**A Generic Scenario Analysis of End-of-Life Plastic Management: Chemical Additives**

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**A. General assumptions used for the material flow analyses of plastics in end-of-life (EoL) stages**

**Table A1.** Assumptions used in the generic scenario calculations

|  |  |
| --- | --- |
| **Assumptions** | **Justification** |
| Accumulation during the consumer use phase is 0 | It is difficult to predict the use-time of a particular plastic product. Thus, in reality, this assumption is not perfectly accurate. For example, in some applications such as food storage, people will use the container for years before discarding/recycling it. Alternatively, some plastics are used as single-use items (food wrapping, utensils, plates). |
| 10% of plastic produced ends up in the environment/ocean | Realistically, plastics sent to landfills are likely to migrate to another environment. Plastic landfills do hold plastics within the containment barrier. However, a fraction of plastics does not make it into the containment. Transportation between stages, collection, sorting, and littering are all factors that contribute to plastics release. |
| Additives composition varies between a specific range based on types. To ensure that the general mass balance of all additive types are accounted for in a given stream, the lowest composition of additive was used for all material balances | Refer to the Material Flow Analysis spreadsheet available in: <https://github.com/USEPA/GS_End-of-Life_Plastic_Additives>  Plastics manufactured do not necessarily always use every additive possible. In some cases, one plastic product may use fillers, while another type uses none. Using minimum composition lets us assume that, on average, the fraction of added additives to omitted additives balances the minimum composition. This assumption was made because the average additive composition for "Other plastics" nets a negative polymer resin mass, which is not possible in reality. For instance, suppose that a plastic product is made out of base resin (A), additive B, and additive C. Additive B can range between 5 – 70% of the total mass, while additive eC can range between 10 - 50% of the total mass. The highest additive composition mixture in this situation would result in 120% additives, an impossible scenario. The lowest additive composition equates to 15% additives and 85% base resin.  Our work considers a longer list of additives that could be present. Using the compositions still the additive content to a value higher than 100%. Instead, low composition for all chemical additives is chosen because we also considered the possibility that some additives may not be found in all plastics generated. |
| 2% of total plastic waste generated becomes litter | Jambeck et al. 2015 reported a 2% littering rate for plastic waste in their analysis |
| Degradation of plastic waste in landfill is too slow for appreciable mass loss | Plastic waste can take hundreds of years to degrade in the environment. When performing a material flow analysis on the basis of one year, the mass loss of plastic waste can be considered negligible. However, mass loss to the environment such as the ocean should be considered. This assumption is valid only for material flow analysis involving plastic components. If we factor in the rest of the MSW that ended up in the landfill, the degradation products cannot be neglected. |
| Incineration of plastic waste results in ash content equal to 1% of the original volume | Refer to the Material Flow Analysis spreadsheet available in: <https://github.com/USEPA/GS_End-of-Life_Plastic_Additives>  Using the average ash density of 2.05 g/cm3, average polymer density of 0.000413367 tons/cm3, or 0.375 kg/cm3 (calculated in the generic polymer stream tab), we can calculate the ash content generated. The remaining mass has already been converted to a standardized unit of CO2-eq and thus will not appear balanced. |
| 2% of additives migrated during the use phase | We have very limited information on migrated chemicals during the use phase because it is difficult and time-consuming to do individual studies. However, we have compiled and estimated this migration using existing data from Crompton (2007), who analyzed additive migration over 30 days at 20°C.  Source: T. R. Crompton, Additive migration from plastics into food: a guide for analytical chemists, New ed. Shawbury: Smithers Rapra Technology, 2007. |
| 0.00047% of polymer/plastic/monomer migrated during use phase | Like the previous assumption, Crompton (2007)’s migration data was used. This value of 0.00047% came from the possibility of PDMS dissolving in oily products. This value is the only contributing factor to polymer migration at this time. More available data will improve the accuracy.  Source: T. R. Crompton, Additive migration from plastics into food: a guide for analytical chemists, New ed. Shawbury: Smithers Rapra Technology, 2007. |
| Emissions in the unit of tons CO2 equivalent is not considered part of the mass | The emissions calculated were based on average endpoint data. The specifics of the identity of the "emission" are unspecified. However, for this study, we assumed that the emissions come from running the process, using substances integral to the operation, and other releases that do not include plastics/additives. Note that tons of CO2 equivalent are simply a way of standardizing the impacts of different released substances. A higher mass of CO2 equivalent signifies a high environmental impact. Therefore, different chemicals are assigned different values of CO2 equivalency. |
| Microplastics/Plastic components make up 0.01% of the compost's mass | Plastic-coated products have the potential to contaminate compost. Brinton et al. 2018 tested the content of microplastics in plastic-coated paper products (milk and juice cartons, hot and cold paper drinking cups, frozen food containers, take-out containers, paper plates, and plastic-lined paper bags). During composting, these plastic coatings break down into smaller components (microplastics) rather than succumbing to biodegradation. Unfortunately, these microplastics can produce persistent organic pollutants such as DDT, PCBs, and dioxins. Eventually, these toxic chemicals may find their way into wildlife and the food chain.  Source: W. Brinton, C. Dietz, A. Bouyounan, and D. Matsch, “Microplastics in Compost: The Environmental Hazards Inherent in the Composting of Plastic-Coated Paper Products,” p. 19, 2018. |
| The incineration of 1 MT (1.1 US tons) of MSW releases approximately 0.95 MT CO2-eq (or 1.05 tons CO2-eq) | A background paper on "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" reported that the incineration of 1 MT of MSW releases between 0.7-1.2 MT of CO2. An average value of 0.95 MT was used.  Source: Intergovernmental Panel on Climate Change (IPCC), IPCC Expert Meetings on Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. Institute for Global Environmental Strategies (IGES) for the IPCC, 2002. |
| Polymer recovery rate = 66.7-94% | van Velzen et al. 2017 performed a study on the polymer recovery efficiency via mechanical recycling and determined that the net polymer yields have varied between 66.7 – 94% for a standard recycling process. Some contaminants are partially removed following the same process. Additionally, a recent material recycling facility constructed in Philadelphia has demonstrated a recycling efficiency of 64%. We estimated a 66.7% efficiency for this one iteration. Opportunities for sensitivity analysis are available for this parameter  Source: E. U. T. van Velzen, M. Jansen, M. T. Brouwer, A. Feil, K. Molenveld, and T. Pretz, “Efficiency of recycling post-consumer plastic packages,” Lyon, France, 2017, p. 170002. doi: 10.1063/1.5016785. |
| 2% of the additives subjected to mechanical recycling have migrated from the polymer matrix | van Velzen et al. 2017 reported that approximately 1-3% of the recovered polymer mass appeared as dissolved substances that were separated during the polymer wash. Although they were not specific about the identity of the dissolved substances, we can approximate that the dissolved substances are volatile/semi-volatile additives  Source: E. U. T. van Velzen, M. Jansen, M. T. Brouwer, A. Feil, K. Molenveld, and T. Pretz, “Efficiency of recycling post-consumer plastic packages,” Lyon, France, 2017, p. 170002. doi: 10.1063/1.5016785. |
| Additives added to help the polymer processability is lumped into the contamination stream #19 | Refer to the Material Flow Analysis spreadsheet available in: <https://github.com/USEPA/GS_End-of-Life_Plastic_Additives>  The spreadsheets available provides the calculations that this assumption is referencing.  Please also refer to Section C diagrams for stream #19’s relation to the rest of the plastic life cycle.  Horodytska (2020) study focuses on determining chemicals found in recycled plastic after being subjected to mechanical recycling. During recycling, we know that more additives are added to improve processability. However, some of the same additives can migrate out. Therefore, the contamination stream is the "net" mass flow rate of chemicals into recycled plastics.  Source: O. Horodytska, A. Cabanes, and A. Fullana, “Non-intentionally added substances (NIAS) in recycled plastics,” Chemosphere, vol. 251, p. 126373, Jul. 2020, doi: 10.1016/j.chemosphere.2020.126373. |
| The contamination/degradation products entering the manufacturing phase are neglected from Stream 4 | Refer to the Material Flow Analysis spreadsheet available in: <https://github.com/USEPA/GS_End-of-Life_Plastic_Additives>  Please also refer to Section C diagrams for streams #4 and #20 and their relations to the rest of the plastic life cycle.  If we account for the contamination/degradation of chemicals from stream 20 (recycled), we will enter a calculation loop. The contaminants/degradation from the plastic's previous life would get added to the next cycle. |
| Plastic Waste Import/Export - Ethylene = HDPE/LDPE are evenly split  “Other plastics” include uncategorized plastics and polyethylene therephthalate at a 60:40 wt ratio | UN COMTRADE database grouped all ethylene polymers into one category rather than specifying HDPE, LDPE, and PET. Therefore, dividing the values into three is chosen as an assumption for calculation.  According to Ma et al. 2020, PET imports account for 40% of the world’s total export. Although variation is expected between countries, using a global average to estimate an unknown fraction should be reasonable.  Therefore, based on the UN COMTRADE data regarding plastic waste import/export/re-export, we assume that 40% of “Other plastics” are PET and 60% contains other uncategorized plastic wastes.  Source: Z. Ma, M. W. Ryberg, P. Wang, L. Tang, and W.-Q. Chen, “China’s Import of Waste PET Bottles Benefited Global Plastic Circularity and Environmental Performance,” ACS Sustainable Chemistry & Engineering, vol. 8, no. 45, pp. 16861–16868, Nov. 2020, doi: 10.1021/acssuschemeng.0c05926.  United Nations, “UN Comtrade,” 2021. [Online]. Available: https://comtrade.un.org/data/ |
| 1/3 of Domestically Recycled Plastic is sent to incineration/landfill due to inefficiency problem | Only 3.9% has been domestically recycled in the United States, while 4.5% has been exported for recycling in 2018. State-of-the-art technology could realistically recover 2/3 of the plastics sent for recycling, leaving 1/3 as waste. This assumption is a "best-case scenario." |
| Landfill leachate release additive at a 0.001% rate | Landfill sites in industrialized countries have been known to perform leachate treatments such as aerobic and membrane bioreactors to reduce the BPA concentration to 0.11 – 30 μg/L. Without proper leachate treatment, plastic additives and BPA could be released into the environment and contaminate the nearby water supply. The rate of leachate release has been estimated to vary between 20 – 30% of the wastes placed in the landfill 23. Our generic scenario holds that over 146 million tons of waste have been sent for landfilling in 2018, with each landfill receiving on average 55,000 tons of MSW/day. The potential leachate generated from landfills may approach 29.2 – 43.8 million tons/yr, or 11,000 – 16,500 tons/(yr·site). For a given site, the estimated yearly chemical additive release through leachate equates to 0.11 – 0.165 tons/(yr·site) (0.001% additive in leachate).  Source: E. L. Teuten, J. M. Saquing, D. R. U. Knappe, M. A. Barlaz, S. Jonsson, A. Björn, S. J. Rowland, R. C. Thompson, T. S. Galloway, R. Yamashita, D. Ochi, Y. Watanuki, C. Moore, P. H. Viet, T. S. Tana, M. Prudente, R. Boonyatumanond, M. P. Zakaria, K. Akkhavong, Y. Ogata, H. Hirai, S. Iwasa, K. Mizukawa, Y. Hagino, A. Imamura, M. Saha and H. Takada, Transport and release of chemicals from plastics to the environment and to wildlife, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 2009, **364**, 2027–2045. |

**B. Incineration process requirements and crucial parameters for modeling the dispersion of pollutants**

**Table B1.** The typical concentration of pollutants generated from incineration furnace, maximum admissible exhaust, and removal efficiency required for gas cleaning systems

|  |  |  |  |
| --- | --- | --- | --- |
| **Pollutant** | **Before Gas Treatment (mg/Nm3)** | **After Gas Treatment (mg/Nm3)** | **Legal Limits (mg/Nm3)** |
| Dust | 1000 – 5000 | 0.1 – 4 | 10 |
| CO | 5 – 50 | 2 – 45 | 50 |
| Total Organic Carbon | 1 – 10 | 0.1 – 5 | 10 |
| Fly Ash | 1500 – 2000 | 10 | 10 |
| HCl | 500 – 2000 | 10 | 10 |
| SO2 | 200 – 1000 | 0.2 – 20 | 50 |
| NOx | 200 – 500 | 20 – 180 | 200 |
| HF | 5 – 20 | 0.01 – 0.1 | 1 |
| Hg | 0.05 – 0.5 | 0.0002 – 0.05 | 0.05 |
| Heavy metals (Cd, Tl, Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V) | < 50 | 0.0002 – 0.05 | 0.05 |
| Dioxins and Furans (ng I-TEQ/Nm3) | 0.5 – 10 | 0.0002 – 0.08 | 0.1 |
| CO2 | 5 – 10% | - | - |
| H2O | 10 – 20% | - | - |

**Reference**: M. J. Quina, J. Bordado and R. Quinta-Ferreira, in The Impact of Air Pollution on Health, Economy, Environment and Agricultural Sources, ed. M. Khallaf, InTech, 2011.

**Table B2.** Parameters used to estimate the ground-level concentration based on dispersion of plume from a point source (incinerator)

|  |  |
| --- | --- |
| **Dispersion Model Parameter** | **Value** |
| Average Wind Speed (m/s) | 4.06 |
| Average Temperature (°F) | 52 |
| Average Pressure (psia) | 14.73 |
| Night/Day | Day (1hr after dawn) |
| Condition | Moderate |
| Weather Stability | Neutrally Stable |
| Location | Urban/Rural |
| Incineration Stack Height (ft) | 15 - 200 |
| Gas Release Rate (SCFM) | 500 – 50,000 |

**Additional Information:**

Time of day (day/night), weather stability (extremely unstable/moderately unstable/slightly unstable/neutrally stable/slightly stable/moderately stable), condition (strong/moderate/slight), and location (urban/rural) are used to determine the recommended equations for Pasquill-Gifford Dispersion Coefficients.

Weather stability depends on windspeed and quantity of sunlight.

Night time is defined as 1 hour before sunset, while daytime is defined as 1 hour after dawn. Weather stability is a function of the time of day.

The “strong” condition corresponds to a sunny midday in midsummer in England. “Slight” condition corresponds to a sunny midday in midwinter. “Moderate” condition is in between strong and slight condition.

Location (urban/rural) considers the effects of obstruction that may prevent the wind from dispersing gaseous pollutant from reaching a longer distance. Rural area generally has less obstruction, leading to a longer range dispersion than urban environment.

Crowl and Louvar 2011 contains different correlations for all cases of gas dispersion, based on the chosen assumptions.

**References:**

D. A. Crowl and J. F. Louvar, Chemical process safety: fundamentals with applications, Prentice Hall, Upper Saddle River, NJ, 3rd ed., 2011.

Barometric Pressure Summary, <https://www.planoweather.com/wxbarosummary.php>.

Annual Average Wind Speed in US Cities, https://www.currentresults.com/Weather/US/wind-speed-city-annual.php.

Average annual temperature in the U.S. from 1895 to 2020, https://www.statista.com/statistics/500472/annual-average-temperature-in-the-us/.

US EPA, “Air Pollution Control Technology Fact Sheet - Thermal Incinerator.” U.S. Environmental Protection Agency, 2003. [Online]. Available: <https://www3.epa.gov/ttnchie1/mkb/documents/fthermal.pdf>

