
| **Ag** | AC13 | Food containers (Nanosilber-Frisch-haltedosen, C) | Leaching in food simulants (3% acetic acid, 10d) | Oral | <0.1 µg g-1 | NR | NR | NR |
| Leaching in food simulants (10% ethanol, 10d) | Oral | NR | NR |
| Leaching in food simulants (water, 10d) | Oral | NR | NR |
| **Ag** | AC13 | Food containers (plastic bags FresherLonger, D) | Leaching in food simulants (3% acetic acid, 10d) | Oral | 37.1 ± 1.2 µg g-1 | NR | 0.5 ng cm-2 | NR |
| Leaching in food simulants (10% ethanol, 10d) | Oral | BDL | NR |
| Leaching in food simulants (water, 10d) | Oral | BDL | NR |
| **Ag** | AC13 | Food containers | Leaching in food simulants (Ultrapure water, 25°C, 15d) | Oral | SEM-EDS  AAS | 100 µg g-1 | 100 – 300 nm | ~1.4 µg dm-2 | NR | (Huang et al. 2011) |
| Leaching in food simulants (Ultrapure water, 40°C, 15d) | Oral | 3.3 µg dm-2 | NR |
| Leaching in food simulants (Ultrapure water, 50°C, 15d) | Oral | 3.4 µg dm-2 | <300 nm |
| Leaching in food simulants (4% acetic acid, 25°C, 15d) | Oral | ~1.7 µg dm-2 | NR |
| Leaching in food simulants (4% acetic acid, 40°C, 15d) | Oral | ~3.4 µg dm-2 | NR |
| Leaching in food simulants (4% acetic acid, 50°C, 15d) | Oral | ~3.7 µg dm-2 | NR |
| Leaching in food simulants (95% ethanol, 25°C, 15d) | Oral | ~0.7 µg dm-2 | NR |
| Leaching in food simulants (95% ethanol, 40°C, 15d) | Oral | ~2.7 µg dm-2 | NR |
| Leaching in food simulants (95% ethanol, 50°C, 15d) | Oral | ~2.9 µg dm-2 | NR |
| Leaching in food simulants (Hexane, 25°C, 15d) | Oral | ~1.4 µg dm-2 | NR |
| Leaching in food simulants (Hexane, 40°C, 15d) | Oral | ~3.7 µg dm-2 | NR |
| Leaching in food simulants (Hexane, 50°C, 15d) | Oral | ~4.0 µg dm-2 | NR |
| **Ag** | AC13 | Food containers (EC) | Leaching in food simulants (Deionized water, 0d) | Oral | GF-AAS | NR | NR | 0.2 µg L-1 | NR | (Hauri and Niece. 2011) |
| Leaching in food simulants (Deionized water , 7d) | Oral | 0.6 µg L-1 | NR |
| Leaching in food simulants (Deionized water , 7d +heating) | Oral | 0.8 µg L-1 | NR |
| Leaching in food simulants (Deionized water, 7d +heating +1h) | Oral | 0.6 µg L-1 | NR |
| Leaching in food simulants (Deionized water, 7d +2 heatings) | Oral | 0.9 µg L-1 | NR |
| Leaching in food simulants (Tap water, 0d) | Oral | 0.2 µg L-1 | NR |
| Leaching in food simulants (Tap water , 7d) | Oral | 0.5 µg L-1 | NR |
| Leaching in food simulants (Tap water , 7d +heating) | Oral | 0.7 µg L-1 | NR |
| Leaching in food simulants (Tap water, 7d +heating +1h) | Oral | 0.8 µg L-1 | NR |
| Leaching in food simulants (Tap water, 7d +2 heatings) | Oral | 0.9 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 0d) | Oral | 0.2 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid , 7d) | Oral | 0.9 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 7d +heating) | Oral | 0.7 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 7d +heating +1h) | Oral | 2.2 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 7d +2 heatings) | Oral | 2.6 µg L-1 | NR |
| **Ag** | AC13 | Food containers (OC) | Leaching in food simulants (Deionized water, 0d) | Oral | NR | NR | 0.2 µg L-1 | NR |
| Leaching in food simulants (Deionized water , 7d) | Oral | 0.3 µg L-1 | NR |
| Leaching in food simulants (Deionized water , 7d +heating) | Oral | 0.4 µg L-1 | NR |
| Leaching in food simulants (Deionized water, 7d +heating +1h) | Oral | 0.4 µg L-1 | NR |
| Leaching in food simulants (Deionized water, 7d +2 heatings) | Oral | 0.4 µg L-1 | NR |
| Leaching in food simulants (Tap water, 0d) | Oral | 0.2 µg L-1 | NR |
| Leaching in food simulants (Tap water , 7d) | Oral | 0.2 µg L-1 | NR |
| Leaching in food simulants (Tap water , 7d +heating) | Oral | 0.3 µg L-1 | NR |
| Leaching in food simulants (Tap water, 7d +heating +1h) | Oral | 0.3 µg L-1 | NR |
| Leaching in food simulants (Tap water, 7d +2 heatings) | Oral | 0.3 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 0d) | Oral | 0.2 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid , 7d) | Oral | 0.3 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 7d +heating) | Oral | 0.3 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 7d +heating +1h) | Oral | 1.0 µg L-1 | NR |
| Leaching in food simulants (5% acetic acid, 7d +2 heatings) | Oral | 1.4 µg L-1 | NR |
| **Ag** | AC13 | Food containers | Leaching in food simulants (3% acetic acid, 20°C, 9h) | Oral | ICP-MS | 234 ± 4 mg kg-1 | NR | 1.70‰ | NR | (Song et al. 2011) |
| Leaching in food simulants (3% acetic acid, 40°C, 9h) | Oral | 3.00‰ | NR |
| Leaching in food simulants (3% acetic acid, 70°C, 9h) | Oral | 5.60‰ | NR |
| Leaching in food simulants (95% ethanol, 20°C, 9h) | Oral | 0.24% | NR |
| Leaching in food simulants (95% ethanol, 40°C, 9h) | Oral | 0.23% | NR |
| Leaching in food simulants (95% ethanol, 70°C, 9h) | Oral | 0.22% | NR |
| **Ag** | AC13 | Food containers (LDPE film) | Leaching in food simulants (3% acetic acid, 10d) | Oral | ICP-MS  AF4  TEM | 48.7 ± 2.6 mg kg-1 | 10nm | 168.5 µg dm-2 | NR | (Bott et al. 2011) |
| Leaching in food simulants (10% ethanol, 10d) | Oral | 2.4 µg dm-2 | NR |
| Leaching in food simulants (95% ethanol, 10d) | Oral | ND | NR |
| Leaching in food simulants (Isooctane, 24h) | Oral | ND | NR |
| **Ag** | AC13 | Food containers (LDPE film) | Leaching in food simulants (3% acetic acid, 10d) | Oral | 185.2 ± 27.4 mg kg-1 | 10nm | 444.8 µg dm-2 | NR |
| Leaching in food simulants (10% ethanol, 10d) | Oral | 13.2 µg dm-2 | NR |
| Leaching in food simulants (95% ethanol, 10d) | Oral | ND | NR |
| Leaching in food simulants (Isooctane, 24h) | Oral | ND | NR |
| **Ag** | AC13 | Food containers (LDPE film) | Leaching in food simulants (3% acetic acid, 10d) | Oral | 249.8 ± 5.7 mg kg-1 | 10nm | 1010.9 µg dm-2 | NR |
| Leaching in food simulants (10% ethanol, 10d) | Oral | 115.1 µg dm-2 | NR |
| Leaching in food simulants (95% ethanol, 10d) | Oral | ND | NR |
| Leaching in food simulants (Isooctane, 24h) | Oral | ND | NR |
| **Ag** | AC13 | Food containers | Leaching in food simulants | Oral | TEM  AFM  ICP-MS |  |  |  | 10 – 20 nm | (Smirnova et al. 2012) (article in Russian) |
| **Ag** | AC13 | PVC films | Leaching in chicken (6.59°C, 2d) | Oral | ICP-MS | 0.29 mg kg-1 | 10 nm | 0.04 ± 0.03 mg dm-2 (1.22%) | NR | (Cushen et al. 2013) |
| Leaching in chicken (19.94°C, 2d) | Oral | 0.02 ± 0.00 mg dm-2 (0.44%) | NR |
| Leaching in chicken (6.59°C, 4d) | Oral | 0.03 ± 0.01 mg dm-2 (0.78%) | NR |
| Leaching in chicken (19.94°C, 4d) |  | 0.01 ± 0.00 mg dm-2 (0.34%) | NR |
| Leaching in chicken (7.24°C, 1.1d) | Oral | 0.01 ± 0.01 mg dm-2 (0.16%) | NR |
| Leaching in chicken (24.13°C, 1.1d) | Oral | 0.02 ± 0.01 mg dm-2 (0.67%) | NR |
| Leaching in chicken (7.24°C, 3.1d) | Oral | 0.01 ± 0.01 mg dm-2 (0.21%) | NR |
| Leaching in chicken (24.13°C, 3.1d) | Oral | 0.01 ± 0.00 mg dm-2 (0.32%) | NR |
| **Ag** | AC13 | PVC films | Leaching in chicken (6.59°C, 2d) | Oral | 0.29 mg kg-1 | 50 nm | 0.05 ± 0.01 mg dm-2 (1.42%) | NR |
| Leaching in chicken (19.94°C, 2d) | Oral | 0.01 ± 0.01 mg dm-2 (0.15%) | NR |
| Leaching in chicken (6.59°C, 4d) | Oral | 0.04 ± 0.01 mg dm-2 (1.18%) | NR |
| Leaching in chicken (19.94°C, 4d) |  | 0.01 ± 0.00 mg dm-2 (0.37%) | NR |
| Leaching in chicken (7.24°C, 1.1d) | Oral | 0.01 ± 0.01mg dm-2 (0.15%) | NR |
| Leaching in chicken (24.13°C, 1.1d) | Oral | 0.01 ± 0.01 mg dm-2 (0.38%) | NR |
| Leaching in chicken (7.24°C, 3.1d) | Oral | 0.02 ± 0.01 mg dm-2 (0.45%) | NR |
| Leaching in chicken (24.13°C, 3.1d) | Oral | 0.01 ± 0.01 mg dm-2 (0.39%) | NR |
| **Ag** | AC13 | PVC films | Leaching in chicken (6.59°C, 2d) | Oral | 3.94 mg kg-1 | 10 nm | 0.37 ± 0.14 mg dm-2 (0.94%) | NR |
| Leaching in chicken (19.94°C, 2d) | Oral | 0.22 ± 0.10 mg dm-2 (0.56%) | NR |
| Leaching in chicken (6.59°C, 4d) | Oral | 0.53 ± 0.23 mg dm-2 (1.37%) | NR |
| Leaching in chicken (19.94°C, 4d) |  | 0.30 ± 0.18 mg dm-2 (0.79%) | NR |
| Leaching in chicken (7.24°C, 1.1d) | Oral | 0.43 ± 0.24 mg dm-2 (1.12 %) | NR |
| Leaching in chicken (24.13°C, 1.1d) | Oral | 0.21 ± 0.13 mg dm-2 (0.55%) | NR |
| Leaching in chicken (7.24°C, 3.1d) | Oral | 0.29 ± 0.10 mg dm-2 (0.75%) | NR |
| Leaching in chicken (24.13°C, 3.1d) | Oral | 0.16 ± 0.06 mg dm-2 (0.41%) | NR |
| **Ag** | AC13 | PVC films | Leaching in chicken (6.59°C, 2d) | Oral | 3.94 mg kg-1 | 50 nm | 0.46 ± 0.05 mg dm-2 (1.20 %) | NR |
| Leaching in chicken (19.94°C, 2d) | Oral | 0.27 ± 0.19 mg dm-2 (0.71%) | NR |
| Leaching in chicken (6.59°C, 4d) | Oral | 0.67 ± 0.13 mg dm-2 (1.72%) | NR |
| Leaching in chicken (19.94°C, 4d) |  | 0.43 ± 0.08 mg dm-2 (1.12%) | NR |
| Leaching in chicken (7.24°C, 1.1d) | Oral | 0.14 ± 0.11 mg dm-2 (0.37%) | NR |
| Leaching in chicken (24.13°C, 1.1d) | Oral | 0.33 ± 0.16 mg dm-2 (0.86%) | NR |
| Leaching in chicken (7.24°C, 3.1d) | Oral | 0.37 ± 0.17 mg dm-2 (0.96%) | NR |
| Leaching in chicken (24.13°C, 3.1d) | Oral | 0.19 ± 0.23 mg dm-2 (0.49%) | NR |
| **Ag** | AC13 | PVC films | Leaching in chicken, worst case scenario (5°C, 4d) | Oral | 3.94 mg kg-1 | 10 nm | 6.84 mg kg-1 | NR |
| **Ag** | AC13 | PVC films | Leaching in chicken, most likely scenario (5°C, 3.1d) | Oral | 0.29 mg kg-1 | 50 nm | 0.24 mg kg-1 | NR |
| **Ag** | AC13 | Food containers (Kinetic Go Green Basic) | Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | ICP-MS  spICP-MS  SEM-EDS | 0.33%  190 µg cm-2 | NR | 3.76 ng cm-2 | 10 – 200 nm | (Echegoyen and Nerín. 2013) |
| Leaching in food simulants (50% ethanol, 40°C, 10d) | Oral | 1.66 ng cm-2 | NR |
| **Ag** | AC13 | Food containers (Oso Fresh Food Storage) | Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 0.32%  20 µg cm-2 | NR | 31.46 ng cm-2 | 10-20nm |
| Leaching in food simulants (50% ethanol, 40°C, 10d) | Oral | 9.48 ng cm-2 | NR |
| **Ag** | AC13 | Food containers (FresherLonger bags) | Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 0.33%  390 µg cm-2 | NR | 10.16 ng cm-2 | 40-60nm |
| Leaching in food simulants (50% ethanol, 40°C, 10d) | Oral | 7.10 ng cm-2 | NR |
| **Ag** | AC13 | PE composites | Leaching in food simulants (distilled water, 40°C, 10d) | Oral | ICP-AES  Hach Lange spectroscopy  TEM | 0.5% | 1507 ± 581 nm | 3.62\*10-4 mg L-1 | 9.24 ± 2.51 nm | (Cushen et al. 2014a) |
| Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 1.02\*10-2 mg L-1 | NR |
| **Ag** | AC13 | PE composites | Leaching in food simulants (distilled water, 40°C, 10d) | Oral | 1% | 1507 ± 581 nm | 2.27\*10-3 mg L-1 | NR |
| Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 5.74\*10-3 mg L-1 | NR |
| **Ag** | AC13 | PE composites | Leaching in food simulants (distilled water, 40°C, 10d) | Oral | 2% | 1507 ± 581 nm | 6.07\*10-3 mg L-1 | NR |
| Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 3.32\*10-2 mg L-1 | NR |
| **Ag** | AC13 | PE composites | Leaching in food simulants (distilled water, 40°C, 10d) | Oral | 0.1% | 8.78 ± 5.11 nm | 6.91\*10-2 mg L-1 | 14.3 ± 3.15 nm |
| Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 0.12 mg L-1 | NR |
| **Ag** | AC13 | PE composites | Leaching in food simulants (distilled water, 40°C, 10d) | Oral | 0.5% | 8.78 ± 5.11 nm | 0.17 mg L-1 | NR |
| Leaching in food simulants (3% acetic acid, 40°C, 10d) | Oral | 0.45 mg L-1 | 66.24 ± 47.56 nm |
| **Ag** | AC13 | Food containers (bags) | Leaching in food simulants (3% acetic acid, 20°C, 10d) | Oral | ICP-MS  AF4-ICP-MS  SEM-EDX | 28 ± 1 µg g-1 | NR | 34 ± 8 ng L-1  1.1 ± 0.3 ng dm-2  1.6 ± 0.4 ng g-1 | NR | (Artiaga et al. 2014) |
| Leaching in food simulants (95% ethanol, 20°C, 10d) | Oral | BDL | NR |
| Leaching in food simulants (10% ethanol, 20°C, 10d) | Oral | BDL | NR |
| Leaching in food simulants (distilled water, 20°C, 10d) | Oral | 10 ± 2 ng L-1  0.34 ± 0.06 ng dm-2  0.49 ± 0.08 ng g-1 | NR |
| Leaching in food simulants (distilled water, 70°C, 2h) | Oral | 400 ng/L | 40 – 60 nm |
| Leaching in food simulants (distilled water, 70°C, 2h) | Oral | 267 ng/L | 40 – 60 nm |