**C. Overall material flow analysis results for sensitivity analysis scenarios**

**Figure C1.** Scenario 1 – only utilizing mechanical recycling (the state of plastic wastes management in 2018)



**Figure C2.** Scenario 2 – the combination of chemical and mechanical recycling



**Figure C3.** Scenario 3 – implementing chemical additive extraction stage post-mechanical recycling



**Table C1.** Material Flow Analysis Stream summary. This result corresponds to Figure C1 (Scenario 1)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Stream** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |
|  | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] |
| **Polyethylene Terephthalate (PET)** | 4,639,200 | 0 | 0 | 5,217,459 | 25 | 5,217,434 | 0 | 214,534 | 104,291 |
| **High Density Polyethylene (HDPE)** | 5,912,896 | 0 | 0 | 6,142,207 | 29 | 6,142,178 | 0 | 448,038 | 122,522 |
| **Polyvinyl Chloride (PVC)** | 710,974 | 0 | 0 | 743,395 | 4 | 743,391 | 0 | 121,749 | 14,860 |
| **Low Density Polyethylene (LDPE)** | 8,192,691 | 0 | 0 | 8,366,180 | 39 | 8,366,140 | 0 | 448,498 | 167,230 |
| **Polylactic Acid (PLA)** | 66,336 | 0 | 0 | 66,336 | 0 | 66,336 | 0 | 0 | 1,326 |
| **Polypropylene (PP)** | 7,982,685 | 0 | 0 | 7,997,513 | 38 | 7,997,475 | 0 | 0 | 159,861 |
| **Polystyrene (PS)** | 2,200,480 | 0 | 0 | 2,225,960 | 10 | 2,225,949 | 0 | 27,664 | 44,494 |
| **Other Plastics** | 2,403,445 | 0 | 0 | 2,977,806 | 14 | 2,977,792 | 0 | 233,554 | 59,523 |
| **Plasticizer** | 0 | 407,991 | 0 | 508,715 | 10,147 | 498,568 | 0 | 46,359 | 10,169 |
| **Flame Retardant** | 0 | 211,396 | 0 | 227,303 | 4,534 | 222,769 | 0 | 10,248 | 4,544 |
| **UV/Heat Stabilizer** | 0 | 253,672 | 0 | 273,497 | 5,455 | 268,042 | 0 | 15,301 | 5,719 |
| **Antioxidant** | 0 | 143,797 | 0 | 151,865 | 3,029 | 148,836 | 0 | 7,061 | 3,036 |
| **Slip Agents** | 0 | 22,693 | 0 | 23,987 | 478 | 23,508 | 0 | 952 | 479 |
| **Lubricants** | 0 | 3,990 | 0 | 4,997 | 100 | 4,898 | 0 | 464 | 100 |
| **Antistatics** | 0 | 9,980 | 0 | 11,703 | 233 | 11,470 | 0 | 572 | 234 |
| **Curing Agents** | 0 | 3,187 | 0 | 4,158 | 83 | 4,075 | 0 | 326 | 83 |
| **Blowing Agents** | 0 | 15,935 | 0 | 20,788 | 415 | 20,374 | 0 | 1,630 | 416 |
| **Biocides** | 0 | 33 | 0 | 42 | 1 | 42 | 0 | 3 | 1 |
| **Colorant** | 0 | 51,592 | 0 | 55,569 | 1,108 | 54,460 | 0 | 3,530 | 1,111 |
| **Organic Pigment** | 0 | 269 | 0 | 293 | 6 | 287 | 0 | 16 | 7 |
| **Clarifier/Toner** | 0 | 2,381 | 0 | 2,639 | 53 | 2,586 | 0 | 82 | 53 |
| **Inorganic Pigments** | 0 | 319 | 0 | 416 | 8 | 407 | 0 | 33 | 8 |
| **Fillers** | 0 | 33 | 0 | 42 | 1 | 42 | 0 | 3 | 1 |
| **Reinforcement** | 0 | 491,550 | 0 | 637,143 | 12,708 | 624,435 | 0 | 48,914 | 12,736 |
| **Misc. Inorganic Wastes** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,063,804 | 0 |
| **Other** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,560,816 | 0 |
| **Yard Trimmings** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35,375,560 | 0 |
| **Food** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 63,120,524 | 0 |
| **Rubber, Leather, Textiles** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26,195,456 | 0 |
| **Wood** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,097,084 | 0 |
| **Metals** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25,610,736 | 0 |
| **Glass** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,249,884 | 0 |
| **Paper and Paperboard** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67,388,980 | 0 |
| **Contaminants** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Additive Degradation Products** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Ash** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total Mass excluding emissions** | 32,108,707 | 1,618,817 | 0 | 35,660,011 | 38,518 | 35,621,493 | 0 | 258,292,372 | 713,200 |
| **Total Plastics** | 32,108,707 | 0 | 0 | 33,736,855 | 159 | 33,736,696 | 0 | 1,494,035 | 674,106 |
| **Total Additives** | 0 | 1,618,817 | 0 | 1,923,156 | 38,359 | 1,884,797 | 0 | 135,493 | 38,695 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Stream** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
|  | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] |
| **Polyethylene Terephthalate (PET)** | 5,327,678 | 0 | 0 | 623 | 0 | 0 | 406,666 | 0 | 0 |
| **High Density Polyethylene (HDPE)** | 6,467,693 | 0 | 0 | 732 | 0 | 0 | 246,870 | 0 | 0 |
| **Polyvinyl Chloride (PVC)** | 850,281 | 0 | 0 | 89 | 0 | 0 | 0 | 0 | 0 |
| **Low Density Polyethylene (LDPE)** | 8,647,408 | 0 | 0 | 999 | 0 | 0 | 163,278 | 0 | 0 |
| **Polylactic Acid (PLA)** | 65,010 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 |
| **Polypropylene (PP)** | 7,837,615 | 0 | 0 | 955 | 0 | 0 | 22,231 | 0 | 0 |
| **Polystyrene (PS)** | 2,209,119 | 0 | 0 | 266 | 0 | 0 | 8,925 | 0 | 0 |
| **Other Plastics** | 3,151,823 | 0 | 0 | 356 | 0 | 0 | 360,014 | 0 | 0 |
| **Plasticizer** | 534,758 | 0 | 0 | 61 | 0 | 0 | 50,266 | 0 | 1,005 |
| **Flame Retardant** | 228,473 | 0 | 0 | 27 | 0 | 0 | 9,510 | 0 | 190 |
| **UV/Heat Stabilizer** | 277,624 | 0 | 0 | 34 | 0 | 0 | 11,964 | 0 | 239 |
| **Antioxidant** | 152,861 | 0 | 0 | 18 | 0 | 0 | 4,778 | 0 | 96 |
| **Slip Agents** | 23,981 | 0 | 0 | 3 | 0 | 0 | 702 | 0 | 14 |
| **Lubricants** | 5,261 | 0 | 0 | 1 | 0 | 0 | 503 | 0 | 10 |
| **Antistatics** | 11,808 | 0 | 0 | 1 | 0 | 0 | 924 | 0 | 18 |
| **Curing Agents** | 4,318 | 0 | 0 | 0 | 0 | 0 | 503 | 0 | 10 |
| **Blowing Agents** | 21,589 | 0 | 0 | 2 | 0 | 0 | 2,513 | 0 | 50 |
| **Biocides** | 44 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| **Colorant** | 56,880 | 0 | 0 | 7 | 0 | 0 | 2,332 | 0 | 47 |
| **Organic Pigment** | 296 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 |
| **Clarifier/Toner** | 2,615 | 0 | 0 | 0 | 0 | 0 | 141 | 0 | 3 |
| **Inorganic Pigments** | 432 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 1 |
| **Fillers** | 44 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| **Reinforcement** | 660,613 | 0 | 0 | 76 | 0 | 0 | 75,399 | 0 | 1,508 |
| **Misc. Inorganic Wastes** | 4,063,804 | 794,880 | 3,215,960 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Other** | 4,560,816 | 656,640 | 2,923,600 | 0 | 966,000 | 0 | 0 | 0 | 0 |
| **Yard Trimmings** | 35,375,560 | 2,557,440 | 10,524,960 | 22,279,800 | 0 | 0 | 0 | 0 | 0 |
| **Food** | 63,120,524 | 7,534,080 | 35,229,380 | 20,320,200 | 0 | 0 | 0 | 0 | 0 |
| **Rubber, Leather, Textiles** | 26,195,456 | 5,736,960 | 16,225,980 | 0 | 4,181,400 | 0 | 0 | 0 | 0 |
| **Wood** | 18,097,084 | 2,833,920 | 12,132,940 | 0 | 3,098,100 | 0 | 0 | 0 | 0 |
| **Metals** | 25,610,736 | 2,937,600 | 13,887,100 | 0 | 8,714,700 | 0 | 0 | 0 | 0 |
| **Glass** | 12,249,884 | 1,624,320 | 7,601,360 | 0 | 3,056,700 | 0 | 0 | 0 | 0 |
| **Paper and Paperboard** | 67,388,980 | 4,216,320 | 17,249,240 | 0 | 45,954,000 | 0 | 0 | 0 | 0 |
| **Contaminants** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Additive Degradation Products** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Ash** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total Mass excluding emissions** | 293,201,065 | 28,892,160 | 118,990,520 | 42,604,258 | 65,970,900 | 0 | 1,367,592 | 0 | 3,192 |
| **Total Plastics** | 34,556,625 | 0 | 0 | 4,026 | 0 | 0 | 1,207,985 | 0 | 0 |
| **Total Additives** | 1,981,595 | 0 | 0 | 231 | 0 | 0 | 159,607 | 0 | 3,192 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Stream** | **19** | **20** | **21 [Import]** | **22 [Re-Export]** | **23** | **24** | **25** | **26** | **27 [Export]** |
|  | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] | [US tons] |
| **Polyethylene Terephthalate (PET)** | 0 | 578,259 | 307,423 | 410 | 67,710 | 745,139 | 81 | 3,580,248 | 214,534 |
| **High Density Polyethylene (HDPE)** | 0 | 229,311 | 68,182 | 3,534 | 41,104 | 963,296 | 100 | 4,628,451 | 448,038 |
| **Polyvinyl Chloride (PVC)** | 0 | 32,420 | 32,451 | 30 | 0 | 128,227 | 13 | 616,106 | 121,749 |
| **Low Density Polyethylene (LDPE)** | 0 | 173,489 | 68,112 | 3,531 | 27,186 | 1,380,910 | 141 | 6,635,009 | 448,498 |
| **Polylactic Acid (PLA)** | 0 | 0 | 0 | 0 | 0 | 11,442 | 1 | 54,978 | 0 |
| **Polypropylene (PP)** | 0 | 14,828 | 0 | 0 | 3,701 | 1,371,015 | 137 | 6,587,461 | 0 |
| **Polystyrene (PS)** | 0 | 25,480 | 19,553 | 27 | 1,486 | 380,554 | 38 | 1,828,490 | 27,664 |
| **Other Plastics** | 0 | 574,361 | 334,678 | 446 | 59,942 | 376,585 | 44 | 1,809,417 | 233,554 |
| **Plasticizer** | 17,874 | 100,723 | 50,393 | 66 | 8,369 | 68,612 | 8 | 329,667 | 46,359 |
| **Flame Retardant** | 3,382 | 15,907 | 6,430 | 58 | 1,583 | 35,587 | 4 | 170,988 | 10,248 |
| **UV/Heat Stabilizer** | 4,254 | 19,825 | 7,911 | 81 | 1,992 | 44,793 | 5 | 215,219 | 15,301 |
| **Antioxidant** | 1,699 | 8,068 | 3,318 | 40 | 795 | 24,376 | 3 | 117,123 | 7,061 |
| **Slip Agents** | 250 | 1,293 | 594 | 4 | 117 | 3,870 | 0 | 18,596 | 952 |
| **Lubricants** | 179 | 1,007 | 504 | 1 | 84 | 671 | 0 | 3,222 | 464 |
| **Antistatics** | 328 | 1,724 | 799 | 1 | 154 | 1,667 | 0 | 8,010 | 572 |
| **Curing Agents** | 179 | 971 | 467 | 1 | 84 | 526 | 0 | 2,526 | 326 |
| **Blowing Agents** | 894 | 4,853 | 2,336 | 3 | 418 | 2,629 | 0 | 12,632 | 1,630 |
| **Biocides** | 2 | 10 | 5 | 0 | 1 | 5 | 0 | 26 | 3 |
| **Colorant** | 829 | 3,977 | 1,659 | 20 | 388 | 8,697 | 1 | 41,788 | 3,530 |
| **Organic Pigment** | 5 | 23 | 10 | 0 | 2 | 56 | 0 | 270 | 16 |
| **Clarifier/Toner** | 50 | 258 | 117 | 0 | 23 | 402 | 0 | 1,930 | 82 |
| **Inorganic Pigments** | 18 | 97 | 47 | 0 | 8 | 53 | 0 | 253 | 33 |
| **Fillers** | 2 | 10 | 5 | 0 | 1 | 5 | 0 | 26 | 3 |
| **Reinforcement** | 26,811 | 145,593 | 70,093 | 93 | 12,554 | 81,196 | 9 | 390,133 | 48,914 |
| **Misc. Inorganic Wastes** | 0 | 0 | 0 | 0 | 0 | 0 | 79 | 0 | 0 |
| **Other** | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 0 | 0 |
| **Yard Trimmings** | 0 | 0 | 0 | 0 | 0 | 0 | 256 | 0 | 0 |
| **Food** | 0 | 0 | 0 | 0 | 0 | 0 | 753 | 0 | 0 |
| **Rubber, Leather, Textiles** | 0 | 0 | 0 | 0 | 0 | 0 | 574 | 0 | 0 |
| **Wood** | 0 | 0 | 0 | 0 | 0 | 0 | 283 | 0 | 0 |
| **Metals** | 0 | 0 | 0 | 0 | 0 | 0 | 294 | 0 | 0 |
| **Glass** | 0 | 0 | 0 | 0 | 0 | 0 | 162 | 0 | 0 |
| **Paper and Paperboard** | 0 | 0 | 0 | 0 | 0 | 0 | 422 | 0 | 0 |
| **Contaminants** | 8,889 | 8,889 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Additive Degradation Products** | 70,431 | 70,431 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Ash** | 0 | 0 | 0 | 0 | 0 | 0 | 307 | 0 | 0 |
| **Total Mass excluding emissions** | 136,075 | 1,932,487 | 975,085 | 8,345 | 227,704 | 5,630,312 | 3,475 | 27,052,568 | 1,629,528 |
| **Total Plastics** | 0 | 1,628,148 | 830,399 | 7,977 | 201,130 | 5,357,168 | 556 | 25,740,159 | 1,494,035 |
| **Total Additives** | 56,755 | 304,339 | 144,686 | 368 | 26,575 | 273,145 | 30 | 1,312,408 | 135,493 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Stream** | **28** | **29** | **30** |
|  | [US tons] | [US tons] | [US tons] |
| **Polyethylene Terephthalate (PET)** | 67,710 | 521,746 | 0 |
| **High Density Polyethylene (HDPE)** | 41,104 | 614,221 | 0 |
| **Polyvinyl Chloride (PVC)** | 0 | 74,339 | 0 |
| **Low Density Polyethylene (LDPE)** | 27,186 | 836,618 | 0 |
| **Polylactic Acid (PLA)** | 0 | 6,634 | 0 |
| **Polypropylene (PP)** | 3,701 | 799,751 | 0 |
| **Polystyrene (PS)** | 1,486 | 222,596 | 0 |
| **Other Plastics** | 59,942 | 297,781 | 0 |
| **Plasticizer** | 8,369 | 50,875 | 0 |
| **Flame Retardant** | 1,583 | 22,732 | 0 |
| **UV/Heat Stabilizer** | 1,992 | 27,352 | 0 |
| **Antioxidant** | 795 | 15,188 | 0 |
| **Slip Agents** | 117 | 2,399 | 0 |
| **Lubricants** | 84 | 500 | 0 |
| **Antistatics** | 154 | 1,170 | 0 |
| **Curing Agents** | 84 | 416 | 0 |
| **Blowing Agents** | 418 | 2,079 | 0 |
| **Biocides** | 1 | 4 | 0 |
| **Colorant** | 388 | 5,557 | 0 |
| **Organic Pigment** | 2 | 29 | 0 |
| **Clarifier/Toner** | 23 | 264 | 0 |
| **Inorganic Pigments** | 8 | 42 | 0 |
| **Fillers** | 1 | 4 | 0 |
| **Reinforcement** | 12,554 | 63,718 | 0 |
| **Misc. Inorganic Wastes** | 0 | 0 | 0 |
| **Other** | 0 | 0 | 0 |
| **Yard Trimmings** | 0 | 0 | 0 |
| **Food** | 0 | 0 | 0 |
| **Rubber, Leather, Textiles** | 0 | 0 | 0 |
| **Wood** | 0 | 0 | 0 |
| **Metals** | 0 | 0 | 0 |
| **Glass** | 0 | 0 | 0 |
| **Paper and Paperboard** | 0 | 0 | 0 |
| **Contaminants** | 0 | 0 | 0 |
| **Additive Degradation Products** | 0 | 0 | 0 |
| **Ash** | 0 | 0 | 0 |
| **Total Mass excluding emissions** | 227,704 | 3,566,015 | 0 |
| **Total Plastics** | 201,130 | 3,373,686 | 0 |
| **Total Additives** | 26,575 | 192,329 | 0 |

**D. Greenhouse gas (GHG) releases and energy footprint of all EoL practices for plastics**

**Table D1.** A compilation of greenhouse gas emission factor and energy footprint used for the sensitivity analysis study

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Mechanical Recycling** | | **Incineration** | | **Landfilling/Littering** | | **Chemical Recycling**  **(Pyrolysis)** | | **Additive Extraction**  **(Dissolution-Precipitation)** | |
| **Plastic Types** | **GHG (MT CO2-eq/ton)** | **Energy Footprint (MJ/kg)a** | **GHG (MT CO2-eq/ton)** | **Energy Footprint (MJ/kg)** | **GHG (MT CO2-eq/tons)** | **Energy Footprint (MJ/kg)b** | **GHG (MT CO2-eq/ton)** | **Energy Footprint (MJ/ton)** | **GHG (MT CO2-eq/tons)** | **Energy Footprint (MJ/kg)** |
| PET | -1.13 | 80.1 | 1.24 | 40.0 | 0.04 | - | 0.238 | 3260 | 0.37 | 24.8 |
| HDPE | -0.88 | 78.5 | 1.27 | 54.3 | 0.04 | - | 0.238 | 3260 | 0.38 | 34.0 |
| PVC | 0 | 57.9 | 0.67 | 28.1 | 0.04 | - | 0.238 | 3260 | 0.20 | 17.0 |
| LDPE | 0 | 82.6 | 1.27 | 51.6 | 0.04 | - | 0.238 | 3260 | 0.38 | 33.1 |
| PLA | 0 | 77.2 | 1.25 | 35.6 | 0.04 | - | 0.238 | 3260 | 0.38 | 18.4 |
| PP | 0 | 90.0 | 1.27 | 55.7 | 0.04 | - | 0.238 | 3260 | 0.38 | 33.1 |
| PS | 0 | 80.0 | 1.64 | 46.3 | 0.04 | - | 0.238 | 3260 | 0.49 | 37.3 |
| Other (Mixed) | -1.03 | 50.8 | 2.33 | 35.6 | 0.04 | - | 0.238 | 3260 | 0.70 | 23.5 |

a Estimated from REMADE Calculator

b Not used for the calculation of material flow analysis

**References**:

US EPA, “Warm Version 13 - PLASTICS,” US EPA, 2015.

I. Vollmer et al., “Beyond Mechanical Recycling: Giving New Life to Plastic Waste,” Angew. Chem. Int. Ed., vol. 59, no. 36, pp. 15402–15423, Sep. 2020, doi: 10.1002/anie.201915651.

C. Smeaton, “Augmentation of global marine sedimentary carbon storage in the age of plastic,” Limnol Oceanogr, vol. 6, no. 3, pp. 113–118, Jun. 2021, doi: 10.1002/lol2.10187.

REMADE INSTITUTE, “Energy and CO2 Calculations for REMADE Project Proposals,” REMADE INSTITUTE, 2019.

H. Jeswani *et al.*, “Life cycle environmental impacts of chemical recycling via pyrolysis of mixed plastic waste in comparison with mechanical recycling and energy recovery,” *Science of The Total Environment*, vol. 769, p. 144483, May 2021, doi: [10.1016/j.scitotenv.2020.144483.](https://doi.org/10.1016/j.scitotenv.2020.144483.)

S. Devasahayam, G. Bhaskar Raju, and C. Mustansar Hussain, “Utilization and recycling of end of life plastics for sustainable and clean industrial processes including the iron and steel industry,” *Materials Science for Energy Technologies*, vol. 2, no. 3, pp. 634–646, Dec. 2019, doi: [10.1016/j.mset.2019.08.002.](https://doi.org/10.1016/j.mset.2019.08.002.)