| Leaching in food simulants (distilled water, 70°C, 2h) | Oral | 316 ng/L | 40 – 60 nm |
| Leaching in food simulants (3% acetic acid, 70°C, 2h) | Oral | 388 ng/L | 40 – 60 nm |
| Leaching in food simulants (3% acetic acid, 70°C, 2h) | Oral | 289 ng/L | 40 – 60 nm |
| Leaching in food simulants (3% acetic acid, 70°C, 2h) | Oral | 318 ng/L | 40 – 60 nm |
| **Ag** | - | Catheter | Leaching in saline solution (200h) | Internal | Anodic stripping voltametry | 0.5 – 1.0 % | 20 – 80 nm | 0.45 – 0.8 µg L-1 | NR | (Joyce‐Wöhrmann et al. 2000) |
| **Ag** | - | Catheter | Leaching in saline solution (26h) | Internal | Anodic stripping voltametry | 0.60% | 20 – 80 nm | 7 µg L-1 | NR | (Joyce‐Wöhrmann and Münstedt. 1999) |
| **Ag** | PC9a | Coatings | Leaching in saline solution | Internal | ToF-SIMS  XPS | 7.50% | NR | NR | NR | (Zanna et al. 2010) |
| **Ag** | PC9a | Coatings | Leaching in saline solution | Internal | 20.30% | NR | NR | NR |
| **Ag** | AC13 | Food containers | Leaching in chicken (8.13°C, 1.1d) | Oral | ICP-MS  SEM | 0.5% (w/w) | 10.1 ±0.64 nm | 0.026 mg kg-1; 0.003 mg dm-2 | NR | (Cushen et al. 2014b) |
| Leaching in chicken (21.8°C, 1.1d) | Oral | 0.031 mg kg-1; 0.004 mg dm-2 | NR |
| Leaching in chicken (8.13°C, 3.1d) | Oral | 0.042 mg kg-1; 0.005 mg dm-2 | NR |
| Leaching in chicken (21.8°C, 3.1d) | Oral | 0.039 mg kg-1; 0.004 mg dm-2 | NR |
| **CuO** | AC13 | Food containers | Leaching in chicken (8.13°C, 1.1d) | Oral | 0.5% (w/w) | 11.4 ±0.68 nm | 0.265 mg kg-1; 0.032 mg dm-2 | NR |
| Leaching in chicken (21.8°C, 1.1d) | Oral | 0.351 mg kg-1; 0.044 mg dm-2 | NR |
| Leaching in chicken (8.13°C, 3.1d) | Oral | 0.207 mg kg-1; 0.024 mg dm-2 | NR |
| Leaching in chicken (21.8°C, 3.1d) | Oral | 0.382 mg kg-1; 0.049 mg dm-2 | NR |
| **Ag** | AC5 | Fabrics (socks) | Leaching in acidic sweat (30min) | Dermal | ICP-OES  STEM  EDS | 18 ± 2 mg kg-1 | Silver integrated in polyamide fiber | BDL | ND | (von Goetz et al. 2013a) |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **Ag** | AC5 | Fabrics (3% polyester, 17 % wool Shirt (Male / Female)) | Leaching in acidic sweat (30min) | Dermal | 183 ± 10 mg kg-1 | Nanoparticles | < 450 nm: 31±5 µg g-1 L-1;  > 450 nm: 30±0 µg g-1 L-1 | 20 – 200 nm particles found |
| Leaching in alkaline sweat (30min) | Dermal | < 450 nm: 34±1 µg g-1 L-1;  > 450 nm: 11±1 µg g-1 L-1 | ND |
| **Ag** | AC5 | Fabrics (100% polyester shirt) | Leaching in acidic sweat (30min) | Dermal | 45 ± 8 mg kg-1 | Silver ions | BDL | ND |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **Ag** | AC5 | Fabrics (93% polyester, 7 % elasthane Trousers (Male/Female)) | Leaching in acidic sweat (30min) | Dermal | 41 ± 0 mg kg-1 | 200-400 nm AgCl-NP | < 450 nm: none detected;  > 450 nm: 23±0 µg g-1 L-1 | ND |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **TiO2** | AC5 | Fabrics (80% polyamide, 20% polyester shirt) | Leaching in acidic sweat (30min) | Dermal | 7149 ± 725 mg kg-1 | ND | < 450 nm: 63±13 µg g-1 L-1;  >450 nm: 725±30 µg g-1 L-1 | 150 – 300 nm particles found |
| Leaching in alkaline sweat (30min) | Dermal | < 450 nm: 38 ±13 µg g-1 L-1;  >450 nm: 188±213 µg g-1 L-1 | 150 – 300 nm particles found |
| **TiO2** | AC5 | Fabrics (82% polyamide, 18% lycra childrens pants) | Leaching in acidic sweat (30min) | Dermal | 6772 ± 11 mg kg-1 | ND | BDL | ND |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **TiO2** | AC5 | Fabrics (46% Lenzing ModalSun (cellulose), 46% cotton, 8% elastane long sleeved shirt) | Leaching in acidic sweat (30min) | Dermal | 2983 ± 11 mg kg-1 | ND | BDL | ND |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **TiO2** | AC5 | Fabrics (91% polyamide, 9% elastane long sleeved shirt (children)) | Leaching in acidic sweat (30min) | Dermal | 8543 ± 32 mg kg-1 | ND | BDL | ND |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **TiO2** | AC5 | Fabrics (53% polyester, 47% polybutylene 91% terephthalate, PBT long sleeved shirt (children)) | Leaching in acidic sweat (30min) | Dermal | 4482 ± 98 mg kg-1 | ND | BDL | ND |
| Leaching in alkaline sweat (30min) | Dermal | BDL | ND |
| **TiO2** | AC5 | Fabrics (adultsT-shirt) | Leaching by washing 30min, rinse 5min | Environmental, Dermal | ICP-OES  TEM  SEM | 7149 ± 725 mg kg-1 | 22 mg kg-1 particles <260nm | 0.02% first waching and rinsing cycle | Particles observed | (Windler et al. 2012) |
| **TiO2** | AC5 | Fabrics (children’s pants) | Leaching by washing 30min, rinse 5min | Environmental, Dermal | 6772 ± 112 mg kg-1 | 810 mg kg-1 particles <260nm | 0.03% one waching and rinsing cycle | Particles observed |
| **TiO2** | AC5 | Fabrics (adultsT-shirt) | Leaching by washing 30min, rinse 5min | Environmental, Dermal | 2983 ± 11 mg kg-1 | 25 mg kg-1 particles <260nm | 0.06% first waching and rinsing cycle | Particles observed |
| **TiO2** | AC5 | Fabrics (children’s T-shirt) | Leaching by washing 30min, rinse 5min | Environmental, Dermal | 8543 ± 32 mg kg-1 | 1230 mg kg-1 particles <260nm | 0.01% first waching and rinsing cycle | Particles observed |
| **TiO2** | AC5 | Fabrics (children’s T-shirt) | Leaching by washing 30min, rinse 5min | Environmental, Dermal | 4482 ± 98 mg kg-1 | 282 mg kg-1 particles <260nm | 0.01% first waching and rinsing cycle | Particles observed |
| **TiO2** | AC5 | Fabrics (adultsT-shirt) | Leaching by washing 30min, rinse 5min | Environmental, Dermal | 2153 ± 34 mg kg-1 | 12 mg kg-1 particles <260nm | 3.4% first waching and rinsing cycle | 54% of the amount of Ti released to  the washing solution was released as coarse, particulate fraction >0.45 μm and 46% was released as particulate fraction  <0.45 μm |
| **TiO2** | PC9a | Paint | Leaching by wheathering | Environmental | ICP-MS  ICP-OES  XRD |  | | | | (Kaegi et al. 2008) |
| **TiO2** | PC9a | Paint | Milling & Leaching | Environmental | STEM  TEM  ICP-OES  ICP-MS  DLS |  | | | | (Al-Kattan et al. 2014a) |
| **TiO2** | PC9a | Paint | Weathering | Environmental | AUC  ICP-OES  ICP-MS  SEM-EDS  TEM-EDS |  | | | | (Al-Kattan et al. 2013) |
| **TiO2** | PC9a | Paint | Dry abrasion | Inhalation | ELPI  SEM | NR | NR | 120 part. cm-3 | No particles in nanosize detected, but particles 200-300 nm embedded in paint matrix were found | (Golanski et al. 2011) |
| **TiO2** | PC9a | Paint | Abrasion glass substrate | Inhalation | NR | NR | 40 000 part. cm-3 | No particles in nanosize detected, but particles 200-300 nm embedded in paint matrix were found |
| **TiO2** | PC9a | Paint | Leaching in water, UV exposure | Environmental | AFM  ICP-OES |  | | | | (Olabarrieta et al. 2012) |
| **TiO2** | PC9a | Coatings (4 layers) | Abrasion (6N load, 624s) | Inhalation | TEM-EDS  SEM  CPC  SMPS  APS | 1.1 % w/w | Anatase < 8 nm | 14 part. cm−3 \* | 154 ±10 nm \* | (Shandilya et al. 2014) |
| **TiO2** | PC9a | Coatings (4 layers) | Abrasion (6N load, 624s) | Inhalation | 1 % w/w | Anatase < 40 nm | 200 part. cm−3 \* | 154 ± 10 nm \* |
| **TiO2** | PC9a | Coatings (on wood) | UV light, fan and scraping motion | Environmental, Inhalation | SMPS | 5 wt. % | NR | 2 min.:  25.3 part. cm-3 \*  30 min.:  231.5 part. cm-3 \*  60 min.:  458.3 part. cm-3 \*  90 min.:  633.3 part. cm-3 \*  120 min.:  478.5 part. cm-3 \* | 2 min.:  213.7 nm \*  30 min.:  53.5 nm \*  60 min.:  8.1 nm \*  90 min.:  20.9 nm \*  120 min.:  38.4 nm \* | (Hsu and Chein. 2007) |
| **TiO2** | PC9a | Coatings (on wood) | Fluorescent lamp, fan and scraping motion | Environmental, Inhalation | 5 wt. % | NR | 2 min.:  64.7 part. cm-3 \*  30 min.:  40.1 part. cm-3 \*  60 min.:  40.5 part. cm-3 \*  90 min.:  31.0 part. cm-3 \*  120 min.:  24.6 part. cm-3 \* | 2 min.:  35.5 nm \*  30 min.:  61.3 nm \*  60 min.:  63.8 nm \*  90 min.:  83.6 nm \*  120 min.:  74.7 nm \* |
| **TiO2** | PC9a | Coatings (on polymer) | UV light, fan and scraping motion | Environmental, Inhalation | 5 wt. % | NR | 2 min.:  29.9 part. cm-3 \*  30 min.:  460.3 part. cm-3 \*  60 min.:  449.8 part. cm-3 \*  90 min.:  383.7 part. cm-3 \*  120 min.:  378.9 part. cm-3 \* | 2 min.:  93.1 nm \*  30 min.:  94.4 nm \*  60 min.:  97.5 nm \*  90 min.:  102.1 nm \*  120 min.:  102.7 nm \* |
| **TiO2** | PC9a | Coatings (on tile) | UV light, fan and scraping motion | Environmental, Inhalation | NR | NR | 2 min.:  12.4 part. cm-3 \*  30 min.:  448.8 part. cm-3 \*  60 min.:  442.2 part. cm-3 \*  90 min.:  525.3 part. cm-3 \*  120 min.:  629.2 part. cm-3 \* | 2 min.:  36.5 nm \*  30 min.:  107.3 nm \*  60 min.:  127.1 nm \*  90 min.:  127.7 nm \*  120 min.:  119.6 nm \* |
| **TiO2** | AC4 | Concrete | UV weathering/aging/temperature averaging/Abrasion | Environmental | NR | NR | NR | NR | NR | (Zorita et al. 2013) |
| **TiO2** | AC4 | Cement hydrated with 30 | Static leaching tests, 7d | Environmental | ICP-OES  SEM  XRF |  | | | | (Bossa et al. 2013) |
| **TiO2** | AC4 | Cement hydrated with 40% water | static leaching tests | Environmental |
| **TiO2** | AC4 | Cement hydrated with 50% water | Static leaching tests | Environmental |
| **TiO2** | AC13 | Food containers (PE film) | Leaching in food simulants (3% acetic acid, 25°C, 8h) | Oral | ICP-MS  SEM  AFM | 253.15 ± 1.40 mg kg−1 | 30 nm | 1.4 ± 0.02 μg kg−1 | 50– 90 nm | (Lin et al. 2014) |
| Leaching in food simulants (3% acetic acid, 70°C, 8h) | Oral | 6.3 ± 0.5 μg kg−1 | 50– 90 nm |
| Leaching in food simulants (3% acetic acid, 100°C, 8h) | Oral | 12.1 ± 0.2 μg kg−1 | 50– 90 nm |
| Leaching in food simulants (50% ethanol, 25°C, 8h) | Oral | 0.5 ± 0.1μg kg−1 | 50– 90 nm |
| Leaching in food simulants (50% ethanol, 70°C, 8h) | Oral | 0.6 ± 0.03 μg kg−1 | 50– 90 nm |
| Leaching in food simulants (50% ethanol, 100°C, 8h) | Oral | 2.1 ± 0.1 μg kg−1 | 50– 90 nm |
| **TiO2** | AC13 | Food containers (PE film, 0.2% UV 783, 0.3% SONOX 900) | Leaching in food simulants (3% acetic acid, 70°C, 8h) | Oral | 248.88 ± 4.74 mg kg−1 | 30 nm | 70°C: 8 μg kg−1 | 50– 90 nm |
| **TiO2** | AC13 | Food containers (PE film) | Leaching in food simulants (3% acetic acid, 70°C, 8h) | Oral | 254.84 ± 2.95 mg kg−1 | 100 nm | 70°C: 7 μg kg−1 | 100– 150 nm |
| **SiO2** | PC9a | Paint | Milling & Leaching | Environmental | DLS  TEM-EDS  XRF  ICP-MS |  | | | | (Zuin et al. 2014b) |
| **SiO2** | PC9a | Paint | Accelerated UV and wet weathering | Environmental | ICP-OES  STEM-EDS  TEM |  | | | | (Al-Kattan et al. 2014b) |
| **SiO2** | AC13 | Polymer | UV weathering | Environmental | SEM-EDS  AFM  XPS  FTIR-ATR |  | | | | (Gorham et al. 2012) |
| **SiO2** | AC13 | Polymer | UV weathering | Environmental | AFM  SEM-EDS  FTIR-ATR  XPS  ICP-OES |  | | | | (Nguyen et al. 2012) |
| **SiO2** | AC13 | Polymer | UV weathering | Environmental |
| **Clay** | AC13 | Polymer | Shredding (2h) | Inhalation | FMPS  OPC  SEM | 5% w/w | NR | 23483 ± 5427 part. cm-3 \* | Few particles >300nm \* No clay particles found by SEM analysis | (Raynor et al. 2012) |
| **SiO2** | AC5 | Fabric with polymer coating | Abrasion | Inhalation | SMPS | NR | 20 nm | NR | 50 nm | (Guiot et al. 2009) |
| **Clay** | AC13 | Polymer | Drilling (14min) | Inhalation | CPC  SMPS  SEM  TEM  XRD  NTA | 5 wt. % | NR | 20 000 part. cm-3 \* | 175 – 350 nm \* | (Sachse et al. 2012b) |
| **ZnO** | AC13 | Surface coating (on fiberboard plate) | Abrasion (100s) | Inhalation | SMPS  CPC  SEM  TEM-EDS | 6 wt. % | 20-200 nm | ~350 000 part. cm-3 \* | No free ZnO particles | (Vorbau et al. 2009) |
| **ZnO** | AC13 | Surface coating (on steel panel) | Abrasion (100s) | Inhalation | 6 wt. % | 20-200 nm | ~10 000 part. cm-3 \* | No free ZnO particles |
| **ZnO** | AC13 | Surface coatings (on fiberboard plate) | Abrasion (100s) | Inhalation | 3 wt. % | NR | ~120 000 part. cm-3 \* | No free ZnO particles |
| **ZnO** | AC13 | Surface coatings (on fiber cement plate) | Abrasion (100s) | Inhalation | 5 wt. % | 20 – 700 nm | ~20 000 part. cm-3 \* | No free ZnO particles |