**F. Sustainable Process Index - Environmental Footprint Contribution**

**Figure F1.** Environmental footprints on the available resources. The total resource impact is equivalent to 371 m2.a/kg of plastic recycled

**G. Chemical additives in plastics**

**Table G1.** A compilation of chemical additives potentially found in plastics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Name** | **Alternate name** | **Type** | **Molecular Weight** | **State** |
|  | Boric acid | Hydrogen borate, boracic acid, orthoboric acid | Flame Retardant | 61.83 | odorless white solid |
|  | Brominated Flame Retardants | PBDE | Flame Retardant | 1366.9 | Solids, liquid |
|  | Tris(2-chloroethyl)phosphate | TCEP | Flame Retardant | 285.5 | odorless clear liquid |
|  | Tris(2-chlorisopropyl)phosphate | TCPP | Flame Retardant | 288.5 | clear colorless viscous liquid |
|  | Hexabromocyclohexane | HBCDD | Flame Retardant | 557.5 | White, beige powder |
|  | 4,4'-dioctyldiphenylamine | Vanox 1081 | Antioxidant | 393.7 | colorless solid |
|  | Octylated diphenylamines | Permanax OD | Antioxidant | 393.7 | beige sticks |
|  | N,N'-di-s-butyl-p-phenylenediamine | HiTEC 4720 (ethyl Antixodant PDA) | Antioxidant | 220.4 | red, clear liquid |
|  | N,N'-di(1,4-dimethylpentyl)-p-phenylenediamine | Vulkanox 4030 | Antioxidant | 304.5 | dark-red, low viscous liquid |
|  | N,N'-di(i-octyl)-p-phenylenediamine | Antozite 1 | Antioxidant | 332.6 | liquid |
|  | N-2-propyl-N'phenyl-p-phenylenediamine | Permanax IPPD | Antioxidant | 226.2 | brown rods |
|  | N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine | Vulkanox 4020 | Antioxidant | 268.4 | brown to violet solid |
|  | N-(1,3-dimethylbutyl)-and N-(1,4-dimethylpentyl)-N'-phenyl-p-phenylenediamine (1:1) | Vulkanox 4022 | Antioxidant | 304.5 | Dark brown low-viscous iquid |
|  | N,N'diphenyl-p-phenylenediamine | Permanax DPPD | Antioxidant | 260.3 | dark-grey solid |
|  | N-phenyl-N-1-naphthylamine | Vulkanox P (ASM PAN) | Antioxidant | 219.2 | violet solid |
|  | N-phenyl-2-naphthylamine | Vulkanox PBN | Antioxidant | 219.2 | violet to brown solid |
|  | N,N' -di(2-naphthyl)-p-phenylenediamine | Age Rite White | Antioxidant | 360.4 | colorless solid |
|  | polymer 2,2,4-trimethyl-l,2-dihydroquinoline | Vulkanox HS/Pulver | Antioxidant | 173.25 | yellow to amber-colored solid |
|  | acetone diphenylamine condensation product | Permanax BL | Antioxidant | 227.3 | Black, clear, viscous liquid |
|  | acetone-diphenylamine condensation product on Si02 | Permanax BWL | Antioxidant | 227.3 | Black solid |
|  | 6-ethoxy-2,2,4-trimethyl-l,2-dihydroquinoline | Santoflex AW | Antioxidant | 217.3 | Liquid |
|  | bis(2,6-di-i-propylphenyl)carbodiimide | Stabaxol I | Antioxidant | 362.5 | colorless solid |
|  | N-dibutyldithiocarbamate | NBC | Antioxidant | 467.4 | green solid |
|  | Hydroquinone | Hydroquinone Inhibtor Grade | Antioxidant | 110.1 | Colorless solid |
|  | 2,6-di-t-butylphenol | Ethyl 701, HiTEC 4701 | Antioxidant | 206.3 | Pale-straw, crystalline solid |
|  | 2,6-di-t-butyl-4-methylphenol | Lowinox BHT | Antioxidant | 220.4 | colorless solid |
|  | 2,6-di-t-butyl-4-s-butylphenol | Vanox 1320 | Antioxidant | 262.4 | straw to light-amber, clear liquid |
|  | 2,4-dimethyl-6-(0-methylcyclohexyl)phenol | Permanax WSL | Antioxidant | 218.3 | yellowish, clear liquid |
|  | mixture of alkylated phenols | HiTEC 4733, Ethanox 733 | Antioxidant | Unknown | liquid |
|  | Styrenated phenol | Montaclere | Antioxidant | 322 - 367 | yellowish to amber-colored liquid |
|  | t-butylhydroquinone | Eastman MTBHQ | Antioxidant | 166.2 | colorless solid |
|  | 2,5-di-t-butylhydroquinone | Eastman DTBHQ | Antioxidant | 222.3 | colorless to tan crystal |
|  | 2,5-di-t-pentylhydroquinone | Santovar A | Antioxidant | 250.4 | yellowish to grey-white solid |
|  | 2,6-di-t-pentylhydroquinone | Lowinox AH 25 | Antioxidant | 250.4 | grey solid |
|  | 2,2'-methylene-bis(6-t-butyl-4-methylphenol) | Irganox 2246 | Antioxidant | 340.5 | colorless, crystalline solid |
|  | 2,2' -ethylidene-bis( 4,6-di-t-butylphenol) | Vanox 1290 | Antioxidant | 438.7 | colorless solid |
|  | 2,2'-methylene-bis( 4-methyl-6-cyclohexylphenol) | Vulkanox ZKF, ASM ZKF | Antioxidant | 392.4 | white solid |
|  | 2,2'-methylene-bis( 4-methyl-6-(0-methylcyclohexyl)phenol) | Permanax WSP | Antioxidant | 420.6 | yellowish solid |
|  | 4,4'-methylene-bis(2-t-butylphenol) | Vulkanox NKF | Antioxidant | 312.4 | white solid |
|  | 4,4'-methylene-bis(2,6-di-t-butylphenol) | Ethanox 702 | Antioxidant | 424.7 | light-straw, crystalline solid |
|  | 4,4'-methylene-bis(2,6-di-t-butylphenol) | CeMox 02 NP, Antioxidant 702 ND | Antioxidant | 424.7 | yellow solid |
|  | 2,2'-i-butylidene-bis(4,6-dimethylphenol) | Lowinox 22 IB 46 | Antioxidant | 298.4 | colorless solid |
|  | 4,4' -butylidene-bis( 6-t-butyl-3-methylphenol) | Santowhite Powder | Antioxidant | 382.6 | colorless solid |
|  | bis( 4-hydroxyphenyl) -2-propane | Bisphenol A | Antioxidant | 228.3 | colorless crystal |
|  | mixture of polybutylated bisphenol A | Agerite Superlite | Antioxidant | 340.5 | liquid |
|  | 2,2'-(octahydro-4,7-methano-1H-indenediyl)-bis( 6-t-butyl-4-methylphenol) | Lowinox CPL | Antioxidant | 456.7 | colorless solid |
|  | 1,1,3-tris(2-methyl-4-hydroxy-5-t-butylphenyl)butane | Topanol CA | Antioxidant | 544.7 | colorless solid |
|  | 1,3,5-trim ethyl-2,4,6- tris( 3,5-di -t-butyl-4-hydroxybenzyl) benzene | Ethanox 330 | Antioxidant | 775.2 | colorless crystalline solid |
|  | 1,3,5-trimethyl-2,4,6-tris(3,5-di-t-butyl-4-hydroxybenzyl)benzene | Irganox 1330 | Antioxidant | 775.2 | colorless to yellowish, crystalline solid |
|  | 4,4' -dihydroxybiphenyl, 4,4' -biphenol | ASM DOD | Antioxidant | 186.2 | colorless solid |
|  | hydroquinone monomethylether, 4-hydroxyanisole | Eastman HQMME | Antioxidant | 124.1 | colorless flakes |
|  | hydroquinone-bis(2-hydroxyethyl)ether | Eastman HQEE | Antioxidant | 198.2 | colorless flakes |
|  | β-(3,5-di-t-butyl-4-hydroxyphenyl)propionic octadecyl ester | Irganox 1076 | Antioxidant | 530.9 | colorless solid |
|  | β-(3,5-di-t-butyl-4-hydroxyphenyl)propionic octadecyl ester | Lowinox PO 35 | Antioxidant | 530.9 | colorless solid |
|  | 3,4,5-trihydroxybenzoic acid propyl ester (propyl gallate) | Tenox PG | Antioxidant | 212.2 | colorless solid |
|  | triethyleneglycol-bis-3-(3-t-butyl-4-hydroxy-5-methylphenyl)propionate | Irganox 245 | Antioxidant | 586.8 | colorless solid |
|  | 3,3-bis( 4-hydroxy-3-t-butylphenyl)ethylene butyrate | Hostanox O 3 | Antioxidant | 795.1 | colorless solid |
|  | pentaerythrityl-tetrakis(3-(3,5-di-t-butyl-4-hydroxyphenyl)propionate) | Lowinox PP 35 | Antioxidant | 1178 | slightly yellowish solid |
|  | pentaerythrityl-tetrakis(3-(3,5-di-t-butyl-4-hydroxyphenyl)propionate) | Irganox 1010 | Antioxidant | 1178 | colorless solid |
|  | 2,6-di-t-butyl-4-dimethylaminomethylphenol | Ethanox 703 | Antioxidant | 263.4 | pale-yellow, crystalline solid |
|  | N,N'-bis(3(3',5'-di-t-butyl-4'-hydroxyphenyl) propionyl)hydrazine | Irganox MD 1024 | Antioxidant | 552.8 | colorless solid |
|  | N ,N' -hexamethylene-bis( 3,5-di -t-butyl-4-hydroxyhydrocinnamide) | Irganox 1098 | Antioxidant | 588.9 | colorless solid |
|  | tris( 3,5-di -t -butyl-4-hydroxybenzyl)isocyanurate | Irganox 3114 | Antioxidant | 784.1 | colorless to slightly yellowish solid |
|  | 2-methyl-4,6-bis( octylthiomethyl)phenol | Irganox 1520 | Antioxidant | 424.8 | pale yellow, low-viscous, free-flowing liquid |
|  | 2,2'-thio-bis(6-t-butyl-4-methylphenol) | Irganox 1081 | Antioxidant | 358.5 | colorless crystalline solid |
|  | 4,4'-thio-bis(2-t-butyl-5-methylphenol) | Irganox 415 | Antioxidant | 358.5 | colorless solid |
|  | 4,4'-thio-bis(6-t-butyl-2-methylphenol) | Ethanox 322 Antioxidant | Antioxidant | 358.5 | white to yellow-straw, crystalline solid |
|  | 2,2' -thiodiethyl-bis(3-(3,5-di-t-butyl-4-hydroxyphenyl)propionate | Irganox 1035 | Antioxidant | 642.9 | colorless solid |
|  | Nonylphenoldisulfide oligomer | Ethanox 323 | Antioxidant | Unknown | liquid |
|  | 2,4-bis(octylthio)-6-(4-hydroxy-3,5-di-t-butylanilino)-1,3,5-triazine | Irganox 565 | Antioxidant | 588.9 | colorless solid |
|  | 3,5-di-t-butyl-4-hydroxybenzylphosphonic acid diethylester | Irganox 1222 | Antioxidant | 356.4 | colorless solid |
|  | tris( 4,4' -thio-bis( 2- t-butyl-5-methylphenol) )phosphite | Hostanox VP OSP 1 | Antioxidant | 1105 | colorless solid |
|  | dioctadecyldisulfide | Hostanox SE 10 | Antioxidant | 571.1 | colorless solid |
|  | thiodistearylpropionate | Hostanox VP SE 2 | Antioxidant | 683.2 | colorless solid |
|  | i-octyldiphenylphosphite | Weston ODPP | Antioxidant | 346.4 | colorless, clear liquid |
|  | tris(nonylphenyl)phosphite | Western TNPP | Antioxidant | 689 | yellow, clear liquid |
|  | bis(2,4-di -t-butylphenyl)pentaerythritoldiphosphite | Ultranox | Antioxidant | 604.7 | colorless solid |
|  | triphenylphosphite | Western TPP | Antioxidant | 310.3 | colorless, clear liquid |
|  | β,β'-thiodilaurylpropionate | Hostanox SE 10 | Antioxidant | 514.9 | colorless solid |
|  | dimyristyl-3,3'-thiodipropionate | Irganox PS 801 | Antioxidant | 571 | colorless crystals |
|  | 3,3'-thio-bis( stearyldipropionate) | Lowinox DSTDP | Antioxidant | 683.2 | colorless flakes |
|  | Zn 2-benzimidazole ethiolate | Vulkanox ZMB 2 | Antioxidant | 363.6 | colorless solid |
|  | 4- or 5-methylmercaptobenzimidazole | Vulkanox MB2/MG | Antioxidant | 164.2 | yellowish-white solid |
|  | 2 basic Pb carbonate | 2-bas, Bleicarbonat | Stabilizer | 780 | colorless solid |
|  | 2-basic Pb phosphite | Zweibasisches Blei-Phosphit | Stabilizer | 289 | colorless solid |
|  | 2-basic Pb phosphite complex | Baerostab E 502 FP | Stabilizer | 1480 | colorless granules |
|  | 2-basic Pb phosphite -sulfite complex | Sulfofos C | Stabilizer | Unknown | Colorless solid |
|  | coprecipitate based on Pb phosphite-carboxylate | Interstab LF 3638 | Stabilizer | Unknown | cream-colored flakes |
|  | Pb phosphite-sulfite-carbonate complex | Naftovin T 82 | Stabilizer | Unknown | colorless solid |
|  | coprecipitate based on Ba Ca complex and 2-basic lead phosphite (1:1) | Interstab LT 3631/3 | Stabilizer | Unknown | cream-colored solid |
|  | basic Pb phosphite carboxylate | Baeropan MC 380 FP | Stabilizer | Unknown | colorless solid |
|  | 3-basic Pb sulfate | Baerostab V 220 MC | Stabilizer | 970 | colorless solid |
|  | 4-basic Pb sulfate | Interstab LP 3104 | Stabilizer | 1200 | colorless solid |
|  | coprecipitate based on Pb sulfate-carboxylate | Interstab LP 3636 | Stabilizer | Unknown | cream-colored solid |
|  | coprecipitate based on Pb sulfate-carboxylate | Interstab LT 3679 | Stabilizer | Unknown | cream-colored solid |
|  | coprecipitate based on Pb sulfate-phosphite-carboxylate | Interstab LF 3734 | Stabilizer | Unknown | cream-colored granules |
|  | epoxidized octanoic ester | Plastepon 451 | Stabilizer | Unknown | light-yellow, clear liquid |
|  | epoxidized soybean oil | Baerostab LSU | Stabilizer | 975 | colorless, clear liquid |
|  | epoxidized soybean oil | Reoplast 39 | Stabilizer | 975 | yellowish, clear liquid |
|  | dilaurylthiodipropionate | Dilaurylthiodipropionat | Stabilizer | 514.9 | colorless solid |
|  | di( tridecyl)thiopropionate | Ditridecylthiopropionat | Stabilizer | 542.9 | colorless, clear liquid |
|  | thiodiethyleneglycol-~-aminocrotonic acid ester with Ca and Zn stearate | Irgastab A 80 | Stabilizer | Unknown | yellowish solid |
|  | N,N'-diphenylthiourea | Diphenylthioharnstoff | Stabilizer | 228.3 | colorless solid |
|  | Zn octoate | Baerostab L 230 | Stabilizer | 351.8 | slightly yellowish, clear liquid |
|  | Zn complex | Interstab M 823 | Stabilizer | Unknown | pale-yellowish, clear viscous liquid |
|  | Ba laurate | Barium-Laurat | Stabilizer | 536 | colorless solid |
|  | Cd laurate | Cadmium-Laurat | Stabilizer | 511 | colorless solid |
|  | Li stearate | Lithium-stearat | Stabilizer | 291.4 | colorless solid |
|  | Na stearate | Natrium-Stearat | Stabilizer | 307.5 | colorless solid |
|  | Mg stearate | Magnesium-stearat | Stabilizer | 591.3 | colorless solid |
|  | Ca stearate | Calcium Stearate IT | Stabilizer | 607 | colorless solid |
|  | Ba stearate | Barium-stearat | Stabilizer | 704.2 | colorless solid |
|  | Zn stearate | Zink-stabilisator LF | Stabilizer | 623.2 | colorless solid |
|  | Cd stearate | Naftowin BM 16 | Stabilizer | 679.4 | colorless solid |
|  | Pb stearate | Interstab LP 3155 | Stabilizer | 774.2 | cream-coloreed solid |
|  | 2-basic Pb stearate | Zweibasisches Blei-Stearat | Stabilizer | 1221 | colorless solid |
|  | basic Pb carboxylate + CaC03 | Baeropan SMS 314 | Stabilizer | Unknown | light-brown flakes |
|  | basic Pb complex with ester, carboxylate and phosphite groups | Baeropan MC 2567 SL | Stabilizer | Unknown | colorless solid |
|  | coprecipitate Pb-carboxylate + PbS04+CaC03 | Baeropan 2028 SP | Stabilizer | Unknown | colorless solid |
|  | 2-basic Pb phthalate | Interstab PDP-E | Stabilizer | 817.8 | colorless solid |
|  | 2-basic Pb phthalate with fatty acid carboxylate | Baerostab E 503 | Stabilizer | 817.8 | colorless granules |
|  | Pb salicylate | Nafovin T 50 | Stabilizer | 343.3 | colorless, fine-crystalline solid |
|  | dibutyltin dilaurate | Meister Z 4101 | Stabilizer | 631.6 | slightly yellowish , clear liquid |
|  | dibutyltin maleate | Meister DBTM | Stabilizer | 347 | colorless solid |
|  | dibutyltin maleic ester carboxylate | Stanclere T 85;  Stanclere T 57;  Stanclere T 85 | Stabilizer | 349.05 | colorless, clear-liquid |
|  | dibutyltin thioglycolate | Hostastab Sn S 61 | Stabilizer | 323.04 | colorless, clear liquid |
|  | dibutyItin thioglycoIic acid 2-ethylhexylester mercaptide | Stanclere T 160 | Stabilizer | 607.5 | colorless, clear liquid |
|  | dibutyltin thioglycolic acid 2-ethylhexylester mercaptide | Stanclere T 161 | Stabilizer | 607.5 | colorless, clear liquid |
|  | dioctyltin thioglycolic alkylester mercaptide | Hostastab Sn S 15  Stanclere T 484 | Stabilizer | 438.16 | colorless, clear liquid |
|  | dibutyltin mercaptopropionate | Stanclere T 186 | Stabilizer | 337.1 | colorless solid |
|  | K Zn complex | Interstab M 731 | Stabilizer | Unknown | amber-colored, clear liquid |
|  | Ca Zn complex | Baerostab NT 1 S | Stabilizer | Unknown | colorless solid |
|  | Ca Sn complex | Baeropan SN 200 | Stabilizer | Unknown | colorless solid |
|  | Ba Zn complex | Baerostab OE 666 | Stabilizer | Unknown | colorless solid |
|  | Ba Zn complex | Swedstab 504 | Stabilizer | Unknown | colorless, clear liquid |
|  | Ba Zn complex | Naftovin BZ 580 | Stabilizer | Unknown | yellow, clear liquid |
|  | Ba Cd complex | Baerostab ZPS-F | Stabilizer | Unknown | colorless solid |
|  | Ba Cd complex | Baerostab PC 52 | Stabilizer | Unknown | colorless solid |
|  | Zn Mg complex | Naftovin CKP 90030 | Stabilizer | Unknown | colorless solid |
|  | Zn Mg complex | Naftovin CKP 90172 | Stabilizer | Unknown | colorless solid |
|  | Pb Ba Cd-phosphite carboxylate | Baeropan 16435 FP | Stabilizer/Lubricant | Unknown | colorless solid |
|  | Ca Zn ester carboxylate | Irgastab CZ 110 | Stabilizer | Unknown | yellowish-white, high viscous paste |
|  | Ca Zn ester carboxylate | Stabiol VCZ 1616 | Stabilizer | Unknown | colorless solid |
|  | Ca Zn ester carboxylate | Baeropan NT 328 FLA | Stabilizer/Lubricant | Unknown | colorless solid |
|  | Ba Zn ester carboxylate | Swedstab 502 | Stabilizer | Unknown | colorless, clear liquid |
|  | Ba Ca soap complex | Reagens F/95 | Stabilizer | Unknown | colorless solid |
|  | Ba Cd soap complex with epoxester | Reagens G1/52 | Stabilizer/Lubricant | Unknown | Brown, clear liquid |
|  | Pb Ba Cd compound with phosphite and carboxylate groups | Baeropan 16511 FP | Stabilizer/Lubricant | Unknown | colorless solid |
|  | tri-iso-decylphosphite | Weston TDP | Stabilizer | 502.8 | colorless, clear liquid |
|  | tri(tridecyl)phosphite | Tritridecylphosphit | Stabilizer/Antioxidant | 629 | colorless, clear liquid |
|  | distearylpentaerythrityldiphosphite | Weston 619 F | Stabilizer | 733.1 | colorless solid |
|  | tri( dipropyleneglycol)phosphite | Weston 430 | Stabilizer | 396.5 | colorless, clear liquid |
|  | di-i-decylphenyl phosphite | Irgastab CH 300 | Stabilizer | 438.6 | colorless, clear liquid |
|  | phenyldidecylphosphite | Weston PDDP | Stabilizer | 438.6 | colorless, clear liquid |
|  | i-decyldiphenyl phosphite | Irgastab CH 301 | Stabilizer | 374.5 | colorless, clear liquid |
|  | 4,4' -i-propylidenediphenol-alkylphosphite | Weston 439 | Stabilizer | Unknown | colorless, clear liquid |
|  | 2,2'-ethylene-bis( 4,6-di-t-butylphenyl)fluorophosphite | Ethanox 398 | Stabilizer/Antioxidant | 486.7 | white, crystalline solid |
|  | bis(2,4-di-t -butylphenyl)pentaerythrityldiphosphite | Ultranox 626 | Stabilizer | 604.7 | colorless solid |
|  | tris(nonylphenyl)phosphite | Baerostab CWM 35 | Stabilizer | 689 | colorless, clear liquid |
|  | Octylphenol | 4-Octylphenol | Stabilizer (antioxidant/UV) | 206.32 | White flakes |
|  | 1,3,5-Tris(oxiran-2-ylmethyl)-1,3,5-triazinane-2,4,6-trione | TGIC | Stabilizer (antioxidant/UV) | 297.3 | White powder |
|  | 1,3,5-tris[(2S and 2R)-2,3-epoxypropyl)-1,3,5-triazine-2,4,6-(1H,3H,5H)-trione | β-TGIC | Stabilizer (antioxidant/UV) | 297.26 | White powder |
|  | Butylated hydroxyltoluene | BHT | Stabilizer (antioxidant/UV) | 220.35 | White to yellow powder |
|  | 2- and 3-t-butyl-4 hydroxyanisole | BHA | Stabilizer (antioxidant/UV) | 180.24 | White-yellow waxy solid |
|  | Tris-nonyl-phenyl phosphate | TNPP | Stabilizer (antioxidant/UV) | 705 | Colorless liquid |
|  | Tris(2,4-di-tert-butylphenyl) phosphite | Irgasfos 168 | Stabilizer (antioxidant/UV) | 646.92 | White solid |
|  | Cadmium compounds | Cadmium sulfide, cadmium sulfoselenide, cadmium | Heat stabilizer/Pigments | Unknown | Unknown |
|  | Lead compounds (Lead, Lead oxide) |  | Heat stabilizer | Unknown | Unknown |
|  | Barium and calcium salts |  | Heat stabilizer | Unknown | Unknown |
|  | tris(2,4-di-t-butylphenol)phosphite | Hostanox PAR 24 | Stabilizer/Antioxidant | 646.9 | colorless solid |
|  | triphenylphosphite | Irgastab CH 55 | Stabilizer | 310.3 | colorless, clear liquid |
|  | Pb phosphite-carboxylate on CaC03 | Baeropan E-RL 25 | Stabilizer/Lubricant | Unknown | colorless granules |
|  | Pb phosphite-carboxylate with aliphatic ester | Baeropan E-RL 15 | Stabilizer/Lubricant | Unknown | colorless granules |
|  | vinyl-functional poly( dimethylsiloxane) with filler | Hitzestabilsator H1 Rot | Heat stabilizer | Unknown | red-brown paste |
|  | sterically hindered amine, HALS | Hostavin N 20 | Light stabilizer | Unknown | colorless solid |
|  | poly( bis(2,2,6,6-tetramethyl-4-piperidinylimino )-1,6-hexanediyl-alt-4-t-octylamino-l,3,5-triazine-2,4-diyl) hexanediyl-alt-4-t-octylamino-l,3,5-triazine-2,4-diyl) | Chimassorb 944 FL | UV stabilizer | Unknown | light-yellow granules, low dusting |
|  | 2-(2-hydroxy-5-methylphenyl)-2H-benzotriazole | Tinuvin P | Light Stabilizer | 225.2 | slightly yellowish solid |
|  | 2-(2' -hydroxy-3' -t-butyl-5'-methylphenyl)-5-chlorobenzotriazole | Tinuvin 326 | UV stabilizer | 315.7 | pale yellow solid |
|  | 2-(2' -hydroxy-3' -dodecyl-5' -methylphenyl)b enzotriazole | Tinuvin 571 | UV stabilizer | 393.6 | pale yellow liquid |
|  | ,6-hexanediol-bis-3-(3-benzotriazole-4-hydroxy-5-t-butyl)propionate | Tinuvin 840 | UV stabilizer | 760.9 | slightly yellowish solid |
|  | alkylphenolic benzotriazole derivative | Tinuvin 234 | Light stabilizer | Unknown | yellowish solid |
|  | 2-hydroxy-4-methoxybenzophenone | UV 325 | UV stabilizer | 228.3 | yellowish solid |
|  | 2-hydroxy-4-octoxybenzophenone | Hostavin ARO 8 | Light stabilizer | 326.4 | light-yellow , crystalline solid |
|  | resorcinol monobenzoate | Eastman RMB | UV stabilizer | 214.2 | colorless, crystalline solid |
|  | cyanoacrylate derivative | UV 340 | UV stabilizer | 438.7 | Colorless solid |
|  | 2-ethoxy-2' -ethyloxalyldianilide | Baerostab B 200 P | UV Stabilizer | 312.4 | Colorless solid |
|  | 2,2'-thio-bis(4-t-octylphenolato )butylamine, Ni-salt | Chimassorb N-705 | UV stabilizer | 572.5 | Light-green solid |
|  | 3,5-di-t-butyl-4-hydroxybenzyl phosphonic acid monoethylester, Ni-salt | Irgastab 2002 | Stabilizer | 713.5 | pale-yellow to green solid |
|  | mixture of higher paraffin hydrocarbons and microwaxes, contains some NH (fatty amine) | Antilux 610 | Light stabilizer | Unknown | Yellowish wax |
|  | poly( oxyalkylene)-polysiloxane blockcopolymer | Tegostab B 1048 | Foam Stabilizer | Unknown | yellowish, clear liquid |
|  | mixture of polyether-modified polysiloxane and surfactant | Tegostab B 5055 | Foam Stabilizer | Unknown | yellowish, clear liquid |
|  | poly( oxyalkylene)-polysiloxane blockcopolymer | Tegostab B 1400 A | Foam Stabilizer | Unknown | yellowish, clear liquid |
|  | poly( oxypropylene)-b-poly( dimethylsiloxane) | Tegostab B 8680 | Foam Stabilizer | Unknown | colorless, clear liquid |
|  | poly( oxypropylene )-b-poly( dimethylsiloxane) | Tegostab B 1651 | Stabilizer | Unknown | colorless, clear liquid |
|  | poly(oxypropylene)-b-poly(oxyethylene)-bpoly(dimethylsiloxane) | Tegostab B 2219 | Foam Stabilizer | Unknown | colorless, clear liquid |
|  | po1y( oxyethylene)-b-poly( oxypropylene)-bpoly(dimethylsiloxane) | Tegostab B 8425 | Foam Stabilizer | Unknown | Clear, amber liquid |
|  | mixture ofhigh-MW paraffins, contains some NH (fatty amine) | Antilux 654 | Antioxidant/Antiozonant | Unknown | White to light-yellow wax |
|  | mixture of higher paraffin hydrocarbons and microwaxes, contains some ester and NH (fatty amine) | Antilux 750 | Light stabilizer | Unknown | yellowish wax |
|  | long-chain aliphatic hindered amine (HALS) | Antilux 550 | UV Stabilizer | Unknown | Yellowish wax |
|  | Antimony(III) Oxide | Antimontrioxid Typ Blue | Flame Retardant | 291.52 | Solid |
|  | antimony(III) chloride | Antimony butter | Flame Retardant | 228.1 | soft, hygroscopic mass |
|  | Ammonium polyphosphate | Exolit VP IFR 23 | Flame Retardant | 97.01 | White powder |
|  | Sb2O 3 with mineral oil | Antiflamm 90/10 | Flame Retardant | Unknown | Colorless solid |
|  | Sb2O 3 with chlorinated phosphoric acid ester | Firex 5718 | Flame Retardant | Unknown | white sediment (with dispersant) |
|  | K antimonate | potassium antimony(III) oxide | Flame Retardant | 262.9 | colorless solid |
|  | chlorinated paraffin hydrocarbons | Cereclor S 52 | Flame Retardant | Unknown | yellowish liquid |
|  | 2,2'-bis( 4-(2,3-dibromopropoxy}-3,5-dibromophenyl}propane | Bromkal 66-8 | Flame Retardant | 835.6 | colorless solid |
|  | N,N'-ethylene-bis( tetrabromophthalimide} | Saytex BT 93 | Flame Retardant | 951.5 | colorless solid |
|  | mixture of oligomeric, chlorinated phosphirc aicd ester | Tego Antiflamm N | Flame Retardant | Unknown | colorless, clear liquid |
|  | oxalyl-bis(benzylidenehydrazide) | Eastman OABH-EF | Metal deactivator | 294.2 | colorless, crystalline solid |
|  | Phosphonic acid ester | Baerostab CW M 201 | Metal deactivator | Unknown | colorless clear liquid |
|  | Tributyltin hydride | XE 9503 (TBTH) | Biocide | 291.1 | colorless, clear liquid |
|  | Tributyltin fluoride | Eurecid 9260 (TBTF) | Biocide | 309.1 | colorless solid |
|  | Tributyltin oxide | Eurecid 9000 | Biocide | 596.1 | colorless, clear liquid |
|  | Tributyltin linoleate | Eurecid 9220 (TBTL) | Biocide | 569.5 | yellow, clear liquid |
|  | tributyltin naphthenate | Eurecid 9240 (TBTN) | Biocide | Unknown | yellow-brown, clear liquid |
|  | tributyltin benzoate | Eurecid 9200 (TBTB) | Biocide | 411.2 | colorless, clear liquid |
|  | tetraoctyltin | Tetra-n-octylzinn, dest. (TOT) | Biocide | 571.6 | pale-yellow, clear liquid |
|  | N-( dichlorofluoromethylthio )phthalimide | Preventol A3 | Biocide | 280.1 | colorless solid |
|  | Arsenic and arsenic compounds | Arsenic trioxide, sodium arsenite, arsenic trichloride | Biocide | Unknown | Metalloid/semi-metal |
|  | Triclosan | Irgasan DP-300 | Biocide | 289.54 | White solid |
|  | Phenoxarsine | 10,10-oxybisphenoarsine | Biocide | 502.2 | Clear, light yellow liquid |
|  | Bis(tributyltin)oxide | TBTO | Biocide | 596.112 | Viscous, colorless liquid |
|  | Ba permanganate mixed crystals with Ba sulfate | Manganblan | Pigment | Unknown | Shining middle-blue solid |
|  | Pb chromate | Sicomin Rot L 3130 S | Inorganic Pigment | 323.19 | Red solid |
|  | Mixed crystals of Pb chromate-sulfate | Sicomingelb LD E-55 | Organic Pigment | Unknown | yellow solid |
|  | mixed crystals of Pb chromate-sulfate | Sicomin Gelb L 1625 | Inorganic Pigment | Unknown | yellow solid |
|  | Pb chromate-molybdate mixed crystals | Sicomin Rot L 3030 S | Inorganic Pigment | Unknown | red solid |
|  | S-containing Na Al silicate | Ultramarin Blau | Inorganic Pigment | Unknown | blue solid |
|  | Co chromate-aluminate, spinell structure | Lichtblau 100 Standard 9515 | Inorganic Pigment | Unknown | blue solid |
|  | Co Ni Zn titanate aluminate, inverse spinell | Lichtgruen 5 G Standard 9270 | Inorganic Pigment | Unknown | green solid |
|  | Fe oxide | Sicotrans Rot I. 2915 D | Inorganic pigment | 165.87 | red solid |
|  | Fe oxide hydrate | Sicotrans Gelb L. 1916 | Inorganic Pigment | 159.69 | yellow solid |
|  | Fe oxide hydrate | Sicotrans Orange L. 2416 | Inorganic Pigment | Unknown | orange solid |
|  | Fe oxide hydrate | Bayferrox 920 | Inorganic Pigment | Unknown | red solid |
|  | iron(lI, III) oxide, magnetite structure | Bayferrox 318, Standard 86 | Inorganic Pigment | 231.6 | black solid |
|  | chromium(III) oxide, corundum structure | Chromoxidgruen GN | Inorganic Pigment | 151.99 | green solid |
|  | Cr-Sb-Ti oxide mixed phase system | Sicotrans Gelb I. 1910 | Inorganic Pigment | Unknown | yellow solid |
|  | Sb Ni Ti oxide | Lichtgelb 7 G | Inorganic Pigment | Unknown | yellow solid |
|  | Titanium dioxide | Tioxide R-CR-2 | Inorganic Pigment | 79.88 | white solid |
|  | calcined coprecipitation of CdS and CdSe, extended with BaS04 | Cadmium Red | Inorganic Pigment | Unknown | red solid |
|  | 3-nitro-4-toluidine -> acetoacetic arylide-anilide | Hansa Gelb G | Organic Pigment | 340.3 | yellow solid |
|  | 4-methoxy-2-nitroaniline -> acetoacetic arylide-2-methylanilide | Hansa Gelb 3R | Organic Pigment | 370.4 | yellow solid |
|  | 2-methoxy-4-nitroaniline -> acetoacetic arylide-2-methoxyanilide | Monolite Yellow 2G | Organic Pigment | 386.4 | yellow solid |
|  | 4-methoxy-2-nitroaniline -> acetoacetic rylide-2-methoxyanilide | Hansa Gelb RN | Organic Pigment | 386.3 | yellow solid |
|  | 4-chloro-2-toluidine -> acetoacetic arylide-I-naphthylimide | Helio Echtgelb 8G | Organic Pigment | 379.8 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic arylide-6-chloro-2-methylanilide | Hansa Gelb 8G | Organic Pigment | 409.2 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic arylide-anilide | Hansa Gelb 3G | Organic Pigment | 360.7 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic rylide-2,4-dimethylanilide | Hansa Gelb GR | Organic Pigment | 388.8 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic arylide-2-chloroanilide | Monolite Yellow 10 GE | Organic Pigment | 395.2 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic arylide-4-chloro-2-methylanilide | Hansa Brillantgelb 10 GX | Organic Pigment | 409.2 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic arylide-2-methoxyanilide | Hansa Brillantgelb 4GX | Organic Pigment | 390.8 | yellow solid |
|  | 4-chloro-2-nitro aniline -> acetoacetic arylide-4-methoxyanilide | Symuler Fast Yellow 4119 | Organic Pigment | 390.8 | yellow solid |
|  | 4-chloro-2-nitroaniline -> acetoacetic arylide-4-ethoxyanilide | Hansa Gelb XT | Organic Pigment | 392.8 | yellow solid |
|  | 4-amino-5-nitrobenzenesulfonic acid -> acetoacetic arylide-anilide, Ca-salt | Irgalite Yellow WSC | Organic Pigment | 848.7 | yellow solid |
|  | 4-amino-3-nitrobenzenesulfonic acid -> acetoacetic arylide-2-methylanilide, Ca-salt | Irgaplast Gelb R | Organic Pigment | 878.9 | yellow solid |
|  | 4-amino-3-nitrobenzenesulfonic acid -> acetoacetic arylide-2-methylanilide, Ba-salt | Irgalite Yellow WSR | Organic Pigment | 976.1 | yellow solid |
|  | 2,5-dimethoxy-4-N-phenylsulfonamidoaniline-> acetoacetic arylide-4-chloro-2,5-dimethoxyanilide | Novoperm Gelb FGL | Organic Pigment | 591 | yellow solid |
|  | 3-nitrosulfanilic acid -> acetoacetic arylide-anilide, Sr-salt | Symuler Lake Fast Yellow 6G | Organic Pigment | 896.3 | yellow solid |
|  | 3-nitrosulfanilic acid -> acetoacetic arylide-4-methoxyanilide | Symuler Yellow 3056 | Organic Pigment | 910.9 | yellow solid |
|  | 2,4-dichloroaniline -> 2-hydroxynaphthoic arylide-2-methylanilide | Permanent Rot FGG | Organic Pigment | 450.3 | red solid |
|  | 2,5-dichloroaniline -> 2-hydroxynaphthoic arylide-4-methylanilide | Permanent Rot FRL | Organic Pigment | 450.3 | red solid |
|  | 4-chloro-2-toluidine -> 2-hydroxynaphthoic arylide-4-chloro-2-methylanilide | Monolite Red 4RH | Organic Pigment | 464.4 | red solid |
|  | 5-chloro-2-toluidine -> 2-hydroxynaphthoic arylide-4-chloroanilide | Helio Echtcarmin B | Organic Pigment | 450.3 | red solid |