| **CNT** | AC13 | TPU | Sanding | Inhalation | SEM-EDS  AUC  XPS  Laser diffraction  CPC | 3 wt. % | Diameter 10nm, length 0.1-10µm | 25 000 part. cm-3 \* | No free CNT release | (Wohlleben et al. 2013) |
| Weathering | Environmental |  | | | |
| **CNT** | AC13 | Epoxy | Weathering | Environmental | SEM-EDS  STEM  AUC  XPS |  | | | | (Hirth et al. 2013) |
| Sanding | Environmental, Inhalation | 2 wt.% | Diameter 10-50nm, length 1-20µm | NR | Protrusions of CNTs from fragments, no free CNT release |
| **CNT** | Cement | Cement | Weathering | Environmental |  | | | |
| Sanding | Environmental, Inhalation | 2 wt.% | Diameter 10-50nm, length 1-20µm | NR | Protrusions of CNTs from fragments, no free CNT release |
| **CNT** | AC13 | TPU | Weathering | Environmental |  | | | |
| Sanding | Environmental, Inhalation | 3 wt.% | Diameter 10-50nm, length 1-20µm | NR | No freeCNT release |
| **CNT** | AC13 | POM | Weathering | Environmental |  | | | |
| Sanding | Environmental, Inhalation | 5 wt.% | Diameter 10-50nm, length 1-20µm | NR | No free CNT release |
| **CNT** | AC13 | Polymer | Shot blasting | Inhalation | TEM-EDS  SEM-EDS  FMPS | 5 wt.% | Diameter 3nm, length NR | 7% weight loss \* | No free CNT release | (Jiang et al. 2014) |
| **CNT** | AC13 | Graphite-epoxy | Dry cutting | Inhalation | APS  CPC  TEM-EDS  SEM-EDS | 0.05 wt.% | Diameter 8nm, length 100-150µm | 280 000 part. cm-3 \* | No free CNT release | (Bello et al. 2009) |
| **CNT** | AC13 | Alumina fiber cloth, epoxy | Dry cutting | Inhalation | 0.5-4.5 wt.% | Diameter 8nm, length 100-150µm | 1 530 000 part. cm-3 \* | No free CNT release |
| **CNT** | AC13 | Alumina fibers, epoxy | Drilling, high speed | Inhalation | Dust Trak  SEM-EDS  TEM-EDS  ICP-MS | 2.2 wt. % | NR | 180 000 part. cm-3 \* | 30 – 70 nm \* Clusters of CNT aggregates | (Bello et al. 2010) |
| Drilling, low speed | Inhalation | 85 000 part. cm-3 \* |
| Drilling, high speed, wet | Inhalation | 8 700 part. cm-3 \* |
| Graphite-expoxy | Drilling, high speed | Inhalation | 0.03 wt. % | NR | 84 000 part. cm-3 \* |
| **CNT** |  | Bulk | Weighing | Inhalation | OPC  CPC  TEM | NR | Diameter 10-50nm, length 1-20µm | 166 part. cm-3 \* | Protruding fibers, bundles of entangled CNTs. No free CNT release | (Cena and Peters. 2011) |
| AC13 | Epoxy | Sanding | Inhalation | 3 889 part. cm-3 \* |
| **CNT** | AC13 | Polymer | Abrasion | Inhalation | TEM-EDS  SEM  SMPS  CPC | 4% | Diameter 12nm, length 1µm | 4 000 part. cm-3 (<100 nm) \* | No free CNT release | (Golanski et al. 2012) |
| **CNT** | AC13 | Polymer | Sanding | Inhalation | CPC  OPC  SMPS  TEM  SEM | 1% | Diameter 10-50nm, length 1-20µm | 200 part. cm-3 \* | No free CNT release | (Huang et al. 2012) |
| 2% | 332 part. cm-3 \* | No free CNT release |
| 3% | 340 part. cm-3 \* | No free CNT release |
| 4% | 455 part. cm-3 \* | Free CNTs observed |
| **CNT** | AC13 | Polymer | Abrasion | Inhalation | SMPS  APS  TEM-EDS  SEM-EDS  FMPS  DMA  CPC | 0.1% | Diameter 13nm, length 1-10µm | NR | Median: 546 nm \*  No free CNT release | (Schlagenhauf et al. 2012) |
| 1% | NR | Median: 577 nm \*  Free CNTs observed, length 304±251 nm |
| **CNT** | AC13 | Polymer | Grinding | Inhalation | SMPS  CPC  SEM | 5% | Diameter 3nm, length NR | NR | No free CNT release | (Ogura et al. 2013) |
| **CNF** | AC13 | Polymer | Weighing CNF | Inhalation | CPC  Aerosol photometer  Diffusion charger  TEM | NR | NR | 64 µgC m-3 | NR | (Mazzuckelli et al. 2007) |
| Mixing CNF with solvent | Inhalation | NR | NR | 93 µgC m-3 | NR |
| Measurement on shelf near hood | Inhalation | NR | NR | 55 µgC m-3 | NR |
| Lab bench | Inhalation | NR | NR | 221 µgC m-3 | NR |
| Wet saw: cutting CNF composite | Inhalation | NR | NR | 1094 µgC m-3 | NR |
| Cart with real-time instruments: different areas | Inhalation | NR | NR | 33 µgC m-3 | NR |
| Cart with real-time instruments: different areas | Inhalation | NR | NR | 30 µgC m-3 | NR |
| Office background | Inhalation | NR | NR | 15 µgC m-3 | NR |
| Office background | Inhalation | NR | NR | 19 µgC m-3 | NR |
| **Fullerenes** | PC7 | Metallic alloy | Extraction from bag | Inhalation | CPC  SMPS  COP | NR | NR | 2 part. cm-3 \* | 5nm-1µm | (Le Bihan et al. 2013) |
| Bag agitation | Inhalation | 10 part. cm-3 \* |
| Part extraction from bag | Inhalation | 10 part. cm-3 \* |
| Moving+shock | Inhalation | 10 part. cm-3 \* |
| Surface rubbing | Inhalation | 10 part. cm-3 \* |
| Falling | Inhalation | 10 part. cm-3 \* |
| Scratching | Inhalation | 12 part. cm-3 \* |
| Sawing | Inhalation | 300 part. cm-3 \* |
| Sanding | Inhalation | 100 000 part. cm-3 \* |
| **TiO2** | PC9a | Coatings | Weathering, sanding, dynamic friction, wind erosion | Environmental | CPC  APS  EEPS  SEM  TEM-EDS |  | | | | (Göhler et al. 2013) |
| **CB** | PC9a | Coatings | Weathering, sanding, dynamic friction, wind erosion | Environmental |
| **Al2O3** | PC9a | Coatings | Weathering, sanding, dynamic friction, wind erosion | Environmental |
| **Fe2O3** | PC9a | Coatings | Weathering, sanding, dynamic friction, wind erosion | Environmental |
| **SiO2 TiO2 Ag** | PC9a | Paint | UV weathering, abrasion, immersion in water | Environmental | DLS  TEM-EDS  XRF  ICP-OES |  | | | | (Zuin et al. 2014a) |
| **ZnO** | PC9a | Polyurethane coating (on steel panel) | Sanding | Inhalation | FMPS  CPC  LAP  SEM  TEM | 75% | <100nm | ~1.1\*108 part. \* | Particles embedded in matrix | (Gohler et al. 2010) |
| **ZnO** | PC9a | Architectural coating (on fiber cement plate) | Sanding | Inhalation | 25% | <100nm | ~1.1\*106 part. \* | Particles embedded in matrix |
| **Fe2O3** | PC9a | Architectural coating (on fiber cement plate) | Sanding | Inhalation | 25% | <100nm | ~1.1\*106 part. \* | Particles embedded in matrix |
| **TiO2** | PC9a | Indoor paint PVA (polyvinyl acetate) | Sanding | Inhalation | APS  FMPS | 9.8% | 220 nm | 0.90 \*105 part. cm-3 \* | 0.13 μm \* | (Koponen et al. 2011) |
| **TiO2** | PC9a | Indoor paint PVA (polyvinyl acetate) | Sanding | Inhalation | 10.0% | < 100 nm | 4.16 \*105  part. cm-3 \* | 0.18 μm \* |
| **Clay** | PC9a | Indoor paint PVA (polyvinyl acetate) | Sanding | Inhalation | 14.7% | 200 nm | 2.30 \*105  part. cm-3 \* | 0.13 μm \* |
| **CB** | PC9a | Metal /wood paint (Acryl binder) | Sanding | Inhalation | 2.5% | 95 nm | 1.18 \*105  part. cm-3 \* | 0.13 μm \* |
| **TiO2** | PC9a | Metal /wood paint (Acryl binder) | Sanding | Inhalation | 10% | 17 nm | 0.93 \*105  part. cm-3 \* | 0.16 μm \* |
| **SiO2** | PC9a | Outdoor paint (Acryl binder) | Sanding | Inhalation | ≈ 10% | 7 nm | 1.45 \*105  part. cm-3 \* | 0.13 μm \* |
| **CaCO3** | Filler | Filler CaCO3 | Sanding | Inhalation | NR | NR | 3.29 \*105  part. cm-3 \* | 0.10 μm \* |
| **SiO2** | PC9a | Lacquer UV-hard coating | Sanding | Inhalation | 5% | <50 nm | 3.74 \*105  part. cm-3 \* | 0.07 μm  \* |
| **CNT** | AC13 | Epoxy | Sanding/Sawing | Inhalation | SEM  FMPS  APS  CPC  Electrical low-pressure impactor | <20 wt.% | Diameter: 9.5 nm; Length: 1.5 μm | NR | Fiber-shaped particles found | (Gomez et al. 2014) |
| **CNT** | AC13 | Epoxy | Sanding/Sawing | Inhalation | 0.2 wt. % | Diameter: 9.5 nm; Length: 1.5 μm | 1.6\*106  part. cm-3 \* | Irregular aggegates + agglomerates attached to the paint matrix; no free NPs observed |
| **TiO2** | PC9a | Paints (on wooden board) | Sanding | Inhalation | 12 wt. % | 80 nm | 2.06\*105 part. cm-3 \* | Irregular aggegates + agglomerates attached to the paint matrix; no free NPs observed |
| **TiO2** | PC9a | Paints (on wooden board) | Sanding | Inhalation | 24 wt. % | 50 nm | 2.50\*105 part. cm-3 \* | Irregular aggegates + agglomerates attached to the paint matrix; no free NPs observed |
| **TiO2** | PC9a | Paints (on wooden board) | Sanding | Inhalation | 36 wt. % | 50 nm | 2.57\*105 part. cm-3 \* | Irregular aggegates + agglomerates attached to the paint matrix; no free NPs observed |
| **CNT** | AC13 | Polymer | Weathering | Environmental | SEM-EDS  FTIR  XPS |  | | | | (Nguyen et al. 2011) |
| **SiO2** | AC13 | Polymer | Weathering | Environmental |
| **SiO2** | AC13 | Polymer | Sanding | Inhalation | XPS  SIMS  SEM-EDS | 4% | NR | 4700 part. cm-3 \* | No release of free SiO2 detected | (Wohlleben et al. 2011) |
| Sanding (do-it-yourself) | Inhalation | 5000 – 65000 part. cm-3 \* | No release of free SiO2 detected |
| Weathering | Environmental |  | |
| **CNT** | AC13 | Polymer | Sanding | Inhalation | 5% | NR | 5800 part. cm-3 \* | No release of free CNTs detected |
| Sanding (do-it-yourself) | Inhalation | 400 part. cm-3 \* | No release of free CNTs detected |
| Weathering | Environmental |  | |
| **CNT** | AC4 | Cement | Sanding | Inhalation | 2% | NR | 3900 part. cm-3 \* | No release of free CNTs detected |
| Sanding (do-it-yourself) | Inhalation | Only sandpaper debris | No release of free CNTs detected |
| Weathering | Environmental |  | |
| **SiO2** | AC13 | Polymer | Drilling | Inhalation | CPC  SMPS  SEM | 5% | NR | ~1\*109 part. min-1 \* | <100nm | (Sachse et al. 2012a) |
| **Clay** | AC13 | Polymer | Drilling | Inhalation | 5% | NR | ~1\*107 part. min-1 \* | <100nm |
| **SiO2** | AC13 | Polymer (EVA) | Aging, weathering | Environmental | TEM-EDS  TGA |  | | | | (Busquets-Fité et al. 2013) |
| **SiO2-OH** | AC13 | Polymer (PA6) | Aging, weathering | Environmental |
| **SiO2-propyl** | AC13 | Polymer (PP) | Aging, weathering | Environmental |
| **TiO2** | AC13 | Polymer (EVA) | Aging, weathering | Environmental |
| **TiO2-OH** | AC13 | Polymer (PA6) | Aging, weathering | Environmental |
| **TiO2-octyl** | AC13 | Polymer (PP) | Aging, weathering | Environmental |
| **ZnO** | AC13 | Polymer (EVA) | Aging, weathering | Environmental |
| **ZnO-OH** | AC13 | Polymer (PA6) | Aging, weathering | Environmental |
| **ZnO-octyl** | AC13 | Polymer (PP) | Aging, weathering | Environmental |
| **MWCNT-OH** | AC13 | Polymer (EVA) | Aging, weathering | Environmental |
| **MWCNT-NH2** | AC13 | AC13 | Aging, weathering | Environmental |
| **MWCNT** | AC13 | Polymer (PP) | Aging, weathering | Environmental |
| **CNT** | AC13 | Polymer | Ageing | Environmental | SEM-EDS  TGA  TEM-EDS DSC  FTIR |  | | | | (Vilar et al. 2013) |
| **SiO2** | AC13 | Polymer | Ageing | Environmental |
| **SiO2** | AC13 | Polymer | Crashing, impact from 1m height | Inhalation | CPC  SMPS | 5% | NR | ~1.6 part. cm-3 \* | ~20nm \* | (Sachse et al. 2013) |
| Crashing, impact from 2m height | Inhalation | ~2.6 part. cm-3 \* | ~18nm\* |
| Crashing, impact from 3m height | Inhalation | ~2.1 part. cm-3 \* | ~65nm\* |
| **Clay** | AC13 | Polymer | Crashing | Inhalation | 5% | NR | NR | NR |
| **Ag** |  | Wound dressings | Wetting | Dermal | ESEM-EDS | 108.5 g kg-1 | 64 ± 28 nm | NR | 89 ± 26 nm | (Holbrook et al. 2014) |
| 108.5 g kg-1 | 135 ± 71 nm | NR | Insufficient release for particle size distribution |
| **SiO2** | AC13 | Polymer | UV exposure, water sprayed periodically | Environmental | AFM  ICP-OES  ATR-FTIR  XPS  UV-Vis  LCSM |  | | | | (Sung et al. 2014) |
| **SiO2** | AC13 | Polymer | UV exposure, water sprayed periodically | Environmental |
| **SiO2** | AC13 | Polymer | UV exposure, water sprayed at the end of experiment | Environmental |
| **Ag** | AC5 | Fabrics T1 | Leaching by machine washing | Environmental, dermal | DLS  ICP-OES  SEM  XAS  XANES | 18 ± 2 mg kg-1 | NR | 5% | AgCl and Ag2S NPs found | (Lombi et al. 2014) |
| **Ag** | AC5 | Fabrics T4 | Leaching by machine washing | Environmental, dermal | 183 ± 10 mg kg-1 | NR | 22% | Ag and Ag2S NPs found |
| **Ag** | AC5 | Fabrics T5 | Leaching by machine washing | Environmental, dermal | 45 ± 8 mg kg-1 | NR | NR | AgCl and Ag2S NPs found |
| **Ag** | AC5 | Fabrics T6 | Leaching by machine washing | Environmental, dermal | 2925 ± 10 mg kg-1 | NR | 60% | AgCl and Ag2S NPs found |
| **Ag** | AC5 | Fabrics T7 | Leaching by machine washing | Environmental, dermal | 41 ± 0.4 mg kg-1 | NR | 80% | Ag, AgCl and Ag2S NPs found |