|  | 5-chloro-2-toluidine -> 2-hydroxynaphthoic rylide-5-chloro-2-methylanilide | Permanent Rubin FBH | Organic Pigment | 498.8 | dark-red solid |
|  | 2,4,5-trichloroaniline -> 2-hydroxynaphthoic arylide-2-methylanilide | Permanent Rot FGR 70 | Organic Pigment | 484.8 | red solid |
|  | 2,4-dinitroaniline -> 2-hydroxynaphthoic arylide-2-ethoxyanilide | Helio Echtbordo RR | Organic Pigment | 501.5 | dark-red solid |
|  | 3-amino-4-methoxy-N(4'-benzamide)benzamide -> 2-hydroxynaphthoic arylide-2,4-dimethoxy-5-chloranilide | PV-Echtrot HF4B | Organic Pigment | 654.1 | red solid |
|  | 3-amino-4-methyl-N-(2',4'-xylyl)benzamide -> 2-hydroxynaphthoic arylide-4-chloroanilide | Vulkan Echtrossa G | Organic Pigment | 563 | pink solid |
|  | 3-amino-4-chlorobenzamide -> 2-hydroxynaphthoic arylide-4-aminoacetylanilide | Novoperm Rot HFG | Organic Pigment | 501.9 | red solid |
|  | 4-aminobenzamide -> 2-hydroxynaphthoic arylide-2-ethoxyanilide | Novoperm Rot F5RK | Organic Pigment | 454.5 | red solid |
|  | 3-chloroaniline -> 2-hydroxynaphthoic arylide-2-methoxyanilide | Helio Echtorange G | Organic Pigment | 502.8 | orange solid |
|  | 2,5-dichloroaniline -> 2-hydroxynaphthoic arylide-2-methoxyanilide | Permanent Rot FRLL | Organic Pigment | 466.3 | red solid |
|  | 2,5-dichloroaniline -> 2-hydroxynaphthoic arylide-2,5-dimethoxyanilide | Permanent Braun FG | Organic Pigment | 496.4 | brown solid |
|  | 4-amino-2,5-diethoxybenzanilide -> 2-hydroxynaphthoic arylide-2-methylanilide | Helio Echtbrillantblau RR | Organic Pigment | 484.5 | blue solid |
|  | 3-amino-4-methoxybenzanilide -> 2-hydroxynaphthoic arylide-anilide | Vulkan Echtrubin B | Organic Pigment | 516.5 | ruby solid |
|  | 3-amino-4-methoxybenzanilide -> 2-hydroxynaphthoic arylide-4-chloro-2-methylanilide | Permanent Rosa F3B | Organic Pigment | 565 | pink solid |
|  | 3-amino-4-methoxybenzanilide -> 2-hydroxynaphthoic arylide-4-chloro-2,5-dimethoxyanilide | Permanent Carmin FBB02 | Organic Pigment | 599 | dark-red solid |
|  | 2-amino-4-(2,5-dichloroanilido)benzoic methylester-> 2-hydroxynaphthoic arylide-2-anisidide | Novoperm Rot HF 3570 | Organic Pigment | 643.5 | Red solid |
|  | 2-amino-4-(2,5-dichloroanilido)benzoic methylester-> 2-hydroxynaphthoic arylide-2-anisidide | Novoperm Rot HF3S | Organic Pigment | 643.5 | Red solid |
|  | 5-nitro-2-toluidine -> 2-hydroxynaphthoic arylide-anilide | Symuler Fast Scarlet BGT | Organic Pigment | 426.4 | scarlet solid |
|  | 4-nitro-2-toluidine -> 2-hydroxynaphthoic arylide-2-methylanilide | Pmernant Bordo FRR | Organic Pigment | 440.5 | dark-red solid |
|  | 5-nitro-2-toluidine -> 2-hydroxynaphthoic arylide-4-chloroanilide | Permanent Rot F4R | Organic Pigment | 460.9 | red solid |
|  | 2-methoxy-4-nitroaniline -> 2-hydroxynaphthoic arylide-2-methylanilide | Toluidine Maroon RT-530-D | Organic Pigment | 456.4 | dark-red solid |
|  | 3-amino-4-methoxybenzanilide -> 2-hydroxynaphthoic arylide-3-nitroanilide | Symuler Fast Red 4085 | Organic Pigment | 561.6 | red solid |
|  | 2-methoxy-4-nitroaniline -> 2-hydroxynaphthoic arylide-l-naphthylamide | Permanent Bordo F3R | Organic Pigment | 477.5 | dark-red solid |
|  | 2,4-dinitroaniline -> 2-hydroxynaphthoic arylide-2-ethoxyanilide | Helio Echtbrillantrot 3B | Organic Pigment | 501.5 | red solid |
|  | 2-nitro-4-toluidine -> 2-hydroxynaphthoic arylide-3-nitroanilide | Sico Echtmaroon BMD dunkel | Organic Pigment | 471.4 | red-brown solid |
|  | 2-methoxy-5-nitroaniline -> 2-hydroxynaphthoic arylide-3-nitroanilide | Symuler Fast Red 4015 | Organic Pigment | 487.4 | red solid |
|  | 3-amino-4-methoxyphenylbenzyl sulfone -> 2-hydroxynaphthoic arylide-2,3-dimethylanilide | Hansa Rottoner R | Organic Pigment | 579.7 | red solid |
|  | 2-methoxy-5-N,N-dimethylsulfonamidoaniline -> 2-hydroxynaphthoic arylide-5-chloro-2,4-dimethoxyanilide | Permanent Carmin FB01 | Organic Pigment | 627.1 | dark-red solid |
|  | 3-amino-4-methoxybenzoanilide -> 2-hydroxynaphthoic acid-4-chloro-2-methylanilide | Permanent Rosa | Organic Pigment | 565 | pink solid |
|  | 5-nitro-2-toluidine -> 2-hydroxynaphthoic arylide-2-methylanilide | Montclair Red Medium 235-7700 | Organic Pigment | 440.4 | red solid |
|  | 2-aminobenzenesulfonic acid -> 2-hydroxynaphthoic arylide-4-sulfonic acid anilide, Ba-salt | PV-Rot H4B 01 | Organic Pigment | 662.9 | red solid |
|  | 4' -nitrophenyl(3-amino-4-methoxyphenyl)sulfonate -> 2-hydroxynaphthoic arylide-2-methylanilide | Helio Echtcarmin G | Organic Pigment | 612.6 | red solid |
|  | 2-amino-I,4-benzenedisulfonic acid -> 2-hydroxyna-phthoic arylide-2, 4-dimethoxy-5-chloro-anilide, Ba salt | Irgaplast Rot HGL | Organic Pigment | 757.3 | red solid |
|  | 2-amino-I,4-benzenedisulfonic acid->2-hydroxynaphthoic arylide-2-naphthylamide, Ba salt | Irgaplast Rot HBL | Organic Pigment | 662.8 | red solid |
|  | 2-nitroaniline -> 2-naphthol | Ortho Nitranilinorange | Organic Pigment | 293.3 | orange solid |
|  | 4-nitroaniline -> 2-naphthol | Pigmentrot B | Organic Pigment | 290.3 | red solid |
|  | 4-nitroaniline -> 2-naphthol, Cu-complex | Tiefdruckbraun 30 | Organic Pigment | 248.3 | brown solid |
|  | 4-methyl-2-nitroaniline -> 2-naphthol | Hansa Scharlach RNC | Organic Pigment | 307.3 | scarlet solid |
|  | 2,4-dinitroaniline -> 2-naphthol | Hansa Rot GG | Organic Pigment | 338.3 | red solid |
|  | 2-chloro-4-nitroaniline -> 2-naphthol | Hansa Rot R | Organic Pigment | 327.7 | Red solid |
|  | 2-naphthylamine-I-sulfonic acid -> 2-naphthol, Ba-salt | Tobithol Red B | Organic Pigment | 463.6 | red solid |
|  | 2-methylsulfanilic acid -> 2-naphthol, Ba-salt | Lithol Rot RMT | Organic Pigment | 443.6 | red solid |
|  | 4-chloro-3-toluidine-6-sulfonic acid -> 2-naphthol,Na-salt | Lackrot C | Organic Pigment | 420.8 | red solid |
|  | 4-chloro-3-toluidine-6-sulfonic acid -> 2-naphthol, Ba-salt | Permanent Lackrot LCLL | Organic Pigment | 824.8 | Red solid |
|  | 2-amino-4-ethyl-5-chlorobenzenesulfonic acid-> 2-naphthol, Ba-salt | Clarion Red 20-7155 | Organic Pigment | 526.1 | Red solid |
|  | 1-(4-methyl-2-nitro-l-phenyl)azo-2-naphthol | Hansascharlach RNC | Organic Pigment | 307.3 | dark-red solid |
|  | 2-amino-5-chloro-4-i-propylbenzenesulfonic acid-> 2-naphthol, Ba-salt | Arcturus Red | Organic Pigment | 539.1 | red solid |
|  | 2-amino-4-carboxy-5-chlorobenzenesulfonic acid -> 2-naphthol, Ca-salt | PV-Rot NCR | Organic Pigment | 444.8 | red solid |
|  | aniline -> 2-naphthol-6-sulfonic acid, Ca-salt | Helio Orange CAG | Organic Pigment | 334.3 | orange solid |
|  | I-naphthylamine -> 2-naphthol-5-sulfonic acid, Ca-salt | Helio Bordo BL | Organic Pigment | 384.4 | dark-red solid |
|  | 3,4,5-trichloroaniline -> 2-naphthol-3,6-disulfonic acid, Ba-salt | Helio Echtrottoner R | Organic Pigment | 647 | red solid |
|  | 5-chloro-2-phenoxyaniline -> 2-naphthol-3,6-disulfonic acid, Ba-salt | Helio Echtrottoner 3B | Organic Pigment | 670.2 | red solid |
|  | 2-naphthylarnine-l-sulfonic acid -> 2-naphthol,Na-salt | Lithol Rot RS | Organic Pigment | 422.4 | red solid |
|  | 2-naphthylarnine-l-sulfonic acid -> 2-naphthol, Ca-Salt | Lithol Rot RBKX (Brillianttoner CS) | Organic Pigment | 416.5 | red solid |
|  | 2-amino-5-chlororbenzoic acid -> 2-hydroxynaphthoic arylide, Cu-salt | Newport Maroon RT-647-D | Organic Pigment | 420.3 | brown solid |
|  | 2-amino-5-chlororbenzoic acid -> 2-hydroxynaphthoic arylide, Mn-salt | Maroon Gold IRT-608-D | Organic Pigment | 411.7 | brown solid |
|  | 4-toluidine-3-sulfonic acid -> 2-hydroxynaphthoic arylide,Na-salt | Lithol Rubin BN | Organic Pigment | 430.4 | ruby solid |
|  | 4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Ca-salt | Irgalite Rubine 4BP | Organic Pigment | 412.4 | dark-red solid |
|  | 2-amino-l-naphthalenesulfonic acid -> 2-hydroxynaphthoic arylide, Na-salt | Lithol Bordeaux BNS | Organic Pigment | 466.4 | dark-red solid |
|  | 2-amino-l-naphthalenesulfonic acid -> 2-hydroxynaphthoic arylide, Ca-salt | Symuler Lake Bordeaux 10 B 310 | Organic Pigment | 460.5 | dark-red solid |
|  | o-aminobenzoic acid -> 2-hydroxy-3,6-naphthalenedisulfonic acid, Ba-salt | Pigmentscharlach 3 B | Organic Pigment | 585.7 | scarlet solid |
|  | 2-amino-l-naphthalenesulfonic acid -> 2-hydroxynaphthoic acrylide, Mn-salt | Maroon Toner BB | Organic Pigment | 475.4 | brown solid |
|  | 2-methyl-5-methoxysulfanilic acid -> 2-hydroxynaphthoic arylide, Ba-salt | Permanent Bordo RN | Organic Pigment | 551.7 | dark-red solid |
|  | 3-amino-6-chlorobenzenesulfonic acid -> 2-hydroxynaphthoic arylide, Mn-salt | Sico Maroon BM hell | Organic Pigment | 459.7 | dark-red solid |
|  | 3-amino-5-chlorobenzenesulfonic acid -> 2-hydroxynaphthoic arylide, Ca-salt | Lithol Rubin GK | Organic Pigment | 444.9 | ruby solid |
|  | 5-chloro-4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Na-salt | Permanent Rot 2B | Organic Pigment | 464.8 | red solid |
|  | 5-chloro-4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Mg-salt | Irgalite Red MGP | Organic Pigment | 443.1 | red solid |
|  | 5-chloro-4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Ca-salt | Rubine Toner 2BO | Organic Pigment | 458.9 | dark-red solid |
|  | 5-chloro-4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Sr-salt | Irgalite Red 2BY | Organic Pigment | 506.4 | red solid |
|  | 5-chloro-4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Ba-salt | Irgalite Red NBSP | Organic Pigment | 556.1 | red solid |
|  | 5-chloro-4-toluidine-2-sulfonic acid -> 2-hydroxynaphthoic arylide, Mn-salt | Lithol Echtscharlach L 4260 | Organic Pigment | 473.7 | scarlet solid |
|  | 6-chloro-3-toluidine-4-sulfonic acid -> 2-hydroxynaphthoic arylide, Ca-salt | Macatawa Red | Organic Pigment | 458.9 | red solid |
|  | 6-chloro-3-toluidine-4-sulfonic acid -> 2-hydroxynaphthoic arylide, Mn-salt | Sico Maroon 33 M | Organic Pigment | 473.7 | dark-red solid |
|  | 2-trifluoromethylaniline -> 5-N-acetoacetylaminobenzimidazolone | Hostaperm Gelb H3G | Organic Pigment | 405.3 | yellow solid |
|  | 2-carboxyaniline -> 5-N-acetoacetylaminobenzimidazolone | Hostaperm Gelb H4G | Organic Pigment | 381.3 | yellow solid |
|  | 3,5-dicarboxymethylaniline -> 5-N-acetoacetylaminobenzimidazolone | PV-Echt-Gelb-H2G01 | Organic Pigment | 453.4 | yellow solid |
|  | 2,5-dimethoxycarbonylaniline -> 5-N-acetoacetylaminobenzimidazolone | Hostaperm Gelb H6G | Organic Pigment | 453.4 | yellow solid |
|  | 4-chloro-2-nitroaniline -> 5-N-acetoacetylaminobenzimidazolone | Novoperm Orange HL70 | Organic Pigment | 416.8 | orange solid |
|  | 4-nitroaniline -> 5-N-acetoacetylaminobenzimidazolone | Novoperm Orange H5G70 | Organic Pigment | 382.3 | orange solid |
|  | 2,5-dichloroaniline -> 2'-hydroxy-3'-naphthoyl-5-aminobenzimidazolone | Hostaperm Braun HFR | Organic Pigment | 492.3 | brown solid |
|  | 2-carboxymethylaniline -> 2'-hydroxy-3'-naphthoyl-5-aminobenzimidazolone | Novoperm Rot HFT | Organic Pigment | 481.5 | red solid |
|  | 2-aminobenzoic butylester -> 2'-hydroxy-3'-naphthoyl-5-aminobenzimidazolone | Permanent Rot HF2B | Organic Pigment | 523.5 | red solid |
|  | 4-nitro-2-anisidine -> 2-hydroxynaphthoic arylide-N-(2-oxo-5-benzimidazoline) | Novoperm Marron HFM01 | Organic Pigment | 498.5 | red-brown solid |
|  | 3-amino-4-methoxybenzanilide -> 2'-hydroxy-3'-naphthoyl-5-amino-benzimidazolone | Novoperm Carmin HF3C | Organic Pigment | 572.6 | dark-red solid |
|  | 2-chloroaniline -> 3-methyl-l-phenyl-5-pyrazolone | Permanent Gelb 4R | Organic Pigment | 312.7 | yellow solid |
|  | 2,5-dichloroaniline -> 3-methyl-l-phenyl-5-pyrazolone | Hansa Gelb RN | Organic Pigment | 347.2 | yellow solid |
|  | anthranilic acid -> 3-methyl-l-phenyl-5-pyrazolone | Filamid Yellow R | Organic Pigment | 322.3 | yellow solid |
|  | I-naphthylamine -> N-benzoyl-8-amino-l-naphthol-3,5-disulfonic acid, Ba-salt | Vulcanosinviolett BB | Organic Pigment | 712.9 | violet solid |
|  | 3-toluidine -> N-benzoyl-8-amino-I-naphthol-3,5-disulfonic acid, Na-salt | Anthosin 3B | Organic Pigment | 585.5 | red solid |
|  | 2-methoxyaniline -> N-(2',4'-dichlorobenzoyl)-8-amino-I-naphthol-3,5-disulfonic acid, Ba-salt | Vulkanosinrot 5B | Organic Pigment | 761.7 | red solid |
|  | 5-chloro-2-methylaniline -> N,N'-diacetoacetyl-3,3'- (5) organic pigment dimethylbenzidine | Helio Echtbrilliant Gelb GR | Organic Pigment | 685.6 | yellow solid |
|  | 2,4-dichloroaniline -> N,N'-diacetoacetyl-3,3'-dimethylbenzidine | Permanent Gelb NCG | Organic Pigment | 726.4 | yellow solid |
|  | 3,3'-dimethoxybenzidine->acetoacetic anilide | Symuler Fast Orange K | Organic Pigment | 620.7 | orange solid |
|  | 3,3'-dimethoxybenzidine -> acetoacetic arylide-2,4-dimethylanilide | Vulcan Echtorange GG | Organic Pigment | 676.7 | orange solid |
|  | 3,3'-dichlorobenzidine -> acetoacetic arylide-anilide | Permanent Gelb DHG | Organic Pigment | 629.5 | yellow solid |
|  | 3,3'-dichlorobenzidine -> acetoacetic arylide-2-methylanilide | Irgalite Yellow BRM | Organic Pigment | 657.5 | yellow solid |
|  | 3,3'-dichlorobenzidine -> acetoacetic arylide-4-toluidide | Irgalite Yellow BAF | Organic Pigment | 657.5 | yellow solid |
|  | 3,3'-dichlorobenzidine -> acetoacetic arylide-2,4-dimethylanilide | Irgalite Yellow BAWP | Organic Pigment | 685.6 | yellow solid |
|  | 3,3'-dichlorobenzidine -> acetoacetic arylide-2-methoxyanilide | Irgalite Yellow 2GP | Organic Pigment | 685.5 | yellow solid |
|  | 3,3'-dichlorobenzidine -> acetoacetic arylide-4-chloro-2,5-dimethoxyanilide | Diacetanil Yellow 3RH | Organic Pigment | 818.5 | yellow solid |
|  | 2,2'-dichloro-S,S'-dimethoxybenzidine -> acetoacetic arylide-2,4-dimethylanilide | Vulcan Echtgelb 5G | Organic Pigment | 745.7 | yellow solid |
|  | ,2',5, S'-tetrachlorobenzidine->acetoacetic arylide-2,4-dimethylanilide | Novoperm Gelb H10G | Organic Pigment | 754.5 | yellow solid |
|  | 3-amino-4,5'-dichloro-2'-methylbenzanilide -> N,N'-(2,5-dimethyl-l,4-phenylene )-bis( acetoacetamide) | Cromophtal Gelb GR | Organic Pigment | 916.6 | yellow solid |
|  | 3-amino-4,5'-dichloro-2'-methylbenzanilide -> N,N'-(2,5-dichloro-l ,4-phenylene )-bis( acetoacetamide) | Cromophtal Gelb 6G | Organic Pigment | 957.4 | yellow solid |
|  | 3-amino-4-chloro-2'-(4-chlorophenoxy)-5'-trifluoromethylbenzanilide-> N,N'-(2-chloro-5-methyl-l,4-phenylene )-bis( acetoacetamide) | Cromophtal Gelb 8G | Organic Pigment | 1229 | yellow sollid |
|  | 3-amino-3,4'-dichloro-2'-methylbenzanilide-> 3-ketobutyrylchloride condensed with 2-chloro-5-methyl-p-phenylenediamine | Cromophtal Gelb 3G | Organic Pigment | 937 | yellow solid |
|  | 2,5-dichloroaniline -> N,N'-1,4-phenylenebis(3-hydroxy-2-naphthamide) | Cromophtal Scharlach RN | Organic Pigment | 794.4 | scarlet solid |