\*Results reported for any kind of particles released, not quantifying specifically the ENM release

NR – Not reported

ND – Not determined

BDL – Below detection limit

APS – Aerosol particle sizer

AUC – Analytical ultracentrifugation

COP – Optical counter

CPC – Condensation particle counter

CPE – Cloud point extraction

DLS – Dynamic light scattering

DSC – Differential scanning calorimetry

ED – Electron diffraction

EDS – Energy dispersive X-ray spectroscopy

EEPS - Engine exhaust particle sizer

FMPS – Fast scanning mobility particle sizer

### FTIR - [Fourier transform infrared spectroscopy](http://en.wikipedia.org/wiki/Fourier_transform_infrared_spectroscopy)

FTIR-ATR - [Fourier transform infrared spectroscopy](http://en.wikipedia.org/wiki/Fourier_transform_infrared_spectroscopy) in the attenuated total reflection

ICP-MS – Inductively coupled plasma mass spectrometry

ISE – Ion selective electrode

LA-ICP-MS – Laser ablation ICP-MS

LAP – Laser aerosol particle size spectrometer

NTA – Nanoparticle tracking analysis

PCCS - Photon cross-correlation spectroscopy  
LALLS – Low angle laser light scattering

QCM - Quartz crystal microbalance

SEM – Scanning electron microscopy

SMPS – Scanning mobility particle sizer

SP-ICP-MS – Single particle ICP-MS

TEM – Transmission electron microscopy

TGA – Thermogravimetry

ToF-SIMS - Time-of-flight secondary ion mass spectrometry

UV-Vis – Ultraviolet-visible spectrophotometry

XANES – X-ray absorption near edge structure

XAS – X-ray absorption spectroscopy

XPS – Photoelectron spectroscopy

XRF – X-ray fluorescence

# Algorithms for consumer exposure estimation

**Table S2a:** R.15 algorithms for exposure estimations and their basic assumptions (ECHA. 2012)

|  |  |  |
| --- | --- | --- |
| **Exposure** | **Algorithm** | **Assumptions & Applications** |
| **Inhalation** | R.15-1    R.15-2 | All substance is released as a gas, vapor or airborne particulate.  Worst-case scenario: event duration is 24h and 100% of the substance will be released into the room with no ventilation.  Not yet validated for ENMs. |
| **Dermal A** | R.15-3    R.15-4 | All of the substance in the product is directly applied to the skin (e.g. liquid soap or sunscreen). Applies for non-volatile substances contained in a mixture. |
| R.15-5    R.15-6    R.15-7 | Certain body parts are dipped in a mixture containing the substance.  Applies for non-volatile substances contained in a mixture. |
| **Dermal B** | R.15-8    R.15-9    R.15-7 | Substance migrates from the area of the article in contact with skin (e.g. textiles).  Worst-case scenario: time of contact 24h and the skin contact factor is set at 1. |
| **Oral** | R.15-10  R.15-11 | Substance in a product is unintentionally swallowed during normal use or substance is migrating from an article e.g. due to sucking, chewing or licking of toys, children's books or textiles.  Model may also be used to estimate exposure from ingestion of the non-respirable fraction of inhaled airborne particulates. |

Qprod – Amount of product used [g];

Fcprod – Weight fraction of substance in product [g·gprod-1];

Vroom – Room size (default 20m3) [m3];

Fresp – Respirable fraction of inhaled substance (default =1) [-];

IHair – Ventilation rate of person [m3·d-1];

Tcontact – Duration of contact per event (default 1 day) [d];

BW – Body weight [kg];

N – Mean number events per day [d-1];

Cprod – Concentration of substance in product before dilution [g·cm-3];

D – Dilution factor [-];

RHOprod - Density of product before dilution [g·cm-3];

Vprod - Volume of product used before dilution [cm3];

Vappl - Volume of diluted product actually contacting the skin [cm3];

THder - Thickness of product layer on skin (default 0.01 cm) [cm];

Askin - Surface area of the exposed skin [cm2];

Fcmigr - Rate (fraction) of substance migrating to skin per unit time [g·g-1·t-1];

Fcontact - Fraction of contact area for skin, to account for the fact that the product is only partially in contact with the skin (default = 1) [cm2·cm-2];

SDprod - Surface density (mass per unit area) [mg·cm-2];

Foral - Fraction of Vappl that is ingested (default = 1) [-]

Cinh – Concentration of substance in air of room [mg·m-3];

Dinh – Inhalatory dose (intake) of substance per day and body weight [mg·kgbw-1·d-1]

Cder - Dermal concentration of substance on skin [mg·cm-3];

Lder – Dermal load, amount of substance on skin area per event [mg·cm-2];

Dder – Dermal dose, amount of substance (external dose) that can potentially be taken up (account later for actual dermal absorption) per body weight [mg·kgbw-1·d-1];

Coral - Concentration in ingested product [mg·m-3];

Doral - Intake per day and body weight [mg·kgbw-1·d-1]

**Table S2b:** ECETOC TRA algorithms for exposure estimations and their basic assumptions (ECETOC. 2014)

|  |  |  |
| --- | --- | --- |
| **Exposure** | **Algorithm** | **Assumptions & Applications** |
| **Inhalation** |  | It is assumed that the substance transfer to air happens instantaneously and the released substance is homogeneously distributed in the room volume. |
| **Dermal** |  | Model assumes 100% transfer of substance from the product or article contact layer to the skin instantaneously. The skin contact areas (fingertips, hands, whole body, etc.) linked to product/article subcategories can be expressed in one of eight categories each characterized by a default surface area for adults and children. |
| **Oral** |  | It is assumed that the oral exposure of substance happens at once. |

Cinh - Exposure air concentration [mg·m-3];

PI - Product ingredient [g·g-1];

MA - Amount product used per application event [g per event];

FQ - Frequency of use [events per day];

F - Fraction released to air [g·g-1];

1000 - Conversion factor;

V - Room volume [m³];

Dder - Exposure dermal dose [mg·kg-1·d-1];

CA - Contact area [cm²];

TL - Thickness of layer (0.01 cm as default) [cm];

D - Density [g·cm-3];

Doral - Exposure oral dose [mg·kg-1·d-1];

V – Volume of product swallowed [cm³],

A – Amount of product used per application [g·event-1].

**Table S2c:** ConsExpo algorithms for exposure estimations and their basic assumptions (Delmaar et al. 2005)

|  |  |  |
| --- | --- | --- |
| **Exposure** | **Algorithm** | **Assumptions & Applications** |
| **Inhalation (vapours)** | 1)  2) | There is an instant release of the substance from the product. Model assumes that all substance is released at once and is over time removed by ventilation. |
| 3a)(t < tr)  3b) (t > tr) | There is a constant release of the substance over time, and the substance is simultaneously removed by ventilation. |
| **Dermal (direct application)** |  | All of the substance in the product is directly applied to the skin instantaneously. |
|  | All of the substance in the product is directly applied to the skin at a constant rate over time. |
| **Dermal (rubbing off)** |  | The surface of the product (e.g. table top, floor) containing the substance is subjected to rubbing, which leads to dermal exposure. |
| **Dermal (migration)** |  | Assumes migration of substance from a material to the skin when dermal contact with the material occurs. |
| **Dermal (diffusion)** |  | The product is applied to the skin and the compound diffuses through the product to the exposed skin. |
| **Oral (direct)** |  | Model assumes direct uptake of the compound from a product that is swallowed at once. |
| **Oral (constant intake rate)** |  | Model assumes that the compound is ingested over a certain period of time. |
| **Oral (migration)** |  | Model assumes that oral exposure occurs through leaching of a substance to the saliva. |
| **Oral (migration from packaging)** |  | The substance migrates from a product into the food, which is subsequently ingested. Model assumes that the migrated compound is homogeneously distributed in the food and that the intake is proportional to the fraction of packaged food consumed. |

Cair - Concentration of substance in air of room [kg·m-3];

Csat –Saturated air concentration [kg·m-3];

Ao – Amount of product used [kg];

wf - Weight fraction of the compound in the total product [fraction];

V - Room volume [m3];

M – Molecular weight of the compound [kg·mole-1];

Psat – Saturated vapor pressure [Pa];

q - Ventilation rate of the room (number of air changes per time unit) [1·s-1];

t – Exposure/loading duration [s];

tr – Release time [s];

Aprod - Amount of product [kg];

Sexp - Surface area of the exposed skin [m2];

Wbody - Bodyweight of the exposed person [kg];

R - Rate at which the product is applied (dermal exposure) or ingested (oral exposure) [kg·s-1];

Sarea - Total area rubbed during exposure, determined by the transfer coefficient [m2];

Smax - Maximal area that can be rubbed during exposure [m2];

Fdislodge - Dislodgeable amount: amount of product or used formulation that can be rubbed off per unit surface area [kg·m2];

Sexp - the surface area of the exposed skin [m2];

Rtrans - Area rubbed per unit time [m2·s-1];

D - Diffusion coefficient of the compound inside the product [m2·s-1];

C(x,t) - the compound concentration in the product at depth x and time t. [kg·m3];

A - Amount of product swallowed or mouthed [kg];

Rm - rate at which the compound migrates from the product (per unit area) [kg·m2·s-1];

S - Surface area of the product that is being mouthed [m2];

Acomp - Total amount of compound that can migrate from the packaging material [kg];

Cprod - Concentration compound in the packaging material [kg·m-3];

Scont - Area of contact between packaging material and food [m2];

d - Thickness of packaging material [m];

Rmigr - Migration rate of the compound from the material to the food [kg·s-1];

Afood - Amount of compound in the packaged food [kg];

Acons - Amount of food consumed [kg];

Apack - Amount of food packaged [kg].