|  | 2,5-dichloroaniline-N,N' -(2-chloro-1 ,4-phenylene)-bis(3-hydroxy-2-naphthamide) | Cromophtal Rot BRN | Organic Pigment | 828.9 | red solid |
|  | 3-amino-p-toluic acid 2-chloroethyl ester -> N,N'(2,5-dimethyl-l,4-phenylene )-bis(3-hydroxy-2-naphthamide) | Cromophtal Rot G | Organic Pigment | 925.8 | red solid |
|  | 4-chloro-2-nitroaniline -> N,N'-(2-chloro-l,4-phenylene)-bis(3-hydroxy-2-naphthamide) | Cromophtal Braun 5R | Organic Pigment | 770.5 | brown solid |
|  | 3,3'-dichlorobenzidine -> 3-methyl-I-phenyl-5-pyrazolone | Irgalite Orange P | Organic Pigment | 623.5 | orange solid |
|  | 3,3'-dichlorobenzidine -> 3-methyl-l-(3'-tolyl)-5-pyrazolone | Permanent Orange RL 70 | Organic Pigment | 651.6 | orange solid |
|  | 2,2'-dianisidine -> 3-methyl-l-phenyl-5-pyrazolone | Elektra Red | Organic Pigment | 614.7 | red solid |
|  | 3,3'-dimethoxybenzidine -> 3-methyl-l,4'-tolyl-5-pyrazolone | PV-Rot G 1 | Organic Pigment | 614.6 | red solid |
|  | 3,3'-dichlorobenzidine -> ethoxycarbonyl-l-phenyl-5-pyrazolone | Sicoplast V Rot | Organic Pigment | 739.6 | red solid |
|  | 1,2-dihydroxy-9,lO-anthraquinone (alizarin), Al-Ca lake | Krapplack C | Organic Pigment | 240.2 | red solid |
|  | 4,4' -bis(I -amino-9, 1 O-anthraquinone) | Indofast Red R6340 | Organic Pigment | 444.4 | red solid |
|  | 4,4-bis(I-amino-9,IO-anthraquinonediyl) on CaC03 | Cromophtal Rot C20 | Organic Pigment | 444.4 | red solid |
|  | I-methylamino-9,1O-anthraquinone | Oracet Red G | Organic Pigment | 237.3 | red solid |
|  | 1 ,8-bis( thiophenyl)-9,1 O-anthraquinone | Oracet Yellow GHS | Organic Pigment | 424.5 | yellow solid |
|  | 1-aminoanthraquinonebenzamide | Pigmosolgelb G | Organic Pigment | 295.3 | yellow solid |
|  | quinizarin-2-sulfonic acid, AI-salt | Violett 31372 | Organic Pigment | 346.3 | violet solid |
|  | quinizarin-6-sulfonic acid, AI-lake | Violett 31372 R | Organic Pigment | 346.3 | violet solid |
|  | quinizarin-2,6-disulfonic acid AI-salt | Violett 31372 B | Organic Pigment | 425.3 | violet solid |
|  | N-l-anthraquinone-anthrapyrimidine-4-carboxylic amid | Paliogen Gelb 1560 | Organic Pigment | 481.5 | yellow solid |
|  | N,N'-{5-phenyl-l,3-triazine)-bis{1-amino-9,1 O-anthraquinone) | Cromophtal Gelb AGR | Organic Pigment | 599.6 | yellow solid |
|  | perylene-3,4,9,lO-tetracarboxylic acid anhydride | Irgazin Rot BPT | Organic Pigment | 392.3 | red solid |
|  | perylene-3,4,9,lO-tetracarboxylic acid diimide | Perindo Violet V4047 | Organic Pigment | 390.3 | violet solid |
|  | perylene-3,4,9,I-tetracarboxylic acid diimide | PV-Echtbordo B | Organic Pigment | 390.3 | dark-red solid |
|  | N ,N' -dimethylperylene-3,4,9,10-tetracarboxylic acid diimide | Paliogen Red L 4120 | Organic Pigment | 418.4 | red solid |
|  | N ,N' -di-4' -anisylperylene-3,4,9, 1 O-tetracarboxylic acid diimide | Indofast Brilliant Scarlet R-6500 | Organic Pigment | 602.6 | scarlet solid |
|  | N,N'-di-3',5'-xylylperylene-3,4,9,IO-tetracarboxylic acid diimide | Paliogen Rot K3580 | Organic Pigment | 598.7 | red solid |
|  | perylene derivative | Indofast Brilliant Scarlet-Toner R-6300 | Organic Pigment | 630.6 | scarlet solid |
|  | N,N' -di-3' ,5' -xylylperylene-3,4,9, 1 0-tetracarboxylic acid diimide with poly( dimethylsiloxane) | Wacker HTV-Farbpaste | Organic Pigment | 598.7 | red paste |
|  | diimide of 3,4,9,10-perylenetetracarboxylic acid with 4-phenylazoaniline | Paliogen Rot L3910 HD | Organic Pigment | 750.8 | red solid |
|  | 2,7 -dibromoanthanthrone | Monolite Red Y | Organic Pigment | 464.1 | light-red solid |
|  | dibenzimidazolo( 1,2-e,1 ',2'-m)-4,9-diaza-3,8-pyrenequinone | EPV-Echtorange GRL | Organic Pigment | 412.4 | orange solid |
|  | pyranthrone | Indanthren Goldorange G | Organic Pigment | 406.4 | orange solid |
|  | 6,14-dichloropyranthrone | Paliogen Orange L 2640 | Organic Pigment | 475.3 | orange solid |
|  | 6, 14-dichloro-l ,9-dibromopyranthrone | Paliogen Rot L 3340 | Organic Pigment | 633.1 | red solid |
|  | 7,9,12-tribromopyranthrone | Paliogen Orange 3GT | Organic Pigment | 643.1 | orange solid |
|  | 16,17 -dimethoxyviolanthrone | Indanthren Brilliant Gruen FFB | Organic Pigment | 492.5 | green solid |
|  | 5,14-dichloroisoviolanthrone | Indanthren Brilliant Violett RR | Organic Pigment | 525.4 | violet solid |
|  | 5,14-dibromoisoviolanthrone | Indanthren Brilliant Violett 3B | Organic Pigment | 614.3 | violet solid |
|  | 2,4-dinitro-l-naphthol-7 -sulfonic acid, Ba-lake on blanc fixe | Hellgelber Lack 1 | Organic Pigment | 433.5 | yellow solid |
|  | N,N' -di-4-chloro-2-nitrophenylmethylendiamine, methylen-bis( 4-chloro-2-nitrophenylamin) | Lithol Echtgelb GG | Organic Pigment | 355.1 | yellow solid |
|  | 4-(amino-3-tolyl)-4'-N-phenylaminophenyl-4"-N-sulfophenylaminophenylmethane, free acid | Arionblau 1 | Organic Pigment | 521.6 | blue solid |
|  | bis(4-N-phenylaminophenyl)-4-N"-sulfophenylaminophenylmethane | Reflex Blau R51 | Organic Pigment | 595.7 | blue solid |
|  | 4-N-phenylaminophenyl-4'-N-(2"-tolylaminophenyl)-4"'-N-(4""-sulfo-2""-tolylaminophenyl)methane | Reflex Blau RB | Organic Pigment | 611.7 | blue solid |
|  | bis(4-N-3'-tolylaminophenyl)-4"-N-(4"'-sulfo-3"'-tolylaminophenyl)methane | Reflex Blau 2G | Organic Pigment | 623.8 | blue solid |
|  | bis(4-N-3'-tolylaminophenyl)-4"-N-(4"'-sulfo-3"'-tolylaminophenyl)methane | Reflex Blau 3G 51 | Organic Pigment | 637.8 | blue solid |
|  | N,N' -1,3-phenylene-bis( 3-iminotetrachloroisoindolin-I-one) | Cromophtal Gelb 2RLTS | Organic Pigment | 641.9 | yellow solid |
|  | N,N' -(2,6-toluenediyl)-bis(3-iminotetrachloroisoindolin-I-one), azomethine-type | Irgazin Gelb 2GLTN | Organic Pigment | 655.9 | yellow solid |
|  | isoindoline derivative | Fanchon Fast Yellow Y-5700 | Organic Pigment | 367.2 | yellow solid |
|  | isoindolinone derivative, azomethine-type | Irgazin Orange 3GL | Organic Pigment | 569.2 | orange solid |
|  | dibenzimidazolo(l,2-e,2',1 '-I)-4,9-diaza-3, 10-pyrenequinone | Permanent Rot TG | Organic Pigment | 412.4 | red solid |
|  | 7,14-dioxo-5,7,12,14-tetrahydroquinolino-[2,3-blacridine,β-form | Cinquasia Violet R RT-891-D | Organic Pigment | 312.3 | violet solid |
|  | 7,14-dioxo-5,7,12,14-tetrahydroquinolino(2,3-b ) acridine, β-form | Hostaperm Rotviolett ER02 | Organic Pigment | 312.3 | red-violet solid |
|  | ,14-dioxo-5,7,12,14-tetrahydroquinoIino-[2,3-b]acridine, γ-form | Hostaperm Rot E2B 70 | Organic Pigment | 312.3 | red solid |
|  | 2,9-dimethyl-7,14-dioxo-5,7,12,14,tetrahydroquinoIino[2,3-b ]acridine | Hostaperm Rosa E Transparent | Organic Pigment | 342.4 | pink solid |
|  | 2,9-dichloro-7,14-dioxo-5,7,12,14-tetrahydroquinolino[ 2,3-b ] acridine | Quindo Magenta RV 6843 | Organic Pigment | 355.2 | solid |
|  | 3,1 0-dichloro-7 ,14-dioxo-5,7, 12,14-tetrahydroquinolino[2,3-b]acridine | Hostaperm Rot EG Transparent | Organic Pigment | 383.2 | red solid |
|  | 3,8,16-trioxo-3,8,9,16-tetrahydronaphthalinobenzo- [a]naphth-[2,3-H]acridine-5,8,13(14H)trione | Indanthren Rot RK | Organic Pigment | 375.4 | red solid |
|  | N ,N' -diethyldipyrazoleanthronyl | Indanthren Rubin R | Organic Pigment | 494.6 | ruby solid |
|  | anthrapyrimidine derivative | Indanthren Yellow 20 | Organic Pigment | 481.5 | yellow solid |
|  | N-phenyl-2-aminophenazoniumchloride derivative | Pigmentschwarz 1 | Organic Pigment | 1102 | black solid |
|  | fiavanthrone | Monolite Yellow FR | Organic Pigment | 408.4 | orange solid |
|  | indanthrone | Cromophtal Blau A3R | Organic Pigment | 442.4 | blue solid |
|  | 7-chloroindanthrone | Indanthren Blau GCD | Organic Pigment | 476.9 | blue solid |
|  | 7,16-dichloroindanthrone | Indanthren Blau BC | Organic Pigment | 511.3 | blue solid |
|  | Cu-phthalocyanine,β-form | Irgalite Blue BLR/P | Organic Pigment | 576.1 | blue solid |
|  | Cu-phthalocyanine,α-form | Cromophtal Blau 4GNP | Organic Pigment | 576.1 | blue solid |
|  | Cu-hexadecachlorophthalocyanine | Bayplast Gruen HG | Organic Pigment | 1127 | green solid |
|  | Cu-hexabromodecachlorophthalocyanine | Bayplast Gruen 8HG | Organic Pigment | 1394 | green solid |
|  | Cu-hexabromodecachlorophthalocyanine | Bayplast Gruen 8GN | Organic Pigment | 1394 | green solid |
|  | phthalocyanine, halogenated, metalfree | Heliogen Blau LG | Organic Pigment | 1065 | blue solid |
|  | 2,4,5,7-tetrahromo6uorescein, Ph-salt | Eosin A salzfrei | Organic Pigment | 853.1 | red solid |
|  | oxazoloanthraquinone pigment | Indanthren Rot FBB | Organic Pigment | 420.4 | red solid |
|  | 2,6-dibenzamido-9,1 O-diacetamido-3,7 -diethoxytriphendioxazine | Cromophtal Violett B | Organic Pigment | 696.7 | violet solid |
|  | phenoxazine derivative | Hostaperm Violett RL Spezial | Organic Pigment | 589.5 | violet solid |
|  | 5,5'-dibromo-4,4'-dichloroindigo | Brilliant Indigo 4G | Organic Pigment | 490.9 | blue solid |
|  | di-Na fluorescein | Uranin A extra | Organic Pigment | 376.3 | dark-red solid |
|  | 2,4,5,7 -tetrabromofluorescein, Na-salt | Phloxinlack 1 | Organic Pigment | 691.9 | red solid |
|  | thioindigo | Indigo | Organic Pigment | 296.4 | blue solid |
|  | 7,7' -dichlorothioindigo | Harmon | Organic Pigment | 365.3 | red solid |
|  | 5,5' -dichloro-7 ,7' -dimethylthioindigo | Indanthren Rotbiolett RH | Organic Pigment | 393.3 | violet solid |
|  | 5,5' -dichloro-4,4',7 ,7' -tetramethylthioindigo | Indanthren Brilliant Bordo RRL | Organic Pigment | 421.4 | dark-red solid |
|  | 6,6' -dichloro-4,4' -dimethylthioindigo | Oracet Pink RF | Organic Pigment | 393.3 | pink solid |
|  | 4,4' -dichloro-7 ,7' -dimethylthioindigo | Thiosa Fast Red MV-6604 | Organic Pigment | 393.3 | red solid |
|  | 4,4',7,7'-tetrachlorothioindigo | Novoperm Rotviolett MRS | Organic Pigment | 434.1 | red-violet solid |
|  | 4,4',7,7'-tetrachlorothioindigo on CaC03 | Cromophtal Bordo RN | Organic Pigment | 434.1 | dark-red solid |
|  | 2(4'-N,N-dimethylaminophenyl)-3,6-dimethylthiazolinium chloride | Fanalgelb G supra | Organic Pigment | 304.8 | yellow solid |
|  | PW-molybdato-complex ofbis(4-N,N-diethylaminophenyl)-4'-N-ethylaminonaphthalenemethane | Lumiere Blue | Organic Pigment | Unknown | blue solid |
|  | PW-molybdato complex ofbis(4-N-dimethylaminophenyl)-2"-chlorophenylmethane | Siegleblau-Extrakt D 449 | Organic Pigment | Unknown | blue solid |
|  | PW-molybdato complex ofbis(4-N-ethylamino-3-methylphenyl)-2" -chlorophenylmethane | Fanalbremer Blau B Supra | Organic Pigment | 355.4 | blue solid |
|  | PW-molybdato complex of bis(4-N-diethylaminophenyl)-PW-molybdato complex of bis(4-N-diethylaminophenyl)- phenylmethane | Sieglegruen-Extrakt D 454 | Organic Pigment | Unknown | green solid |
|  | complex of Rhodamine 3 B | Fanalrot 5B supra | Organic Pigment | Unknown | red solid |
|  | PW-molybdato-complex of Rhodamine 6 G | Sieglerosa Extrakt D 443 | Organic Pigment | Unknown | pink solid |
|  | PW-molybdato-complex of Rhodamine B | Sieglerotviolett D 445 | Organic Pigment | Unknown | violet solid |
|  | 4,4'-bis(2-methoxy)stilbene | Uvitex FP | Fluorescent brightening agent | 418.5 | yellowish-green solid |
|  | 2,2'-(2,5-thiophenediyl)-bis(5-t-butylbenzoxazole) | Uvitex OB | Fluorescent brightening agent | 430.6 | yellowish solid |
|  | Ca carbonate | Omya BSH | Filler | 100.1 | colorless solid |
|  | AI silicate, hydrated | Dixie Clay | Filler | 516.3 | beige solid |
|  | Na-Al silicate | Vulkasil A 1 | Filler | Unknown | White powder |
|  | Al hydroxysilicate | Kaolin Argirex | Filler | 516.3 | light-grey solid |
|  | calcinated Al silicate | Argirex B24 | Inorganic Pigment/Filler | Unknown | greyish solid |
|  | Al hydroxysilicate | China Clay Polewhite LM | Filler | 516.3 | colorless solid |
|  | amorphous Si02 | Perkasil KS 404 | Filler | 60.08 | Transparent solid, white/yellow solid |
|  | Active SiO2 | Vulkasil N | Filler | 60.07 | Colorless solid |
|  | Si02 with Ca silicate | Vulkasil C | Filler | Unknown | White powder |
|  | Al hydroxide | Apyral B 40 E | Fililler/Flame retardant | 78 | colorless solid |
|  | Chalk | Calcium carbonate | Fillers | 100.1 | White powder |
|  | Clay | Kaolinite | Fillers | Unknown | Grey solid |
|  | Zinc oxide | Calamine | Fillers | 81.4 | White powder |
|  | Metal powder | N/A | Fillers | Unknown | Grey powder |
|  | Wood powder | N/A | Fillers | Unknown | Brown powder |
|  | Asbestos | Chrysotile, crocidolite, amosite, anthophyllite | Fillers | 277.11 | Blue, brown, white fiber with low density |
|  | Barium sulfate | Barite powder | Fillers | 233.38 | Dense white powder |
|  | Glass microspheres | N/A | Fillers | Unknown |  |
|  | Siliceous earth |  | Fillers | Unknown | White powder |
|  | paraffinic mineral oil | Naftolen P 613 K | Plasticizer | Unknown | brown liquid |
|  | mixture of predominantly aliphatic hydrocarbons | Naftolen V 4057 | Plasticizer | Unknown | brown liquid |
|  | naphthenic mineral oil | Naftolen N 400 | Plasticizer | 315 | brown liquid |
|  | aromatic mineral oil | Naftolen NV | Plasticizer | Unknown | black liquid |
|  | aliphatic C15,C16 chloroparaffin | Chlorparaffin Huels 40G | Plasticizer | Unknown | colorless, clear liquid |
|  | aliphatic C15,C16 chloroparaffin (40 ... 56% Cl) | Chlorparaffin Huels 45G | Plasticizer | Unknown | colorless, clear liquid |
|  | aliphatic C1S,C16-chloroparaffin | Chlorparaffin Huels 52G | Plasticizer | Unknown | colorless, clear liquid |
|  | 1,4-butanediol | 1,4-Butandiol | Plasticizer, Educt | 90.12 | colorless, clear liquid |
|  | di-butoxyethoxyethyl formal | Reomol BCF | Plasticizer | 336.5 | colorless, clear liquid |
|  | polyether with ester and alcoholic groups | Vulkanol FH | Plasticizer | Unknown | colorless, clear liquid |
|  | glyceroltriacetate | Triacetin | Plasticizer | 218.2 | colorless, clear liquid |
|  | glycerol mono acetate | Hallco C-918 | Plasticizer | 134.1 | colorless, clear liquid |
|  | pentaerythritol(isostearate adipate) | Ester KE-23 | Plasticizer | 566.8 | colorless, viscous liquid |
|  | trirnethylolpropane(isostearate adipate) | Ester KE-25 | Plasticizer | 933.6 | colorless, viscous liquid |
|  | aliphatic mono carboxylic acid ester | Edenol 192 | Plasticizer | Unknown | colorless, clear liquid |
|  | aliphatic carboxylic acid ester | Edenol 194 | Plasticizer | Unknown | colorless, clear liquid |
|  | tri( ethyleneglycol)diacetate | Tegda | Plasticizer | 234.2 | colorless, clear liquid |
|  | triethyleneglycol caprate-caprylate | Plasthall 4141 | Plasticizer | 430 | colorless, clear liquid |
|  | polyglycol ester of fatty acids | Witamol 460 | Plasticizer | Unknown | colorless, clear liquid |
|  | dibutyladipate | Adimoll DB | Plasticizer | 258.4 | colorless, clear liquid |