# Consumer exposure estimation calculation input and results

**Table S3a:** Calculations for inhalation exposure assessment based on relevant literature

**Assumptions:** Body weight : 60 kg; Children’s body weight: 14.3 kg (Sagunski. 1995); Number of events per day: 1; Respirable fraction: 1; Volume of room: 20m3; Ventilation rate of a person: 160 m3 per day.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | **R.15** | | **ConsExpo** | **ECETOC TRA** |  |
| Product | ENM | Exposure scenario | Qprod  g | Fcprod  g/gprod | Tcont.  d | n | **Cinh**  mg/m3 | **Dinh**  mg/kgbw/d | **Cair**  mg/m3 | **Cinh**  mg/m3 | Ref. |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 6N | 20 | 0.011 | 0.007 | 1 | 11 | 0.204 | 11 | 11 | (Shandilya et al. 2014) |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 6N | 20 | 0.01 | 0.007 | 1 | 10 | 0.185 | 10 | 10 |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 7.5N | 20 | 0.011 | 0.007 | 1 | 11 | 0.204 | 11 | 11 |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 7.5N | 20 | 0.01 | 0.007 | 1 | 10 | 0.185 | 10 | 10 |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 10N | 20 | 0.011 | 0.007 | 1 | 11 | 0.204 | 11 | 11 |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 10N | 20 | 0.01 | 0.007 | 1 | 10 | 0.185 | 10 | 10 |
| Coatings | TiO2 | 4 x 5g layers of coating, abrasion 6N | 20 | 0.011 | 0.007 | 1 | 11 | 0.204 | 11 | 11 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 2N | 10 | 0.01 | 0.007 | 1 | 5 | 0.093 | 5 | 5 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 6N | 10 | 0.011 | 0.007 | 1 | 5.5 | 0.102 | 5.5 | 5.5 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 6N | 10 | 0.01 | 0.007 | 1 | 5 | 0.093 | 5 | 5 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 7.5N | 10 | 0.011 | 0.007 | 1 | 5.5 | 0.102 | 5.5 | 5.5 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 7.5N | 10 | 0.01 | 0.007 | 1 | 5 | 0.093 | 5 | 5 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 10N | 10 | 0.011 | 0.007 | 1 | 5.5 | 0.102 | 5.5 | 5.5 |
| Coatings | TiO2 | 2 x 5g layers of coating, abrasion 10N | 10 | 0.01 | 0.007 | 1 | 5 | 0.093 | 5 | 5 |
| Paint | TiO2 | UV light, fan and scraping motion on painted wood | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 | (Hsu and Chein. 2007) |
| Paint | TiO2 | Fluorescent lamp, fan and scraping motion on painted wood | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Paint | TiO2 | UV light, fan and scraping motion on painted polymer | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Paint | TiO2 | UV light, fan and scraping motion on painted tile | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Polypropylene composite | Clay | Shredding | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 | (Raynor et al. 2012) |
| Polymer | Clay | Drilling | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 | (Sachse et al. 2012b) |
| Polymer | CNT | Abrasion | 10 | 0.03 | 0.083 | 1 | 15 | 3.333 | 15 | 15 | (Wohlleben et al. 2013) |
| Epoxy | CNT | Sanding | 10 | 0.02 | 0.083 | 1 | 10 | 2.222 | 10 | 10 | (Hirth et al. 2013) |
| Cement | CNT | Sanding | 10 | 0.02 | 0.083 | 1 | 10 | 2.222 | 10 | 10 |
| TPU | CNT | Sanding | 10 | 0.03 | 0.083 | 1 | 15 | 3.333 | 15 | 15 |
| POM | CNT | Sanding | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Polymer | CNT | Abrasion | 10 | 0.01 | 0.083 | 1 | 5 | 1.111 | 5 | 5 | (Schlagenhauf et al. 2012) |
| Polymer | CNT | Abrasion | 10 | 0.001 | 0.083 | 1 | 0.5 | 0.111 | 0.5 | 0.5 |
| Polymer | CNT | Grinding | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 | (Ogura et al. 2013) |
| Polymer | CNF | Weighing CNF |  |  | 0.083 | 1 | 0.064 | 0.014 | 0.064 | 0.064 | (Mazzuckelli et al. 2007) |
| Polymer | CNF | Mixing CNF with solvent |  |  | 0.083 | 1 | 0.093 | 0.021 | 0.093 | 0.093 |
| Polymer | CNF | Measurement on shelf near hood |  |  | 0.083 | 1 | 0.055 | 0.012 | 0.055 | 0.055 |
| Polymer | CNF | Operations on lab bench |  |  | 0.083 | 1 | 0.221 | 0.049 | 0.221 | 0.221 |
| Polymer | CNF | Wet saw: cutting CNF composite |  |  | 0.083 | 1 | 1.094 | 0.243 | 1.094 | 1.094 |
| Polymer | CNF | Cart with real-time instruments: different areas |  |  | 0.083 | 1 | 0.033 | 0.007 | 0.033 | 0.033 |
| Polymer | CNF | Cart with real-time instruments: different areas |  |  | 0.083 | 1 | 0.03 | 0.007 | 0.03 | 0.03 |
| Paint | TiO2 | Sanding | 10 | 0.098 | 0.083 | 1 | 49 | 10.889 | 49 | 49 | (Koponen et al. 2011) |
| Paint | TiO2 | Sanding | 10 | 0.1 | 0.083 | 1 | 50 | 11.111 | 50 | 50 |
| Paint | Clay | Sanding | 10 | 0.147 | 0.083 | 1 | 73.5 | 16.333 | 73.5 | 73.5 |
| Paint | CB | Sanding | 10 | 0.025 | 0.083 | 1 | 12.5 | 2.778 | 12.5 | 12.5 |
| Paint | TiO2 | Sanding | 10 | 0.1 | 0.083 | 1 | 50 | 11.111 | 50 | 50 |
| Paint | SiO2 | Sanding | 10 | 0.1 | 0.083 | 1 | 50 | 11.111 | 50 | 50 |
| Lacquer | SiO2 | Sanding | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Polymer | CNT | Sanding, sawing | 10 | 0.002 | 0.083 | 1 | 1 | 0.222 | 1 | 1 | (Gomez et al. 2014) |
| Paint | TiO2 | Sanding, sawing | 10 | 0.36 | 0.083 | 1 | 180 | 40.000 | 180 | 180 |
| Paint | TiO2 | Sanding, sawing | 10 | 0.36 | 0.083 | 1 | 180 | 40.000 | 180 | 180 |
| Polymer | SiO2 | Sanding | 10 | 0.04 | 0.083 | 1 | 20 | 4.444 | 20 | 20 | (Wohlleben et al. 2011) |
| Polymer | CNT | Sanding | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Concrete | CNT | Sanding | 10 | 0.02 | 0.083 | 1 | 10 | 2.222 | 10 | 10 |
| Polymer | SiO2 | Drilling | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 | (Sachse et al. 2012a) |
| Polymer | Clay | Drilling | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |
| Polymer | SiO2 | Crashing | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 | (Sachse et al. 2013) |
| Polymer | Clay | Crashing | 10 | 0.05 | 0.083 | 1 | 25 | 5.556 | 25 | 25 |

**Table S3b:** Calculations for dermal exposure assessment based on relevant literature using “Dermal A” scenario from R.15 (ECHA. 2012)

**Assumptions:** Body weight : 60 kg; Children’s body weight: 14.3 kg (Sagunski. 1995); Number of events per day: 1; Dilution factor: 1; Thickness of product layer on skin: 0.01cm; Fraction of contact area for skin, to account for the fact that the product is only partially in contact with the skin: 1; Volume of water in contact with skin: 10L. N/a: not applicable.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **R.15** | | | **ConsExpo** | | **ECETOC TRA** |  |
| Product | ENM | Exposure scenario | Qprod  g | Fcprod  g/gprod | Cprod  g/cm3 | RHOprod  g/cm3 | Vprod  cm3 | Askin  cm2 | **Cder**  mg/cm3 | **Lder**  mg/cm3 | **Dder**  mg/kgbw/d | **Cder**  mg/cm3 | **Dder**  mg/kgbw | **Dder**  mg/kgbw/d | Ref. |
| Fabric | Ag | Hand-washing of textiles | 200 | 0,31 |  |  | 10000 | 840 | 7,68E-01 | 7,68E-03 | 1,08E-01 | N/a | N/a | N/a | (Pasricha et al. 2012) |
| Fabric | Ag | Hand-washing of textiles | 200 | 0,11 |  |  | 10000 | 840 | 3,03E-01 | 3,03E-03 | 4,24E-02 | N/a | N/a | N/a |
| Fabric | Ag | Hand-washing of textiles | 200 | 0,1 |  |  | 10000 | 840 | 5,03E-01 | 5,03E-03 | 7,05E-02 | N/a | N/a | N/a |
| Fabric (X-static) | Ag | Hand-washing of textiles | 200 | 3,14E-04 |  |  | 10000 | 840 | 6,28E-03 | 6,28E-05 | 8,79E-04 | N/a | N/a | N/a | (Geranio et al. 2009) |
| Fabric (PLASMA-NP) | Ag | Hand-washing of textiles | 200 | 6,70E-05 |  |  | 10000 | 840 | 1,34E-03 | 1,34E-05 | 1,88E-04 | N/a | N/a | N/a |
| Fabric (AgCl lab made) | Ag | Hand-washing of textiles | 200 | 2,70E-06 |  |  | 10000 | 840 | 5,40E-05 | 5,40E-07 | 7,56E-06 | N/a | N/a | N/a |
| Fabric (AgCl binder - lab made) | Ag | Hand-washing of textiles | 200 | 2,40E-06 |  |  | 10000 | 840 | 4,80E-05 | 4,80E-07 | 6,72E-06 | N/a | N/a | N/a |
| Fabric (NP-PES-SURF - lab made) | Ag | Hand-washing of textiles | 200 | 1,01E-05 |  |  | 10000 | 840 | 2,02E-04 | 2,02E-06 | 2,83E-05 | N/a | N/a | N/a |
| Fabric (NP-PES) | Ag | Hand-washing of textiles | 200 | 1,30E-06 |  |  | 10000 | 840 | 2,60E-05 | 2,60E-07 | 3,64E-06 | N/a | N/a | N/a |
| fabric (NP-PES/PA) | Ag | Hand-washing of textiles | 200 | 4,30E-06 |  |  | 10000 | 840 | 8,60E-05 | 8,60E-07 | 1,20E-05 | N/a | N/a | N/a |
| Fabric (AgKillBAct) | Ag | Hand-washing of textiles | 200 | 3,77E-04 |  |  | 10000 | 840 | 7,54E-03 | 7,54E-05 | 1,06E-03 | N/a | N/a | N/a |
| Fabrics (T-shirt – commercial) | Ag | Hand-washing of textiles | 200 | 1,83E-04 |  |  | 10000 | 840 | 6,04E-04 | 6,04E-06 | 8,45E-05 | N/a | N/a | N/a | (Lorenz et al. 2012) |
| Fabrics (T-shirt – commercial) | Ag | Hand-washing of textiles | 200 | 4,50E-05 |  |  | 10000 | 840 | 9,72E-05 | 9,72E-07 | 1,36E-05 | N/a | N/a | N/a |
| Fabrics (socks - commercial) | Ag | Hand-washing of textiles | 200 | 2,93E-03 |  |  | 10000 | 840 | 1,15E-02 | 1,15E-04 | 1,61E-03 | N/a | N/a | N/a |
| Fabrics (trousers – commercial) | Ag | Hand-washing of textiles | 200 | 4,10E-05 |  |  | 10000 | 840 | 9,35E-05 | 9,35E-07 | 1,31E-05 | N/a | N/a | N/a |
| Fabrics (T-25-25 – lab made) | Ag | Hand-washing of textiles | 200 | 1,46E-05 |  |  | 10000 | 840 | 9,93E-05 | 9,93E-07 | 1,39E-05 | N/a | N/a | N/a | (Mitrano et al. 2014) |
| Fabrics (X-Static – lab made) | Ag | Hand-washing of textiles | 200 | 1,45E-02 |  |  | 10000 | 840 | 2,90E-03 | 2,90E-05 | 4,06E-04 | N/a | N/a | N/a |
| Fabrics (JMAC – lad made) | Ag | Hand-washing of textiles | 200 | 1,95E-05 |  |  | 10000 | 840 | 3,51E-05 | 3,51E-07 | 4,91E-06 | N/a | N/a | N/a |
| Fabrics (#382280 – lab made) | Ag | Hand-washing of textiles | 200 | 6,76E-05 |  |  | 10000 | 840 | 2,16E-04 | 2,16E-06 | 3,03E-05 | N/a | N/a | N/a |
| Sock | Ag | Hand-washing of textiles | 29,3 |  | 1,67E-06 |  |  | 840 | 1,67E-03 | 1,67E-05 | 2,34E-04 | N/a | N/a | N/a | (Benn and Westerhoff. 2008) |
| Sock | Ag | Hand-washing of textiles | 27,3 |  | 3,69E-06 |  |  | 840 | 3,69E-03 | 3,69E-05 | 5,17E-04 | N/a | N/a | N/a |
| Sock | Ag | Hand-washing of textiles | 23 |  | 3,30E-07 |  |  | 840 | 3,30E-04 | 3,30E-06 | 4,62E-05 | N/a | N/a | N/a |
| Sock | Ag | Hand-washing of textiles | 21,9 |  | 3,80E-08 |  |  | 840 | 3,80E-05 | 3,80E-07 | 5,32E-06 | N/a | N/a | N/a |
| Fabrics (adultsT-shirt) | TiO2 | Hand-washing of textiles | 203 |  | 5,83E-06 |  |  | 840 | 5,83E-03 | 5,83E-05 | 8,17E-04 | N/a | N/a | N/a | (Windler et al. 2012) |
| Pants (children) | TiO2 | Hand-washing of textiles | 68 |  | 5,83E-06 |  |  | 840 | 5,83E-03 | 5,83E-05 | 8,17E-04 | N/a | N/a | N/a |
| Fabrics (adultsT-shirt) | TiO2 | Hand-washing of textiles | 176 |  | 5,83E-06 |  |  | 840 | 5,83E-03 | 5,83E-05 | 8,17E-04 | N/a | N/a | N/a |
| T-shirt (children) | TiO2 | Hand-washing of textiles | 187 |  | 5,83E-06 |  |  | 840 | 5,83E-03 | 5,83E-05 | 8,17E-04 | N/a | N/a | N/a |
| T-shirt (children) | TiO2 | Hand-washing of textiles | 183 |  | 5,83E-06 |  |  | 840 | 5,83E-03 | 5,83E-05 | 8,17E-04 | N/a | N/a | N/a |
| Fabrics (adultsT-shirt) | TiO2 | Hand-washing of textiles | 89 |  | 3,92E-05 |  |  | 840 | 3,92E-02 | 3,92E-04 | 5,48E-03 | N/a | N/a | N/a |

**Table S3c:** Calculations for dermal exposure assessment based on relevant literature using “Dermal B” scenario from R.15 (ECHA. 2012)

**Assumptions:** Body weight : 60 kg; Children’s body weight: 14.3 kg (Sagunski. 1995); Number of events per day: 1; Dilution factor: 1; Thickness of product layer on skin: 0.01cm; Fraction of contact area for skin, to account for the fact that the product is only partially in contact with the skin: 1. N/a: not applicable.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  | **R.15** | | **ConsExpo** | | **ECETOC TRA** |  |
| Product | ENM | Exposure scenario | Qprod  g | Fcprod  g/gprod | Fcmigr  g/g/t | Askin  cm2 | Tcont.  h | **Lder**  mg/cm2 | **Dder**  mg/kgbw/d | **Lder**  mg/cm2 | **Dder**  mg/kgbw | **Dder**  mg/kgbw/d | Ref. |
| Fabric | Ag | Release in sweat pH 3 | 200 | 0.17 | 9.0E-07 | 4550 | 4 | 2.7E-05 | 2.0E-03 | 4.0E-05 | 3.0E-03 | N/a | (Yan et al. 2012) |
| Fabric | Ag | Release in sweat pH 8.5 | 200 | 0.17 | 3.2E-07 | 4550 | 4 | 9.6E-06 | 7.3E-04 | 1.4E-05 | 1.1E-03 | N/a |
| Fabric | Ag | Release in sweat pH 8 | 200 | 0.17 | 6.5E-07 | 4550 | 4 | 1.9E-05 | 1.5E-03 | 2.9E-05 | 2.2E-03 | N/a |
| Underwear | Ag | Release in simple sweat | 55 | 1.07E-03 | 1.18E-06 | 1300 | 24 | 1.3E-06 | 2.8E-05 | 5.0E-05 | 1.1E-03 | N/a | (Stefaniak et al. 2014) |
| Underwear | Ag | Release in SSFL, pH 5.3, 36°C | 55 | 1.07E-03 | 1.18E-06 | 1300 | 24 | 1.3E-06 | 2.8E-05 | 5.0E-05 | 1.1E-03 | N/a |
| Underwear | Ag | Release in SSFL, pH 4.5, 36°C | 55 | 1.07E-03 | 5.35E-07 | 1300 | 24 | 5.8E-07 | 1.3E-05 | 2.3E-05 | 4.9E-04 | N/a |
| Underwear | Ag | Release in SSFL, pH 5.3, 45°C | 55 | 1.07E-03 | 8.56E-07 | 1300 | 24 | 9.3E-07 | 2.0E-05 | 3.6E-05 | 7.8E-04 | N/a |
| Underwear | Ag | Release in SSFL, pH 4.5, 45°C | 55 | 1.07E-03 | 1.18E-06 | 1300 | 24 | 1.3E-06 | 2.8E-05 | 5.0E-05 | 1.1E-03 | N/a |
| Underwear | Ag | Release in SSFL (no Vitamin E), pH 5.3, 36°C | 55 | 1.07E-03 | 1.18E-06 | 1300 | 24 | 1.3E-06 | 2.8E-05 | 5.0E-05 | 1.1E-03 | N/a |
| Glove | Ag | Release in simple sweat | 100 | 1.10E-03 | 3.29E-07 | 840 | 24 | 1.0E-06 | 1.4E-05 | 3.9E-05 | 5.5E-04 | N/a |
| Glove | Ag | Release in SSFL, pH 5.3, 36°C | 100 | 1.10E-03 | 2.19E-07 | 840 | 24 | 6.7E-07 | 9.4E-06 | 2.6E-05 | 3.7E-04 | N/a |
| Glove | Ag | Release in SSFL, pH 4.5, 36°C | 100 | 1.10E-03 | 1.10E-07 | 840 | 24 | 3.4E-07 | 4.8E-06 | 1.3E-05 | 1.8E-04 | N/a |
| Glove | Ag | Release in SSFL, pH 5.3, 45°C | 100 | 1.10E-03 | 2.19E-07 | 840 | 24 | 6.9E-07 | 9.6E-06 | 2.6E-05 | 3.7E-04 | N/a |
| Glove | Ag | Release in SSFL, pH 4.5, 45°C | 100 | 1.10E-03 | 2.19E-07 | 840 | 24 | 6.9E-07 | 9.6E-06 | 2.6E-05 | 3.7E-04 | N/a |
| Glove | Ag | Release in SSFL (no Vitamin E), pH 5.3, 36°C | 100 | 1.10E-03 | 2.19E-07 | 840 | 24 | 6.9E-07 | 9.6E-06 | 2.6E-05 | 3.7E-04 | N/a |
| Male wool shirt | Ag | Release in acidic sweat | 89 | 1.83E-04 | 6.10E-05 | 5690 | 0.5 | 8.73E-08 | 8.28E-06 | 9.5E-04 | 9.0E-02 | N/a | (von Goetz et al. 2013a) |
| Male wool shirt | Ag | Release in alkaline sweat | 89 | 1.83E-04 | 4.50E-05 | 5690 | 0.5 | 6.44E-08 | 6.11E-06 | 7.0E-04 | 6.7E-02 | N/a |
| Female wool shirt | Ag | Release in acidic sweat | 64 | 1.83E-04 | 6.10E-05 | 4957 | 0.5 | 7.21E-08 | 5.95E-06 | 7.9E-04 | 6.5E-02 | N/a |
| Female wool shirt | Ag | Release in alkaline sweat | 65 | 1.83E-04 | 4.50E-05 | 4957 | 0.5 | 5.40E-08 | 4.46E-06 | 5.9E-04 | 4.9E-02 | N/a |
| Male trousers | Ag | Release in acidic sweat | 345 | 4.10E-05 | 2.30E-05 | 6360 | 0.5 | 2.56E-08 | 2.71E-06 | 1.2E-03 | 1.3E-01 | N/a |
| Female trousers | Ag | Release in acidic sweat | 300 | 4.10E-05 | 2.30E-05 | 5533 | 0.5 | 2.56E-08 | 2.36E-06 | 1.2E-03 | 1.2E-01 | N/a |
| Shirt | Ti | Release in acidic sweat | 203 | 7.15E-03 | 7.88E-04 | 5690 | 0.5 | 1.00E-04 | 9.53E-03 | 2.8E-02 | 2.7E+00 | N/a |
| Shirt | Ti | Release in alkaline sweat | 203 | 7.15E-03 | 2.26E-04 | 5690 | 0.5 | 2.88E-05 | 2.73E-03 | 8.1E-03 | 7.6E-01 | N/a |
| Fabric (lab made A1) | Ag | Leaching in sweat (AATCC pH 4.3) | 200 | 3.61E-05 | 2.10E-05 | 4550 | 24 | 8.01E-07 | 6.07E-05 | 9.2E-04 | 7.0E-02 | N/a | (Kulthong et al. 2010) |
| Fabric (lab made A1) | Ag | Leaching in sweat (ISO pH 5.5) | 200 | 3.61E-05 | 1.55E-05 | 4550 | 24 | 5.92E-07 | 4.49E-05 | 6.8E-04 | 5.2E-02 | N/a |
| Fabric (lab made A1) | Ag | Leaching in sweat (ISO pH 8.0) | 200 | 3.61E-05 | 3.43E-05 | 4550 | 24 | 1.31E-06 | 9.90E-05 | 1.5E-03 | 1.1E-01 | N/a |
| Fabric (lab made A1) | Ag | Leaching in sweat (EN pH 6.5) | 200 | 3.61E-05 | 3.58E-05 | 4550 | 24 | 1.37E-06 | 1.04E-04 | 1.6E-03 | 1.2E-01 | N/a |
| Fabric (lab made A2) | Ag | Leaching in sweat (AATCC pH 4.3) | 200 | 5.66E-03 | 3.34E-05 | 4550 | 24 | 1.99E-04 | 1.51E-02 | 1.5E-03 | 1.1E-01 | N/a |
| Fabric (lab made A2) | Ag | Leaching in sweat (ISO pH 5.5) | 200 | 5.66E-03 | 2.88E-05 | 4550 | 24 | 1.72E-04 | 1.30E-02 | 1.3E-03 | 9.6E-02 | N/a |
| Fabric (lab made A2) | Ag | Leaching in sweat (ISO pH 8.0) | 200 | 5.66E-03 | 6.65E-05 | 4550 | 24 | 3.97E-04 | 3.01E-02 | 2.9E-03 | 2.2E-01 | N/a |
| Fabric (lab made A2) | Ag | Leaching in sweat (EN pH 6.5) | 200 | 5.66E-03 | 7.80E-05 | 4550 | 24 | 4.65E-04 | 3.53E-02 | 3.4E-03 | 2.6E-01 | N/a |
| Fabric (lab made A3) | Ag | Leaching in sweat (AATCC pH 4.3) | 200 | 9.51E-03 | 7.02E-05 | 4550 | 24 | 7.04E-04 | 5.34E-02 | 3.1E-03 | 2.3E-01 | N/a |
| Fabric (lab made A3) | Ag | Leaching in sweat (ISO pH 5.5) | 200 | 9.51E-03 | 7.27E-05 | 4550 | 24 | 7.29E-04 | 5.53E-02 | 3.2E-03 | 2.4E-01 | N/a |
| Fabric (lab made A3) | Ag | Leaching in sweat (ISO pH 8.0) | 200 | 9.51E-03 | 8.22E-05 | 4550 | 24 | 8.25E-04 | 6.26E-02 | 3.6E-03 | 2.7E-01 | N/a |
| Fabric (lab made A3) | Ag | Leaching in sweat (EN pH 6.5) | 200 | 9.51E-03 | 1.52E-04 | 4550 | 24 | 1.53E-03 | 1.16E-01 | 6.7E-03 | 5.1E-01 | N/a |
| Fabric (lab made A4) | Ag | Leaching in sweat (AATCC pH 4.3) | 200 | 4.25E-04 | 2.18E-04 | 4550 | 24 | 9.76E-05 | 7.40E-03 | 9.6E-03 | 7.3E-01 | N/a |
| Fabric (lab made A4) | Ag | Leaching in sweat (ISO pH 5.5) | 200 | 4.25E-04 | 1.77E-04 | 4550 | 24 | 7.95E-05 | 6.03E-03 | 7.8E-03 | 5.9E-01 | N/a |
| Fabric (lab made A4) | Ag | Leaching in sweat (ISO pH 8.0) | 200 | 4.25E-04 | 2.86E-04 | 4550 | 24 | 1.28E-04 | 9.74E-03 | 1.3E-02 | 9.5E-01 | N/a |
| Fabric (lab made A4) | Ag | Leaching in sweat (EN pH 6.5) | 200 | 4.25E-04 | 3.22E-04 | 4550 | 24 | 1.45E-04 | 1.10E-02 | 1.4E-02 | 1.1E+00 | N/a |
| Fabric (commercial E) | Ag | Leaching in sweat (AATCC pH 4.3) | 200 | 1.52E-03 | 8.00E-08 | 4550 | 24 | 1.28E-07 | 9.70E-06 | 3.5E-06 | 2.7E-04 | N/a |
| Fabric (commercial E) | Ag | Leaching in sweat (ISO pH 5.5) | 200 | 1.52E-03 | 1.00E-08 | 4550 | 24 | 1.60E-08 | 1.21E-06 | 4.4E-07 | 3.3E-05 | N/a |
| Fabric (commercial E) | Ag | Leaching in sweat (ISO pH 8.0) | 200 | 1.52E-03 | 5.00E-07 | 4550 | 24 | 8.00E-07 | 6.06E-05 | 2.2E-05 | 1.7E-03 | N/a |
| Fabric (commercial E) | Ag | Leaching in sweat (EN pH 6.5) | 200 | 1.52E-03 | 3.60E-07 | 4550 | 24 | 5.76E-07 | 4.37E-05 | 1.6E-05 | 1.2E-03 | N/a |
| Fabric (commercial F) | Ag | Leaching in sweat (EN pH 6.5) | 200 | 1.22E-06 | 5.00E-08 | 4550 | 24 | 6.44E-11 | 4.88E-09 | 2.2E-06 | 1.7E-04 | N/a |
| Plush toy (interior foam) | Ag | Leaching in tap water | 50 | 4.82E-05 | 2.40E-07 | 320 | 2 | 3.62E-09 | 8.09E-08 | 3.8E-05 | 8.4E-04 | N/a | (Quadros et al. 2013) |
| Plush toy (interior foam) | Ag | Leaching in sweat | 50 | 4.82E-05 | 1.85E-05 | 320 | 2 | 2.79E-07 | 6.24E-06 | 2.9E-03 | 6.5E-02 | N/a |
| Plush toy (interior foam) | Ag | Leaching in urine | 50 | 4.82E-05 | 1.84E-05 | 320 | 2 | 2.77E-07 | 6.20E-06 | 2.9E-03 | 6.4E-02 | N/a |
| Plush toy (exterior fur) | Ag | Leaching in sweat | 50 | 6.00E-07 | 1.40E-07 | 320 | 2 | 2.63E-11 | 5.87E-10 | 2.2E-05 | 4.9E-04 | N/a |
| Plush toy (exterior fur) | Ag | Adsorbed to dermal wipes | 50 | 6.00E-07 | 1.38E-05 | 320 | 2 | 2.59E-09 | 5.79E-08 | 2.2E-03 | 4.8E-02 | N/a |
| Baby blanket | Ag | Leaching in tap water | 300 | 1.10E-04 | 1.60E-06 | 320 | 2 | 3.29E-07 | 7.37E-06 | 1.5E-03 | 3.4E-02 | N/a |
| Baby blanket | Ag | Leaching in sweat | 300 | 1.10E-04 | 4.80E-06 | 320 | 2 | 9.88E-07 | 2.21E-05 | 4.5E-03 | 1.0E-01 | N/a |
| Baby blanket | Ag | Leaching in urine | 300 | 1.10E-04 | 3.70E-06 | 320 | 2 | 7.62E-07 | 1.70E-05 | 3.5E-03 | 7.8E-02 |  |
| Baby blanket | Ag | Adsorbed to dermal wipes | 300 | 1.10E-04 | 2.30E-05 | 320 | 2 | 4.74E-06 | 1.06E-04 | 2.2E-02 | 4.8E-01 | N/a |
| Baby blanket | Ag | Leaching in HCl solution | 300 | 1.10E-04 | 4.70E-06 | 320 | 2 | 9.68E-07 | 2.17E-05 | 4.4E-03 | 9.9E-02 | N/a |
| Baby blanket | Ag | Leaching in saline | 300 | 1.10E-04 | 4.00E-06 | 320 | 2 | 8.24E-07 | 1.84E-05 | 3.8E-03 | 8.4E-02 | N/a |
| Surface wipes | Ag | Adsorbed to dermal wipes | 5 | 4.50E-06 | 2.30E-06 | 320 | 0.166667 | 2.70E-11 | 6.03E-10 | 3.6E-05 | 8.0E-04 | N/a |
| Kitchen scrubber | Ag | Adsorbed to dermal wipes | 5 | 4.60E-06 | 3.00E-07 | 320 | 0.166667 | 3.59E-12 | 8.04E-11 | 4.7E-06 | 1.0E-04 | N/a |
| Fabrics (athletic shirt) | Ag | Leaching in tap water | 178 | 3.00E-05 | 5.60E-07 | 4550 | 1 | 6.57E-10 | 4.98E-08 | 2.2E-05 | 1.7E-03 | N/a | (Benn et al. 2010) |
| Fabrics (unfinished cloth) | Ag | Leaching in tap water | 178 | 4.40E-05 | 5.00E-07 | 4550 | 1 | 8.61E-10 | 6.53E-08 | 2.0E-05 | 1.5E-03 | N/a |
| Fabrics (unfinished cloth) | Ag | Leaching in tap water | 178 | 4.40E-05 | 1.10E-06 | 4550 | 1 | 1.89E-09 | 1.44E-07 | 4.3E-05 | 3.3E-03 | N/a |
| Fabrics (medical mask) | Ag | Leaching in tap water | 2.2 | 2.70E-01 | 1.10E-05 | 590 | 1 | 1.11E-05 | 1.09E-04 | 4.1E-05 | 4.0E-04 | N/a |
| Fabrics (medical wipe) | Ag | Leaching in tap water | 3.5 | 2.30E-01 | 4.60E-05 | 840 | 1 | 4.41E-05 | 6.17E-04 | 1.9E-04 | 2.7E-03 | N/a |
| Fabrics (wipes) | Ag | Leaching in tap water | 8.6 | 2.70E-04 | 1.00E-07 | 840 | 1 | 2.76E-10 | 3.87E-09 | 1.0E-06 | 1.4E-05 | N/a |
| Teddy bear | Ag | Leaching in tap water | 377 | 7.00E-05 | 2.00E-07 | 320 | 1 | 1.65E-08 | 3.69E-07 | 2.4E-04 | 5.3E-03 | N/a |