|  | dihexyladipate | Adimoll PH | Plasticizer | 314.5 | colorless, clear liquid |
|  | dihexylazelate | Priplast 3013 DNHZ | Plasticizer | 356.6 | pale-yellow liquid |
|  | dioctylazelate | Priplast 3018 DOZ | Plasticizer | 412.7 | pale-yellow liquid |
|  | dibutylsebacate | Edenol DBS | Plasticizer | 314.5 | colorless, clear liquid |
|  | dioctylsebacate | Edenol 888 | Plasticizer | 426.7 | colorless, clear liquid |
|  | di(C8···C10-alkyl)adipate | Linplast 810 XA | Plasticizer | Unknown | colorless, clear liquid |
|  | di-i-butyladipate | Freudenberg (Brunne collection) | Plasticizer | 258.4 | colorless, clear liquid |
|  | di(2-ethylhexyl)adipate | Hexaplas DOA | Plasticizer | 370.6 | colorless, clear liquid |
|  | di-i-nonyladipate | Adimoll DN | Plasticizer | 398.6 | colorless, clear liquid |
|  | di-i-nonyladipate, mixture of isomers with high amount of linear chains | Plastomoll DNA | Plasticizer | 398.6 | colorless, clear liquid |
|  | di-i-decyladipate | Jayflex DIDA | Plasticizer | 382.5 | colorless, clear liquid |
|  | di(i-octyl)dodecanedioate | Plasthall DIODD | Plasticizer | 454.7 | colorless, clear liquid |
|  | mixture of di-i-decyladipate and di-i-decylphthalate | Palatinol CE | Plasticizer | Unknown | colorless, clear liquid |
|  | di(butoxyethoxyethyl}glutarate | Plasthall DBEEG | Plasticizer | 420.6 | colorless, clear liquid |
|  | di(butoxyethoxyethyl}adipate | Plasthall DBEEA | Plasticizer | 434.6 | colorless, clear liquid |
|  | dibutoxyethoxyethylsebacate | Plasthall 83 SS | Plasticizer | 490.7 | brown, clear liquid |
|  | fatty acid polyglycol ester | Deplastol 00130344 | Plasticizer | Unknown | colorless, clear liquid |
|  | poly(1,2-propanedioladipate) | Palamoll 636 | Plasticizer | Unknown | colorless, clear liquid |
|  | poly( 1,2-propyleneadipate) | Witamol 615 MEK | Plasticizer | Unknown | colorless, clear liquid |
|  | poly(I,3-butanedioladipate) | Diolpate 150 | Plasticizer | Unknown | colorless, clear liquid |
|  | poly(l,3-butylene-co-I,2-propylene adipate) | Diolpate 214 | Plasticizer | 1150 | colorless, clear liquid |
|  | poly(butanedioladipate) | Palamoll 646 | Plasticizer | Unknown | colorless, clear liquid |
|  | adipic acid polyester (based on butanediol) | Palamoll 652 | Plasticizer | Unknown | colorless, clear liquid |
|  | azelaic polyester | Priplast 3142 | Plasticizer | Unknown | colorless, viscous liquid |
|  | sebacic acid polyester | Edenol 1800 | Plasticizer | Unknown | colorless, clear liquid |
|  | polyester based on adipic and phthalic acids | Uraplast RA17 | Plasticizer | Unknown | colorless, clear liquid |
|  | polyester based on adipic and phthalic acids | Uraplast RA5 | Plasticizer | Unknown | colorless, clear liquid |
|  | benzyloctyl adipate | Adimoll BO | Plasticizer | 348.5 | colorless, clear liquid |
|  | fatty acid ester | Edenol W750 | Plasticizer | Unknown | yellow, clear liquid |
|  | special unsaturated fatty acid ester | Edenol W 1385 | Plasticizer | Unknown | yellowish, clear liquid |
|  | i-butyloleate | Edenol IBO | Plasticizer | 338.6 | yellow, clear liquid |
|  | tetra( oxyethylene )dimethacrylate | Weichmacher TEDMA | Plasticizer | 330.4 | colorless, clear liquid |
|  | octylepoxystearate | Reagens EP/3 | Plasticizer | 383.6 | colorless, clear liquid |
|  | special epoxidised fatty acid ester | Edenol B 33 | Plasticizer | Unknown | colorless, clear liquid |
|  | i-alkylepoxystearate | Edenol B35 | Plasticizer | 380 | colorless, clear liquid |
|  | epoxidised oleic ester | Priplast 1431 | Plasticizer | 600 | pale-yellow liquid |
|  | epoxidised soy bean oil | Edenol D82,ESBO | Plasticizer | 935 | yellowish liquid |
|  | epoxidised linseed oil | Edenol B316, Lankroflex L | Plasticizer | 960 | yellow, clear liquid |
|  | epoxidised vegetable oil | Drying oil epoxides | Plasticizer | Unknown | colorless, clear liquid |
|  | benzyloctyladipate | Adimoll BO | Plasticizer | 348.5 | colorless, clear liquid |
|  | methylene-bis(thioglycolic acid butyl ester) | Vulkanol 88 | Plasticizer | 308.5 | yellowish, clear liquid |
|  | thiodi(glycolic acid-di-2-ethylhexyl ester) | Vulkanol 90 | Plasticizer | 374.6 | yellow to brownish, clear liquid |
|  | mixture of thiocarboxylic and carboxylic acid esters | Vulkanol 81 | Plasticizer | Unknown | pale yellow, clear liquid |
|  | dimethylphthalate | Chrompack | Plasticizer | 194.2 | colorless, clear liquid |
|  | diethylphthalate | Chrompack | Plasticizer | 222.2 | colorless, clear liquid |
|  | dipropylphthalate | Chrompack | Plasticizer | 250.3 | colorless, clear liquid |
|  | dibutylphthalate | Chrompack | Plasticizer | 278.3 | colorless, clear liquid |
|  | dihexylphthalate | Chrompack | Plasticizer | 334.5 | colorless, clear liquid |
|  | diheptylphthalate | Witamol 107 | Plasticizer | 362.5 | colorless, clear liquid |
|  | dinonylphthalate | Chrompack | Plasticizer | 418.6 | colorless, clear liquid |
|  | diundecylphthalate | Chrompack | Plasticizer | 474.7 | colorless, clear liquid |
|  | didodecylphthalate | Chrompack | Plasticizer | 502.8 | colorless, clear liquid |
|  | di-2-propylphthalate | Chrompack | Plasticizer | 250.3 | colorless, clear liquid |
|  | di-i-butylphthalate | Chrompack | Plasticizer | 278.3 | colorless, clear liquid |
|  | di-i-pentylphthalate | Palatinol CE 5539 (DIPP) | Plasticizer | 306.4 | colorless, clear liquid |
|  | di-i-heptylphthalate | DIHP J 77 | Plasticizer | 362.5 | colorless, clear liquid |
|  | di(2-ethylhexyl)phthalate | Witamol 100 | Plasticizer | 390.6 | colorless, clear liquid |
|  | di-i-octylphthalate | Jayflex DIOP | Plasticizer | 390.6 | colorless, liquid |
|  | di-i-nonylphthalate | Palatinol DINP | Plasticizer | 418.6 | colorless, clear liquid |
|  | di-i-decylphthalate | Genomoll 180 | Plasticizer | 446.7 | colorless, clear liquid |
|  | di-i-undecylphthalate | Jayflex DIUP | Plasticizer | 474.7 | colorless, clear liquid |
|  | di-i-tridecylphthalate | Vestinol TD stab | Plasticizer | 530.8 | colorless, clear liquid |
|  | di-i-tridecylphthalate | Edenol W300S | Plasticizer | 530.8 | yellow liquid |
|  | dicyclohexylphthalate | Unimoll 66 | Plasticizer | 330.4 | colorless solid |
|  | di(C6···C10 aIkyl)phthalate | Witamol 110 | Plasticizer | 395 | colorless, clear liquid |
|  | nonylundecylphthalate | Jayflex 911P | Plasticizer | 446.7 | colorless, clear liquid |
|  | mixture of phthalic acid esters | Calibration Mixture 84C | Plasticizer | Unknown | colorless, clear liquid |
|  | benzylbutylphthalate | Unimoll BB | Plasticizer | 312.4 | colorless, clear, low-viscous liquid |
|  | dibenzylphthalate | Santicizer 278 | Plasticizer | 346.4 | colorless, clear, oily liquid |
|  | dimethoxyethylphthalate | Palatinol O | Plasticizer | 282.3 | colorless, clear liquid |
|  | dibutoxyethylphthalate | Palatinol K (CE 5531) | Plasticizer | 366.5 | colorless, clear liquid |
|  | triheptyItrimellitate | Witamol 207 stab | Plasticizer | 504.7 | colorless, clear liquid |
|  | tri(C6 ... C8-alkyl)trimellitate | Linplast 68 TM | Plasticizer | Unknown | colorless, clear liquid |
|  | tri(C8···C10-alkyl)trimellitate | Witamol 218 stab | Plasticizer | 590 | colorless, clear liquid |
|  | tri(2-ethylhexyl)trimellitate | Hexaplas OTM | Plasticizer | 546.8 | colorless, clear liquid |
|  | mixture of trioctyl and tridecyl trimellitate | Hexaplas L810TM | Plasticizer | 592 | colorless, clear liquid |
|  | polymer, linear, saturated phthalate | Uraplast W4 | Plasticizer | Unknown | colorless, clear liquid |
|  | phthalic acid polyester | Ultramoll PP | Plasticizer | Unknown | colorless, clear, low-viscous liquid |
|  | phthalic polyester | Paraplex G31 | Plasticizer | Unknown | colorless, clear liquid |
|  | tributylphosphate | Freudenberg (Brunne collection) | Plasticizer | 266.3 | colorless, clear liquid |
|  | trioctylphosphate | Disflamoll TOF | Plasticizer | 434.7 | colorless, clear liquid |
|  | tricresylphosphate | Disflamoll TKP | Plasticizer | 416.4 | colorless, pale-yellow, clear liquid |
|  | trixylenylphosphate | Reomol TXP | Plasticizer | 410.5 | colorless, clear liquid |
|  | 2-ethylhexyldiphenylphosphate | Santicizer 141 | Plasticizer | 362.4 | colorless, clear, oily liquid |
|  | i-decyldiphenylphosphate | Santicizer 148 | Plasticizer | 390.5 | colorless, clear, oily liquid |
|  | cresyldiphenylphosphate | Disflamoll DPK | Plasticizer | 340.3 | colorless, clear liquid |
|  | 2,4-xylyldiphenylphosphate | Reomol CDP | Plasticizer | 354.4 | colorless, clear liquid |
|  | triphenylphosphate | Disflamoll TP | Plasticizer | 326.3 | colorless solid |
|  | pentadecanesulfonic acid phenol and cresol esters | Mesamoll | Plasticizer | 368.4 | colorless, clear liquid |
|  | phenolic ester of aliphatic sulfonic acid | Weichmacher KL 3-3030 | Plasticizer | Unknown | colorless, clear liquid |
|  | N-butylbenzenesulfonamide | Cetamoll BMB | Plasticizer | 213.3 | colorless, clear liquid |
|  | mixture of 0- and p-N-ethyltoluenesulfonamide | Isaplast 5975 | Plasticizer | 185.24 | viscous liquid |
|  | N -(2-hydroxypropyl)benzenesulfonamide | Isaplast | Plasticizer | 215.27 | viscous, clear liquid |
|  | N,N-disubstituted fatty acid amide | Hallcomid M-8-10 | Plasticizer | Unknown | yellow, clear liquid |
|  | fatty acid ester + mineral oil + dispersant | Struktol WB 700, extract | Plasticizer | Unknown | colorless, oily liquid |
|  | hydrophilised fatty acid ester | Struktol WB 222 | Plasticizer | Unknown | colorless, soft waxy material |
|  | hydrophilised aliphatic ester on carrier | Struktol KW 400 | Plasticizer | Unknown | colorless solid |
|  | phthalic acid ester | Struktol KW 500 | Plasticizer | Unknown | colorless liquid |
|  | aliphatic-aromatic polyester based on phthalic acid | Struktol WB 300 | Plasticizer | Unknown | colorless, viscous liquid |
|  | Short chain chlorinated paraffins | SCCP | Plasticizer/Flame Retardant | Unknown | viscous liquid |
|  | Medium chain chlorinated paraffins | MCCP | Plasticizer | Unknown | Viscous liquid |
|  | Long chain chlorinated paraffins | LCCP | Plasticizer | Unknown | solid |
|  | Diisoheptylphthalate | DIHP | Plasticizer | 362.5 |  |
|  | 1,2-Benzenedicarboxylic acid, di-C7,11-branched and linear alkyl esters, | DHNUP | Plasticizer | 362-474 | liquid |
|  | Benzyl butyl phthalate | BBP | Plasticizer | 312.4 | clear colorless liquid |
|  | Bis(2-ethylhexyl)phthalate | DEHP | Plasticizer | 390.56 | pale yellow oily liquid |
|  | Bis(2-methoxyethyl)phthalate | DMEP | Plasticizer | 282.29 | oily liquid |
|  | Dibutyl phthalate | DBP | Plasticizer | 278.34 | Colorless oil |
|  | Dipentyl phthalate | DPP | Plasticizer | 306.4 | Clear, colorless liquid |
|  | Di-(2-ethylhexyl) adipate | DEHA | Plasticizer | 370.574 | Colorless oily liquid |
|  | Di-octyladipate | DOA | Plasticizer | 370.574 | Colorless oily liquid |
|  | Diethyl phthalate | DEP | Plasticizer | 222.24 | Colorless liquid |
|  | Diisobutylphthalate | DiBP | Plasticizer | 278.35 | Oily, colorless liquid |
|  | Tris(2 chloroethyl)phosphate | TCEP | Plasticizer | 285.48 | Clear liquid |
|  | Dicyclohexyl phthalate | DCHP | Plasticizer | 330.418 | White granular solid |
|  | Benzyl butyl phthalate | BBP | Plasticizer | 312.365 | Clear, colorless liquid |
|  | Diheptyl adipate | DHA | Plasticizer | 342.5 | Clear, colorless liquid |
|  | Dihexyl adipate | HAD | Plasticizer | 314.5 | Colorless liquid |
|  | Heptyl octyl adipate | HOA | Plasticizer | 356.6 | Colorless liquif |
|  | mixture of polyglycol ether and phthalate ester | Atepas U | Viscosity modifier/Plasticizer | Unknown | yellowish, clear, viscous liquid |
|  | substituted fatty alcohol-ethyleneoxide adduct | Atepas K | Viscosity modifier/Plasticizer | Unknown | colorless, clear, viscous |
|  | Glass fibers | fiberglass | Reinforcements | Unknown | Clear, glass pellets |
|  | Carbon fibers | Graphite fiber | Reinforcements | 12.01 | Black, string-like solid |
|  | Aramide fibers | Kevlar, Nomex, Twaron | Reinforcements | Unknown | Yellow fibers |
|  | higher paraffinic hydrocarbons | Irgawax 366 | Lubricant | Unknown | colorless, clear liquid |
|  | paraffin wax with low melting point | Naftolube SP 17 | Lubricant | Unknown | colorless solid |
|  | paraffin wax with high melting point | Naftolube SP 18 | Lubricant | Unknown | colorless solid |
|  | hydrocarbon wax with aliphatic ester groups | Baerolub L-KM | Lubricant | Unknown | colorless solid |
|  | polyethylene wax | Naftolube PEF | Lubricant | Unknown | colorless solid |
|  | polyethylene wax, non-polar | Hoechst-Wachs PE 520 | Lubricant | Unknown | colorless granules |
|  | hydrogenated castor oil | Loxiol EP 15 | Lubricant | 939.5 | colorless solid |
|  | oxidized polyethylene wax | Naftolube OPE | Lubricant | Unknown | colorless solid |
|  | polyethylene wax, polar | Hostalub H 12 | Lubricant | Unknown | colorless solid |
|  | oxidized hydrocarbon wax | Baerolub L-AX | Lubricant | Unknown | colorless solid |
|  | partially oxidized, partially saponified polyethylene wax | Irgawax 372 | Lubricant | Unknown | yellowish solid |
|  | cetyl-stearyl alcohol | Realube C/18 | Lubricant | 513 | colorless solid |
|  | saturated fatty alcohol | Naftolube SRL | Lubricant | Unknown | colorless solid |
|  | saturated fatty alcohol | Loxiol EP 52 | Lubricant | Unknown | colorless solid |
|  | saturated fatty alcohol | Irgawax 365 | Lubricant | Unknown | colorless solid |
|  | etherified poly( oxyethylene) | Loxiol EP 304 | Lubricant | Unknown | almost colorless flakes |
|  | stearic acid | Naftozin N | Lubricant/plasticizer | 284.5 | waxy solid |
|  | spedal stearic add | Ligalub Se | Lubricant | 284.5 | colorless solid |
|  | mixture of fatty acids | Baerolub FTA | Lubricant | Unknown | colorless solid |
|  | fatty acid | Realube PS | Lubricant | Unknown | colorless solid |
|  | 12-hydroxystearic acid | Loxiol G 21 | Lubricant | 300.5 | colorless solid (beaded) |
|  | mixture of hydroxyfatty acids | Baerolub FTO | Lubricant | Unknown | colorless solid |
|  | stearylstearate | Ligalub 36 Fe | Lubricant | 537 | colorless solid |
|  | C16, C18 ester wax | Realube SS/16-18 | Lubricant | Unknown | colorless solid |
|  | fatty acid ester + acid | Baerolub L-PO-1 | Lubricant | Unknown | colorless, clear liquid |
|  | aliphatic ester wax | Loxiol G 47 | Lubricant | Unknown | colorless solid |
|  | fatty acid ester | Baerolub L-PK | Lubricant | Unknown | colorless, clear liquid |
|  | long-chain aliphatic ester | Realube TR | Lubricant | Unknown | colorless, clear liquid |
|  | glycerol ester of unsaturated fatty acids | Swedlub FG-4 | Lubricant | Unknown | colorless, clear oily liquid |
|  | unsaturated fatty acid ester | Ligalub 40/1 | Lubricant | Unknown | yellow, clear liquid |