**Table S3d:** Calculations for oral exposure assessment based on relevant literature.

**Assumptions:** For scenarios relevant for food ingestion from e.g. storage in plastic food containers, it was assumed consuming 500g of food per day, if not stated in the research paper. For scenarios relevant for drinking water, e.g. from ceramic filters, it was assumed to be 1L of water consumed per day. Body weight: 60 kg; number of events per day: 1; Dilution factor: 1; Fraction of product ingested: 1.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **R.15** | | **ConsExpo** | **ECETOC TRA** |  |
| Product | ENM | Exposure scenario | Qprod  g | Fcprod  g/gprod | Cprod  g/cm3 | RHOprod  g/cm3 | Vprod  cm3 | Vappl  cm3 | **Coral**  mg/cm3 | **Doral**  mg/kgbw/d | **Doral**  mg/kg | **Doral**  mg/kgbw/d | Ref. |
| Polyethylene film | TiO2 | Leaching in 3% acetic acid at 100°C, 8h |  |  | 1.21E-08 |  |  | 30 | 12.1 | 6.05E-06 | 6.05E-06 | 6.05E-06 | (Lin et al. 2014) |
| Polyethylene film | TiO2 | Leaching in 3% acetic acid at 75°C, 8h |  |  | 6.3E-09 |  |  | 30 | 6.3 | 3.15E-06 | 3.15E-06 | 3.15E-06 |
| Polyethylene film | TiO2 | Leaching in 3% acetic acid at 25°C, 8h |  |  | 1.40E-09 |  |  | 30 | 1.4 | 7.00E-07 | 7.00E-07 | 7.00E-07 |
| Polyethylene film | TiO2 | Leaching in 50% ethanol at 100°C, 8h |  |  | 2.10E-09 |  |  | 30 | 2.1 | 1.05E-06 | 1.05E-06 | 1.05E-06 |
| Polyethylene film | TiO2 | Leaching in 50% ethanol at 75°C, 8h |  |  | 6.00E-10 |  |  | 30 | 0.6 | 3.00E-07 | 3.00E-07 | 3.00E-07 |
| Polyethylene film | TiO2 | Leaching in 50% ethanol at 25°C, 8h |  |  | 5.00E-10 |  |  | 30 | 0.5 | 2.50E-07 | 2.50E-07 | 2.50E-07 |
| Polyethylene film | TiO2 | Leaching in 3% acetic acid at 70°C, 8h |  |  | 8.00E-09 |  |  | 30 | 8 | 4.00E-06 | 4.00E-06 | 4.00E-06 |
| Polyethylene film | TiO2 | Leaching in 3% acetic acid at 70°C, 8h |  |  | 7.00E-09 |  |  | 30 | 7 | 3.50E-06 | 3.50E-06 | 3.50E-06 |
| Ceramic filters (prepared by dipping) | Ag | Leaching in moderately hard synthetic water |  |  | 1.00E-05 |  |  | 1000 | 10000 | 1.67E-01 | 1.67E-01 | 1.67E-01 | (Ren and Smith. 2013) |
| Ceramic filters (prepared by painting) | Ag | Leaching in moderately hard synthetic water |  |  | 1.00E-05 |  |  | 1000 | 10000 | 1.67E-01 | 1.67E-01 | 1.67E-01 |
| Ceramic filters (prepared by dipping) | Ag | Leaching in moderately hard synthetic water with increased ionic strength |  |  | 5.00E-06 |  |  | 1000 | 5000 | 8.33E-02 | 8.33E-02 | 8.33E-02 |
| Ceramic filters (prepared by painting) | Ag | Leaching in moderately hard synthetic water with increased ionic strength |  |  | 5.00E-06 |  |  | 1000 | 5000 | 8.33E-02 | 8.33E-02 | 8.33E-02 |
| Ceramic filters (prepared by fire in) | Ag | Leaching in moderately hard synthetic water |  |  | 2.00E-08 |  |  | 1000 | 20 | 3.33E-04 | 3.33E-04 | 3.33E-04 |
| Ceramic filters (prepared by fire in) | Ag | Leaching in moderately hard synthetic water |  |  | 2.00E-08 |  |  | 1000 | 20 | 3.33E-04 | 3.33E-04 | 3.33E-04 |
| Food containers (EC) | Ag | Leaching in deionized water |  |  | 9E-10 |  |  | 500 | 0.9 | 7.50E-06 | 7.50E-06 | 7.50E-06 | (Hauri and Niece. 2011) |
| Food containers (EC) | Ag | Leaching in tap water |  |  | 9E-10 |  |  | 500 | 0.9 | 7.50E-06 | 7.50E-06 | 7.50E-06 |
| Food containers (EC) | Ag | Leaching in 5% acetic acid |  |  | 2.2E-09 |  |  | 500 | 2.2 | 1.83E-05 | 1.83E-05 | 1.83E-05 |
| Food containers (OC) | Ag | Leaching in deionized water |  |  | 4E-10 |  |  | 500 | 0.4 | 3.33E-06 | 3.33E-06 | 3.33E-06 |
| Food containers (OC) | Ag | Leaching in tap water |  |  | 3E-10 |  |  | 500 | 0.3 | 2.50E-06 | 2.50E-06 | 2.50E-06 |
| Food containers (OC) | Ag | Leaching in 5% acetic acid |  |  | 1.4E-09 |  |  | 500 | 1.4 | 1.17E-05 | 1.17E-05 | 1.17E-05 |
| PVC films | Ag | Leaching in chicken | 500 | 6.84E-06 |  |  |  |  | N/a | 0.057 | 0.057 | 0.057 | (Cushen et al. 2013) |
| PVC films | Ag | Leaching in chicken | 500 | 2.40E-07 |  |  |  |  | N/a | 0.002 | 0.002 | 0.002 |
| PE composites 0.5% Agion | Ag | Leaching in distilled water |  |  | 3.62E-10 |  |  | 500 | 0.362 | 3.02E-06 | 3.02E-06 | 3.02E-06 | (Cushen et al. 2014b) |
| PE composites 0.5% Agion | Ag | Leaching in 3% acetic acid |  |  | 1.02E-08 |  |  | 500 | 10.2 | 8.50E-05 | 8.50E-05 | 8.50E-05 |
| PE composites 1% Agion | Ag | Leaching in distilled water |  |  | 2.27E-09 |  |  | 500 | 2.27 | 1.89E-05 | 1.89E-05 | 1.89E-05 |
| PE composites 1% Agion | Ag | Leaching in 3% acetic acid |  |  | 5.74E-09 |  |  | 500 | 5.74 | 4.78E-05 | 4.78E-05 | 4.78E-05 |
| PE composites 2% Agion | Ag | Leaching in distilled water |  |  | 6.07E-09 |  |  | 500 | 6.07 | 5.06E-05 | 5.06E-05 | 5.06E-05 |
| PE composites 2% Agion | Ag | Leaching in 3% acetic acid |  |  | 3.32E-09 |  |  | 500 | 3.32 | 2.77E-05 | 2.77E-05 | 2.77E-05 |
| PE composites 0.1% AgNP | Ag | Leaching in distilled water |  |  | 6.91E-08 |  |  | 500 | 69.1 | 5.76E-04 | 5.76E-04 | 5.76E-04 |
| PE composites 0.1% AgNP | Ag | Leaching in 3% acetic acid |  |  | 0.00000012 |  |  | 500 | 120 | 1.00E-03 | 1.00E-03 | 1.00E-03 |
| PE composites 0.5% AgNP | Ag | Leaching in distilled water |  |  | 0.00000017 |  |  | 500 | 170 | 1.42E-03 | 1.42E-03 | 1.42E-03 |
| PE composites 0.5% AgNP | Ag | Leaching in 3% acetic acid |  |  | 4.5E-10 |  |  | 500 | 0.45 | 3.75E-06 | 3.75E-06 | 3.75E-06 |
| Food containers | Ag | Leaching in 3% acetic acid, 20°C, 10d |  |  | 3.4E-11 |  |  | 500 | 0.034 | 2.83E-07 | 2.83E-07 | 2.83E-07 | (Artiaga et al. 2014) |
| Food containers | Ag | Leaching in distilled water, 20°C, 10d |  |  | 1E-11 |  |  | 500 | 0.01 | 8.33E-08 | 8.33E-08 | 8.33E-08 |
| Food containers | Ag | Leaching in distilled water, 70°C, 2h |  |  | 4E-10 |  |  | 500 | 0.4 | 3.33E-06 | 3.33E-06 | 3.33E-06 |
| Food containers | Ag | Leaching in distilled water, 70°C, 2h |  |  | 2.67E-10 |  |  | 500 | 0.267 | 2.23E-06 | 2.23E-06 | 2.23E-06 |
| Food containers | Ag | Leaching in distilled water, 70°C, 2h |  |  | 3.16E-10 |  |  | 500 | 0.316 | 2.63E-06 | 2.63E-06 | 2.63E-06 |
| Food containers | Ag | Leaching in 3% acetic acid, 70°C, 2h |  |  | 3.88E-10 |  |  | 500 | 0.388 | 3.23E-06 | 3.23E-06 | 3.23E-06 |
| Food containers | Ag | Leaching in 3% acetic acid, 70°C, 2h |  |  | 2.89E-10 |  |  | 500 | 0.289 | 2.41E-06 | 2.41E-06 | 2.41E-06 |
| Food containers | Ag | Leaching in 3% acetic acid, 70°C, 2h |  |  | 3.18E-10 |  |  | 500 | 0.318 | 2.65E-06 | 2.65E-06 | 2.65E-06 |
| PE composites | Ag | Leaching in chicken | 500 | 2.60E-08 |  |  |  |  | N/a | 2.17E-04 | 2.17E-04 | 2.17E-04 | (Cushen et al. 2014b) |
| PE composites | Ag | Leaching in chicken | 500 | 3.10E-08 |  |  |  |  | N/a | 2.58E-04 | 2.58E-04 | 2.58E-04 |
| PE composites | Ag | Leaching in chicken | 500 | 4.20E-08 |  |  |  |  | N/a | 3.50E-04 | 3.50E-04 | 3.50E-04 |
| PE composites | Ag | Leaching in chicken | 500 | 3.90E-08 |  |  |  |  | N/a | 3.25E-04 | 3.25E-04 | 3.25E-04 |
| PE composites | CuO | Leaching in chicken | 500 | 2.65E-07 |  |  |  |  | N/a | 2.21E-03 | 2.21E-03 | 2.21E-03 |
| PE composites | CuO | Leaching in chicken | 500 | 3.51E-07 |  |  |  |  | N/a | 2.93E-03 | 2.93E-03 | 2.93E-03 |
| PE composites | CuO | Leaching in chicken | 500 | 2.07E-07 |  |  |  |  | N/a | 1.73E-03 | 1.73E-03 | 1.73E-03 |
| PE composites | CuO | Leaching in chicken | 500 | 3.82E-07 |  |  |  |  | N/a | 3.18E-03 | 3.18E-03 | 3.18E-03 |

# Weight of products

**Table S4:** Mass of different products used for calculations (when product weight was not reported in the published studies)

|  |  |  |
| --- | --- | --- |
| **Product** | **Weight** | **Reference** |
| T-shirt | 200g | http://www.amazon.co.uk/Fruit-Loom-Super-Premium-T-Shirt/dp/B0074RH2EE/ref=sr\_1\_3?ie=UTF8&qid=1430326635&sr=8-3&keywords=t-shirt |
| Men’s underwear | 55g | <http://www.cockeyed.com/science/weight/underwear-mens-boxer-briefs.html> |
| Men’s gloves | 100g | http://www.amazon.com/Ansell-ActivArmr-Resistant-Protection-Abrasion/dp/B00EW6NFE6 |
| Children’s gloves | 40g | <http://www.amazon.co.uk/Childrens-Gloves-Mitten-Thinsulate-Lining/dp/B009V1KYQE> |
| Plush toy | 50g | <http://www.amazon.com/Disney-Story-Peas-Pod-Plush/dp/B0041OCGZ8> |
| Baby blanket | 300g | http://www.amazon.co.uk/baby/dp/B002TQ8M4O/ref=sr\_1\_5?ie=UTF8&qid=1430326777&sr=8-5&keywords=baby+blanket |
| Dermal wipes | 5g | Assumed |
| Sippy ring | 10g | Assumed |
| Sippy cap | 20g | Assumed |
| Sippy cover | 20g | Assumed |

# References

Al-Kattan A, Wichser A, Vonbank R, Brunner S, Ulrich A, Zuin S, Nowack B. 2013. Release of TiO2 from paints containing pigment-TiO2 or nano-TiO2 by weathering. Environmental Science: Processes & Impacts 15:2186-2193.

Al-Kattan A, Wichser A, Zuin S, Arroyo Y, Golanski L, Ulrich A, Nowack B. 2014a. Behavior of TiO2 released from nano-TiO2-containing paint and comparison to pristine nano-TiO2. Environ Sci Technol 48(12), 6710-6718.

Al-Kattan A, Wichser A, Vonbank R, Brunner S, Ulrich A, Zuin S, Arroyo Y, Golanski L, Nowack B. 2014b. Characterization of materials released into water from paint containing nano-SiO2. Chemosphere 119:1314-1321.

Artiaga G, Ramos K, Ramos L, Cámara C, Gómez-Gómez M. 2014. Migration and characterisation of nanosilver from food containers by AF4-ICP-MS. Food Chem 166:76-85.

Bello D, Wardle BL, Yamamoto N, Guzman deVilloria R, Garcia EJ, Hart AJ, Ahn K, Ellenbecker MJ, Hallock M. 2009. Exposure to nanoscale particles and fibers during machining of hybrid advanced composites containing carbon nanotubes. Journal of Nanoparticle Research 11:231-249.

Bello D, Wardle BL, Zhang J, Yamamoto N, Santeufemio C, Hallock M, Virji MA. 2010. Characterization of exposures to nanoscale particles and fibers during solid core drilling of hybrid carbon nanotube advanced composites. International journal of occupational and environmental health 16:434-450.

Benn TM, Westerhoff P. 2008. Nanoparticle silver released into water from commercially available sock fabrics. Environ Sci Technol 42:4133-4139.

Benn T, Cavanagh B, Hristovski K, Posner JD, Westerhoff P. 2010. The Release of Nanosilver from Consumer Products Used in the Home. J Environ Qual 39:1875-1882.

Bielefeldt AR, Stewart MW, Mansfield E, Scott Summers R, Ryan JN. 2013. Effects of chlorine and other water quality parameters on the release of silver nanoparticles from a ceramic surface. Water Res 47:4032-4039.

Bossa N, Rose J, Chaurand P, Aguerre-Chariol O. 2013. Release of TiO2 nanoparticles from cement during their life cycle: step of use. Abstract from 8th International Conference on the Environmental Effects of Nanoparticles and Nanomaterials.

Bott J, Störmer A, Franz R. 2011. A Comprehensive Study into the Migration Potential of Nano Silver Particles from Food Contact Polyolefins. Regulation 10:19.

Busquets-Fité M, Fernandez E, Janer G, Vilar G, Vázquez-Campos S, Zanasca R, Citterio C, Mercante L, Puntes V. 2013. Exploring release and recovery of nanomaterials from commercial polymeric nanocomposites. Journal of Physics: Conference Series 429. No. 1. IOP Publishing.

Cena LG, Peters TM. 2011. Characterization and control of airborne particles emitted during production of epoxy/carbon nanotube nanocomposites. Journal of occupational and environmental hygiene 8:86-92.

Cushen M, Kerry J, Morris M, Cruz-Romero M, Cummins E. 2013. Migration and exposure assessment of silver from a PVC nanocomposite. Food Chem 139:389-397.

Cushen M, Kerry J, Morris M, Cruz-Romero M, Cummins E. 2014a. Silver migration from nanosilver and a commercially available zeolite filler polyethylene composites to food simulants. Food Additives & Contaminants: Part A 31.6:1132-1140.

Cushen M, Kerry J, Morris M, Cruz-Romero M, Cummins E. 2014b. Evaluation and simulation of silver and copper nanoparticle migration from polyethylene nanocomposites to food and an associated exposure assessment. J Agric Food Chem 62:1403-1411.

Delmaar J, Park M, Van Engelen J. 2005. ConsExpo 4.0 - Consumer exposure and uptake models - Program manual, http://rivm.openrepository.com/rivm/bitstream/10029/7307/1/320104004.pdf.

ECETOC. 2014. Technical Report No. 124 : Addendum to TR114 : Technical Basis for the TRA v3.1. European Centre for Ecotoxicology and Toxicology of Chemicals, Brussels, Belgium.

ECHA. 2012. Guidance on information requirements and chemical safety assessment, Chapter R. 15: Consumer exposure estimation. http://echa.europa.eu/documents/10162/13632/information\_requirements\_r15\_en.pdf.

Echegoyen Y, Nerín C. 2013. Nanoparticle release from nano-silver antimicrobial food containers. Food and Chemical Toxicology 62:16-22.

Farkas J, Peter H, Christian P, Gallego Urrea JA, Hassellov M, Tuoriniemi J, Gustafsson S, Olsson E, Hylland K, Thomas KV. 2011. Characterization of the effluent from a nanosilver producing washing machine. Environ Int 37:1057-1062.

Geranio L, Heuberger M, Nowack B. 2009. The Behavior of Silver Nanotextiles during Washing. Environ Sci Technol 43:8113-8118.

Göhler D, Nogowski A, Fiala P, Stintz M. 2013. Nanoparticle release from nanocomposites due to mechanical treatment at two stages of the life-cycle. Journal of Physics: Conference Series 429 No. 1. IOP Publishing.

Gohler D, Stintz M, Hillemann L, Vorbau M. 2010. Characterization of nanoparticle release from surface coatings by the simulation of a sanding process. Ann Occup Hyg 54:615-624.

Golanski L, Gaborieau A, Guiot A, Uzu G, Chatenet J, Tardif F. 2011. Characterization of abrasion-induced nanoparticle release from paints into liquids and air 304:012062.

Golanski L, Guiot A, Pras M, Malarde M, Tardif F. 2012. Release-ability of nano fillers from different nanomaterials (toward the acceptability of nanoproduct). Journal of Nanoparticle Research 14:1-9.

Gomez V, Levin M, Saber AT, Irusta S, Dal Maso M, Hanoi R, Santamaria J, Jensen KA, Wallin H, Koponen IK. 2014. Comparison of Dust Release from Epoxy and Paint Nanocomposites and Conventional Products during Sanding and Sawing. Ann Occup Hyg Meu046.

Gorham JM, Nguyen T, Bernard C, Stanley D, David Holbrook R. 2012. Photo‐induced surface transformations of silica nanocomposites. Surf Interface Anal 44:1572-1581.

Guiot A, Golanski L, Tardif F. 2009. Measurement of nanoparticle removal by abrasion.Journal of Physics: Conference Series 170. No. 1. IOP Publishing.

Hauri JF, Niece BK. 2011. Leaching of Silver from Silver-Impregnated Food Storage Containers. J Chem Educ 88:1407-1409.

Hirth S, Cena L, Cox G, Tomovic Z, Peters T, Wohlleben W. 2013. Scenarios and methods that induce protruding or released CNTs after degradation of nanocomposite materials. J Nanopart Res 15:1-15.

Holbrook RD, Rykaczewski K, Staymates ME. 2014. Dynamics of silver nanoparticle release from wound dressings revealed via in situ nanoscale imaging. J Mater Sci Mater Med 25:2481-2489.

Hsu L, Chein H. 2007. Evaluation of nanoparticle emission for TiO2 nanopowder coating materials. J Nanopart Res 9:157-163.

Huang G, Park JH, Cena LG, Shelton BL, Peters TM. 2012. Evaluation of airborne particle emissions from commercial products containing carbon nanotubes. Journal of Nanoparticle Research 14:1-13.

Huang Y, Chen S, Bing X, Gao C, Wang T, Yuan B. 2011. Nanosilver migrated into food-simulating solutions from commercially available food fresh containers. Packaging technology & science 24:291-297.

Impellitteri CA, Tolaymat TM, Scheckel KG. 2009. The Speciation of Silver Nanoparticles in Antimicrobial Fabric Before and After Exposure to a Hypochlorite/Detergent Solution. J Environ Qual 38:1528-1530.

Jiang L, Kondo A, Shigeta M, Endoh S, Uejima M, Ogurab I, Naito M. 2014. Evaluation of particles released from single-wall carbon nanotube/polymer composites with or without thermal aging by an accelerated abrasion test. Journal of occupational and environmental hygiene 11(10), 658-664.

Joyce-Wöhrmann RM, Hentschel T, Münstedt H. 2000. Thermoplastic Silver-Filled Polyurethanes for Antimicrobial Catheters. Advanced Engineering Materials 2:380-386.

Joyce-Wöhrmann RM, Münstedt H. 1999. Determination of the silver ion release from polyurethanes enriched with silver. Infection 27:S46-S48.

Kaegi R, Ulrich A, Sinnet B, Vonbank R, Wichser A, Zuleeg S, Simmler H, Brunner S, Vonmont H, Burkhardt M, Boller M. 2008. Synthetic TiO2 nanoparticle emission from exterior facades into the aquatic environment. Environmental Pollution 156:233-239.

Kaegi R, Sinnet B, Zuleeg S, Hagendorfer H, Mueller E, Vonbank R, Boller M, Burkhardt M. 2010. Release of silver nanoparticles from outdoor facades. Environmental Pollution 158:2900-2905.

Koponen IK, Jensen KA, Schneider T. 2011. Comparison of dust released from sanding conventional and nanoparticle-doped wall and wood coatings. Journal of exposure science and environmental epidemiology 21:408-418.

Kulthong K, Srisung S, Boonpavanitchakul K, Kangwansupamonkon W, Maniratanachote R. 2010. Determination of silver nanoparticle release from antibacterial fabrics into artificial sweat. Particle and Fibre Toxicology 7.

Le Bihan O, Shandilya N, Gheerardyn L, Guillon O, Dore E, Morgeneyer M. 2013. Investigation of the Release of Particles from a Nanocoated Product. Advances in Nanoparticles 2:39-44.

Lin Q, Li H, Zhong H, Zhao Q, Xiao D, Wang Z. 2014. Migration of Ti from nano-TiO2-polyethylene composite packaging into food simulants. Food Additives & Contaminants: Part A 31.7:1284-1290.

Lombi E, Donner E, Scheckel KG, Sekine R, Lorenz C, Von Goetz N, Nowack B. 2014. Silver speciation and release in commercial antimicrobial textiles as influenced by washing. Chemosphere 111:352-358.

Lorenz C, Windler L, von Goetz N, Lehmann RP, Schuppler M, Hungerbuehler K, Heuberger M, Nowack B. 2012. Characterization of silver release from commercially available functional (nano)textiles. Chemosphere 89:817-824.

Mazzuckelli LF, Methner MM, Birch ME, Evans DE, Ku B, Crouch K, Hoover MD. 2007. Identification and characterization of potential sources of worker exposure to carbon nanofibers during polymer composite laboratory operations. Journal of occupational and environmental hygiene 4:D125-D130.

Mitrano DM, Rimmele E, Wichser A, Erni R, Height M, Nowack B. 2014. Presence of Nanoparticles in Wash Water from Conventional Silver and Nano-Silver Textiles. ACS Nano 8(7), 7208-7219.

Nguyen T, Pellegrin B, Bernard C, Rabb S, Stuztman P, Gorham J, Gu X, Yu L, Chin J. 2012. Characterization of surface accumulation and release of nanosilica during irradiation of polymer nanocomposites by ultraviolet light. Journal of nanoscience and nanotechnology 12:6202-6215.

Nguyen T, Pellegrin B, Bernard C, Gu X, Gorham J, Stutzman P, Stanley D, Shapiro A, Byrd E, Hettenhouser R. 2011. Fate of nanoparticles during life cycle of polymer nanocomposites. Journal of Physics: Conference Series 304. No. 1. IOP Publishing.

Ogura I, Kotake M, Shigeta M, Uejima M, Saito K, Hashimoto N, Kishimoto A. 2013. Potential release of carbon nanotubes from their composites during grinding. Journal of Physics: Conference Series 429. No. 1. IOP Publishing.

Olabarrieta J, Zorita S, Peña I, Rioja N, Monzón O, Benguria P, Scifo L. 2012. Aging of photocatalytic coatings under a water flow: Long run performance and TiO2 nanoparticles release. Applied Catalysis B: Environmental 123:182-192.

Pasricha A, Jangra SL, Singh N, Dilbaghi N, Sood KN, Arora K, Pasricha R. 2012. Comparative study of leaching of silver nanoparticles from fabric and effective effluent treatment. Journal of Environmental Sciences 24:852-859.

Quadros ME, Pierson IV R, Tulve NS, Willis R, Rogers K, Thomas TA, Marr LC. 2013. Release of silver from nanotechnology-based consumer products for children. Environ Sci Technol 47:8894-8901.

Raynor PC, Cebula JI, Spangenberger JS, Olson BA, Dasch JM, D’Arcy JB. 2012. Assessing potential nanoparticle release during nanocomposite shredding using direct-reading instruments. Journal of occupational and environmental hygiene 9:1-13.

Ren D, Smith JA. 2013. Retention and transport of silver nanoparticles in a ceramic porous medium used for point-of-use water treatment. Environ Sci Technol 47:3825-3832.

Rigo C, Roman M, Munivrana I, Vindigni V, Azzena B, Barbante C, Cairns WRL. 2012. Characterization and evaluation of silver release from four different dressings used in burns care. Burns 38:1131-1142.

Sachse S, Gendre L, Silva F, Zhu H, Leszczyńska A, Pielichowski K, Ermini V, Njuguna J. 2013. On nanoparticles release from polymer nanocomposites for applications in lightweight automotive components. Journal of Physics: Conference Series 429. No. 1. IOP Publishing.

Sachse S, Silva F, Irfan A, Zhu H, Pielichowski K, Leszczynska A, Blazquez M, Kazmina O, Kuzmenko O, Njuguna J. 2012a. Physical characteristics of nanoparticles emitted during drilling of silica based polyamide 6 nanocomposites. IOP Conference Series: Materials Science and Engineering 40. No. 1. IOP Publishing.

Sachse S, Silva F, Zhu H, Irfan A, Leszczyńska A, Pielichowski K, Ermini V, Blazquez M, Kuzmenko O, Njuguna J. 2012b. The effect of nanoclay on dust generation during drilling of PA6 nanocomposites. Journal of Nanomaterials 2012:26.

Sagunski H. 1995. Standards zur Expositionsabschätzung. Bericht des Ausschusses für Umwelthygiene. Behörde für Arbeit, Gesundheit und Soziales Hamburg (Hrsg.). Hamburg, Germany. (Report in German).

Schlagenhauf L, Chu BT, Buha J, Nüesch F, Wang J. 2012. Release of carbon nanotubes from an epoxy-based nanocomposite during an abrasion process. Environ Sci Technol 46:7366-7372.

Shandilya N, Le Bihan O, Bressot C, Morgeneyer M. 2014. Evaluation of the particle aerosolization from n-TiO 2 photocatalytic nanocoatings under abrasion. Journal of Nanomaterials 2014.

Smirnova VV, Krasnoiarova OV, Pridvorova SM, Zherdev AV, Gmoshinskii IV, Kazydub GV, Popov KI, Khotimchenko SA. 2012. Characterization of silver nanoparticles migration from package materials destined for contact with foods. Vopr Pitan 81:34-39.

Song H, Li B, Lin Q, Wu H, Chen Y. 2011. Migration of silver from nanosilver–polyethylene composite packaging into food simulants. Food Additives & Contaminants: Part A 28:1758-1762.

Stefaniak AB, Duling MG, Lawrence RB, Thomas TA, LeBouf RF, Wade EE, Abbas Virji M. 2014. Dermal exposure potential from textiles that contain silver nanoparticles. International Journal of Occupational and Environmental Health 20:220-234.

Sung L, Stanley D, Gorham JM, Rabb S, Gu X, Lee LY, Nguyen T. 2014. A quantitative study of nanoparticle release from nanocoatings exposed to UV radiation. Journal of Coatings Technology and Research :1-15.

Vilar G, Fernández-Rosas E, Puntes V, Jamier V, Aubouy L, Vázquez-Campos S. 2013. Monitoring migration and transformation of nanomaterials in polymeric composites during accelerated aging 429:012044.

von Goetz N, Lorenz C, Windler L, Nowack B, Heuberger M, Hungerbuhler K. 2013a. Migration of Ag- and TiO2-(Nano)particles from Textiles into Artificial Sweat under Physical Stress: Experiments and Exposure Modeling. Environ Sci Technol 47:9979-87.

von Goetz N, Fabricius L, Glaus R, Weitbrecht V, Gunther D, Hungerbuhler K. 2013b. Migration of silver from commercial plastic food containers and implications for consumer exposure assessment. Food additives & contaminants.Part A, Chemistry, analysis, control, exposure & risk assessment 30:612-20.

Vorbau M, Hillemann L, Stintz M. 2009. Method for the characterization of the abrasion induced nanoparticle release into air from surface coatings. J Aerosol Sci 40:209-217.

Windler L, Lorenz C, von Goetz N, HungerbuÌˆhler K, Amberg M, Heuberger M, Nowack B. 2012. Release of Titanium Dioxide from Textiles during Washing. Environ Sci Technol 46:8181-8188.

Wohlleben W, Brill S, Meier MW, Mertler M, Cox G, Hirth S, von Vacano B, Strauss V, Treumann S, Wiench K. 2011. On the Lifecycle of Nanocomposites: Comparing Released Fragments and their In‐Vivo Hazards from Three Release Mechanisms and Four Nanocomposites. Small 7:2384-2395.

Wohlleben W, Cox G, Hirth S, Meier MW, Wohlleben W, Vogel S, Landsiedel R, Tomovic Z. 2013. Elastic CNT-polyurethane nanocomposite: Synthesis, performance and assessment of fragments released during use. Nanoscale 5:369-380.

Yan Y, Yang H, Li J, Lu X, Wang C. 2012. Release behavior of nano-silver textiles in simulated perspiration fluids. Text Res J 82:1422-1429.

Zanna S, Saulou C, Mercier-Bonin M, Despax B, Raynaud P, Seyeux A, Marcus P. 2010. Ageing of plasma-mediated coatings with embedded silver nanoparticles on stainless steel: An XPS and ToF-SIMS investigation. Appl Surf Sci 256:6499-6505.

Zorita S, Olabarrieta J, Benguria P. 2013. Photocatalytic pavements: release of TiO2 nanoparticles during different aging processes. Abstract from 8th International Conference on the Environmental Effects of Nanoparticles and Nanomaterials.

Zuin S, Gaiani M, Ferrari A, Golanski L. 2014a. Leaching of nanoparticles from experimental water-borne paints under laboratory test conditions. Journal of nanoparticle research 16:1-17.

Zuin S, Massari A, Ferrari A, Golanski L. 2014b. Formulation effects on the release of silica dioxide nanoparticles from paint debris to water. Sci Total Environ 476:298-307.