|  | fatty acid triglycerol ester | Realube SI | Lubricant | Unknown | colorless solid |
|  | pentaerythrol fatty ester | Loxiol EP 861 | Lubricant | Unknown | colorless solid (beaded) |
|  | montanic ester carboxylate | Hostalub We 4 | Lubricant | Unknown | yellowish solid |
|  | complex ester of saturated fatty acids | Baerolub A 275 | Lubricant | Unknown | yellowish solid |
|  | aliphatic ester wax with some phthalate ester | Naftolube ELP | Lubricant | Unknown | colorless solid |
|  | aliphatic ester wax + phthalate ester | Realube SD | Lubricant | Unknown | colorless solid |
|  | ester acid carboxylate | Baerolub GL 5 DO | Lubricant | Unknown | yellowish solid |
|  | glycerolmonostearate | Swedlub HG 55 | Lubricant | 358.6 | slightly yellowish flakes |
|  | wax esteralcohol, partial ester of glycerol | Realube GMS | Lubricant | Unknown | colorless solid |
|  | glycerol partial ester of saturated fatty acids | Baerolub L-MS | Lubricant | Unknown | colorless solid |
|  | fatty acid ester with OH groups | Baerolub LM 4 | Lubricant | Unknown | colorless solid |
|  | mixture of aliphatic esteralcohols | Tebestat HSE 81 | Lubricant | Unknown | yellowish, clear liquid |
|  | glycerol partial ester of oleic acid | Realube GMO | Lubricant | Unknown | light yellowish, clear liquid |
|  | glycerol partial ester of unsaturated fatty acid | Baerolub L-PL | Lubricant | Unknown | yellowish, clear liquid |
|  | glycerol partial ester of unsaturated fatty acids | Irgawax 361 | Lubricant | Unknown | light yellowish, clear, oily liquid |
|  | partially esterified poly(oxyethylene) | Baerostat 318 S | Lubricant | Unknown | colorless, clear liquid |
|  | Li stearate | Liga Lithiumsterat | Lubricant | 290.4 | colorless solid |
|  | linear (C28-C32) carboxylic acid, Na-salt | Hostamont NaV 101 | Lubricant | Unknown | pale-yellow solid |
|  | K stearate | Liga Kaliumsterat R/D | Lubricant | 322.6 | colorless to yellowish solid |
|  | K oleate | Liga Kaliumoleat 90% | Lubricant | 320.6 | yellowish solid |
|  | K salts of unsaturated fatty acids (predominantly K oleate) | Rhenodiv LE | Lubricant | 320.6 | yellowish, soft paste |
|  | Mg stearate | Liga Magnesiumsterat MG tech | Lubricant | 591.3 | colorless solid |
|  | Ca stearate | Liga Calciumsterat CA 800 | Lubricant/Stabilizer | 607 | colorless solid |
|  | Ba stearate | Liga Bariumsterat | Lubricant/Stabilizer | 704.3 | colorless solid |
|  | K stearate | Liga Kaliumsterat R/D | Lubricant | 322.6 | colorless to yellowish solid |
|  | Pb stearate | Liga Bleistearat B 28 | Lubricant | 774.2 | colorless solid |
|  | Al tristearate | Liga Aluminiumsterat TR | Lubricant/Stabilizer | 877.4 | colorless solid |
|  | Al di-tri-stearate | Liga Aluminiumsterat DT | Lubricant/Stabilizer | 877.4 | colorless solid |
|  | Al distearate | Liga Aluminiumsterat D2 | Lubricant/Stabilizer | 615 | colorless solid |
|  | fatty amine | Armeen HTD | Lubricant | Unknown | colorless flakes |
|  | fatty amine | Armeen IOD | Lubricant | Unknown | colorless flakes |
|  | erucamide | Armid E | Lubricant/Antiblocking agent | 337.6 | slightly yellowish flakes |
|  | hydrogenated tallowamide | Armid HT | Lubricant/Antiblocking agent | Unknown | colorless flakes |
|  | oleylamide, partially isomerized to elaidic amide | Loxamid OA | Lubricant/Slip agent | 281.5 | colorless solid |
|  | secondary amide wax | Baerolub L-AK | Lubricant | Unknown | colorless solid |
|  | hydrogenated tallowamide | Armid HT | Lubricant/Antiblocking agent | 251.52 | colorless flakes |
|  | Erucamide | (Z)-docos-13-enamide | Slip agents | 337.6 | White solid |
|  | Oleamide | (Z)-Octa-9-decenamide | Slip agents/lubricant/corrosion inhibitor | 281.477 | Creamy solid |
|  | Zinc stearate | Zinc octadecanoate | Slip agents | 632.33 | White solid |
|  | 3-(2-aminoethylamino )propyltrimethoxysilane | Silane A 1100 | Adhesion agent | 222.4 | colorless, clear liquid |
|  | hexamethylenetetramine,1,3,5,7-tetraazaadamantane | Cohedur H 30 | Adhesion agent | 140.2 | colorless solid |
|  | isocyanate with ester groups | Desmodur RE | Adhesion agent | Unknown | yellowish, clear liquid |
|  | 20% solution of thionophosphoric acid tris- (p-isocyanatophenyl)ester in CH2Cl2 | Desmodur RF/E | Adhesion agent | 465.4 | pale brownish yellow, clear liquid |
|  | poly( acrylic ester-co-acrylonitrile) | Acralen AFR | Adhesion agent | Unknown | yellowish, clear liquid |
|  | 3-mercaptopropyltrimethoxysilane | Silane A 189 | Adhesion agent/Hydrophobing agent | 196.3 | colorless, clear liquid |
|  | 3-glycidyloxypropyltrimethoxysilane | Silane A 186 | Adhesion agent/Hydrophobing agent | 236.3 | colorless, clear liquid |
|  | H -active mixture, phenol-formaldehyde resin (resol) | Vulcabond E | Adhesion agent | Unknown | black liquid, dried (solid residue) |
|  | azodicarboxamide | Porofor ADC/M Pulver | Blowing agent | 116.1 | colorless solid |
|  | azodicarbamide and activator (9:1) | Porofor ADC/K | Blowing agent | Unknown | ochre-colored solid |
|  | benzenesulfonohydrazide | Porofor BSH | Blowing agent | 172.2 | colorless solid |
|  | 3,3' -diphenylsulfonedisulfonohydrazide | Porofor D 33 | Blowing agent | 406.4 | colorless solid |
|  | Azodicarbonamide | ADCA; ADA; azoformamide | Blowing agents | 116.08 | Yellow/orange/red crystalline powder |
|  | Benzene disulphonyl hydrazide (BSH) | BSH | Blowing agents | 172.21 | White crystalline solid |
|  | Pentane | nC5 | Blowing agents | 72.15 | Clear liquid |
|  | Carbon dioxide | CO2 | Blowing agents | 44.01 | Colorless gas |
|  | ethoxylated fatty alcohol | Meister H 9268 | Antistatic | Unknown | colorless liquid |
|  | ethoxylated fatty amine | Hostastat FA 14 | Antistatic | Unknown | yellowish, clear, low viscosity liquid |
|  | fatty alcohol-ethylene oxide adduct, poly( oxyethylene)etheralcohol | Dehydat 3204 | Antistatic | Unknown | colorless, clear liquid |
|  | fatty acid-ethyleneoxide adduct, poly(oxyethylene)ester | Dehydat 22 | Antistatic | Unknown | colorless, clear oily liquid |
|  | ethoxylated fatty amine | Hostastat FA 18 | Antistatic | Unknown | yellowish solid |
|  | alkane sulfonate | Hostastat HS 1 | Antistatic | Unknown | colorless solid |
|  | quaternary ammonium compound | Tebestat BK | Antistatic | Unknown | yellow, clear liquid |
|  | modified quaternary ammonium compound with ethyleneoxide adduct | Tebestat IK 39 | Antistatic | Unknown | darkyellow, clear liquid |
|  | laurylpyridiniumchloride | Dehydat C krist | Antistatic | 283.9 | colorless solid |
|  | fatty alcohol-ethyleneoxide adduct | Tebestat PE 1 | Antistatic | Unknown | yellowish wax |
|  | triallylcyanurate | Perkalink 300 | Crosslinking agent | 249.3 | colorless solid |
|  | triallylisocyanurate | TAIC DL 70 | Crosslinking agent | 249.3 | colorless, clear liquid |
|  | ethyleneglycoldimethacrylate | Perkalink 401 | Crosslinking agent | 198.2 | colorless, clear liquid |
|  | 2-ethyl-2-hydroxymethyl-l,3-propanedioltrimethacrylate, trimethylolpropanetrimethacrylate | Perkalink 400 | Crosslinking agent | 338.4 | colorless, clear liquid |
|  | methacrylic acid 3-trimethoxysilylpropylester | Silane A 174, 3-trimethoxysilylpropylmethacrylate | Crosslinking agent/Adhesion agent | 248.4 | colorless, clear liquid |
|  | 2,5-dimethyl-2,5-di-t-butylperoxyhexyne-3 | Trigonox 145 | Crosslinking agent | 296.5 | light-yellowish, clear liquid |
|  | t-butyicumylperoxide | Trigonox T | Crosslinking agent | 208.3 | colorless, clear liquid |
|  | 1,3-bis(t-butylperoxy-2-propyl)benzene | Perkadox-14 S | Crosslinking agent | 338.5 | colorless solid |
|  | dicumylperoxide | Perkadox BC | Crosslinking agent | 270.4 | colorless granules |
|  | isocyanate with carbodiimide | Desmodur TT | Crosslinking agent/Peptizer | 348.3 | yellowish solid |
|  | hexamethylenediamine carbamate | Diak 1 | Crosslinking agent | 160.2 | colorless solid |
|  | N,N-dimethylethanolamine | Tegoamin DMEA | Curing agent/Activator | 89.13 | colorless, clear liquid |
|  | solution of triethylenediamine in dipropyleneglycol | Tegoamin 33 | Curing agent/Activator, catalyst | 101.2 | yellowish, clear liquid |
|  | bis(2-dimethylaminoethyl)ether in dipropyleneglycol | Tegoamin BDE | Curing agent/Activator, catalyst | 160.3 | colorless, clear liquid |
|  | dibutyltin carboxylate | Kosmos 19 | Curing agent/Activator, catalyst | 277.96 | yellow, clear liquid |
|  | Sn(II) octoate | Kosmos 29 | Curing agent/Activator, catalyst | 405.1 | pale yellowish, clear liquid |
|  | condo product of a-ethyl-~-propylacrolein and aniline | Vulkacit 576 | Accelerator | 201.3 | red-brown liquid |
|  | N,N'-diphenylguanidine | Vulkasit DC | Accelerator | 211.2 | colorless solid |
|  | 1,3-di-o-tolylguanidine | Vulkacit DOTG | Accelerator | 239.3 | greyish solid |
|  | N ,N' -diethylthiourea | Perkacit DETU | Accelerator | 132.2 | colorless, crystalline solid |
|  | 2-imidazolidinethione, ethylenethiourea | Perkacit ETU | Accelerator | 102.2 | colorless solid |
|  | N,N'-diphenylthiourea | Thenocure CA | Accelerator/Antioxidant | 228.3 | colorless solid |
|  | Zn dimethyldithiocarbamate | Vulkacit L | Accelerator | 305.8 | colorless solid |
|  | Te diethyldithiocarbamate | Perkacit TDEC | Accelerator | 720.6 | yellowish, soft granules |
|  | Zn diethyldithiocarbamate | Vulkacit LDA | Accelerator | 361.9 | colorless solid |
|  | Zn-dibutyldithiocarbamate | Perkacit ZDBC | Accelerator | 474.1 | colorless solid |
|  | Zn N-dibutydithiocarbamate | Vulkacit LDB/C | Accelerator | 474.1 | light-grey solid |
|  | Ni dibutyldithiocarbamate | Perkacit NDBC | Accelerator | 467.4 | green, soft, granules |
|  | Zn pentamethylenedithiocarbamate | Vulkacit ZP | Accelerator | 385.9 | colorless solid |
|  | Zn ethylphenyldithiocarbamate | Desmorapid DA | Accelerator | 458.0 | colorless solid |
|  | Zn-dibenzyldithiocarbamate | Perkacit ZBEC | Accelerator | 610.2 | colorless solid |
|  | tetramethylthiurammonosulfide | Perkacit TMTM | Accelerator | 208.3 | yellowish, soft granules |
|  | tetramethylthiuramdisulfide | Perkacit TMTD | Accelerator | 240.4 | colorless solid |
|  | tetraethylthiuram disulfide | Perkacit TETD | Accelerator | 296.6 | colorless solid |
|  | dipentamethylenethiuram tetrasulfide | Perkacit DPTT | Accelerator | 384.6 | colorless solid |
|  | tetraallylthiuramdisulfide | Freudenberg (Brunne collection) | Accelerator/Vulcanization agent | 344.6 | yellowish, clear liquid |
|  | tetrabenzylthiuramdisulfide | Perkacit TBZTD | Accelerator | 544.8 | colorless solid |
|  | I-methylimidazol | Beschleuniger DY 070 | Accelerator | 82.09 | colorless liquid |
|  | 2-mercaptoimidazoline | Vulkacit NP | Accelerator | 102.1 | colorless solid |
|  | 2-mercaptobenzothiazole | Perkacit MBT | Accelerator | 167.2 | colorless solid |
|  | Zn benzothiazolemercaptide | Vulkacit ZM | Accelerator | 319.7 | colorless solid |
|  | bis(2-benzothiazole)disulfide | Perkacit MBTS | Accelerator | 332.5 | slightly yellowish solid |
|  | 2-( thiomorpholino) benzothiazole | Perkacit MBS | Accelerator | 224.4 | yellowish, soft granules |
|  | Zn diethyldithiocarbamate + mercaptobenzothiazole | Vulkacit MDA/C | Accelerator | 519 | greyish solid |
|  | 2-mercaptobenzothiazole + tetramethylthiuramdisulfide | Vulkacit MT/C | Accelerator | 407.7 | colorless solid |
|  | N-t-butyl-2-benzothiazolesulfenamide | Perkacit TBBS | Accelerator | 238.3 | colorless, soft granules |
|  | N -cyclohexyl-2-benzothiazolsulfenamide | Vulkacit CZ/EG-C | Accelerator | 264.4 | colorless solid |
|  | N-cyclohexyl-2-benzothiazole sulfenamide | Perkacit CBS | Accelerator | 264.4 | colorless granules |
|  | N ,N' -dicyclohexyl-2-benzothiazolesulfenamide | Perkacit DCBS | Accelerator | 346.6 | colorless, soft granules |
|  | dithiophosphoric acid ester, Zn salt, on Si02 | Rhenocure TP/S | Accelerator | Unknown | colorless solid |
|  | Zn oxide (93-95% ZnO, <10 ppm PbO) | Zinkoxid Aktiv | Vulcanization Activator/Filler | 81.38 | colorless solid |
|  | basic Zn carbonate (70-73% ZnO, <10 ppm PbO) | Zinkoxid transparent | Vulcanization Activator/Filler | 125.4 | colorless solid |
|  | amorphous silicium dioxide with active organic substance | Aflux S | Vulcanization Activator | 60.09 | colorless solid |
|  | mixture of amorphous siliciumdioxide with surfactants | Rhenofit 1987 | Vulcanization Activator | Unknown | colorless solid |
|  | 4-methyl-l-piperazinepropanol | Freudenberg (Brunne collection) | Vulcanization Activator | 158.2 | colorless, clear liquid |
|  | N-nitrosodiphenylamine | Vulkalent A | Vulcanization Retarder | 198.2 | solid |
|  | aromatic-aliphatic sulfonamide | Vulkalent E | Vulcanization Retarder | Unknown | colorless solid |
|  | N -( cyc1ohexylthio )phthalimide | Santogard PVI DS | Vulcanization Retarder | 261.3 | colorless solid |
|  | acetone-aniline condensation product, polymeric 1, 2-dihydro-2, 2, 4-trimethylquinoline | Flectol H | Aging Inhibitor/Antioxidant | Unknown | light-brown solid |
|  | 2,2' -methylene-bis( 6-t-butyl-4-methylphenol) | Vulkadur RB | Reinforcing Resin | 340.5 | red flakes |
|  | phenol-formaldehyde novolac with 10% hexamethylenetetramine | Vulkadur A | Intensifier | Unknown | Ochre solid |
|  | poly(butadiene-co-styrene-co-2-vinylpyridineco- amide/acid) | Pyratex 240 | Adhesion agent, Adhesion Improver | Unknown | yellowish, clear liquid |
|  | 3-chloropropyltriethoxysilane | Dynasylan CPTEO | Adhesion agent | 240.8 | colorless, clear liquid |
|  | pentachlorothiophenol on kaolin | Renacit 7 | Peptiser, Plastificator | 282.4 | light-grey solid |
|  | Zn pentachlorothiophenolate on kaolin with other ingredients | Renacit 9 | Peptiser | 282.4 | colorless solid |
|  | poly( oxyethylene )dialkylether | Vulcastab LW | Stabilizer | Unknown | colorless solid |
|  | pentachlorothiophenol on kaolin with other ingredients | Renacit 7/WG | Peptiser | 282.4 | grey sticks |
|  | methacrylate copolymer | Baerorapid 10 F | Acrylate-Modifier | Unknown | white powder, free flowing |
|  | poly( oxyethylene )-b-poly( oxypropylene)b- poly( dimethylsiloxane) | Tegostab B404 | General additive | Unknown | colorless, clear, viscous liquid |
|  | modified silicate complex | Antiblocking 7831 | Antiblocking agent | Unknown | colorless solid |
|  | modified silicate complex | Antiblocking 3780 | Antiblocking agent | Unknown | grey-white solid |
|  | Na oleate | Liga Natriumoleat | Emulsifying agent | 304.5 | yellowish solid |
|  | Na stearate | Liga Natriumsterat R/D | Emulsifying agent | 306.5 | colorless to yellowish solid |
|  | phosphoric acid ester and ethoxylated fatty alcohol | Ruco-Netzer VF | Wetting agent | Unknown | colorless, clear liquid |
|  | alkylpolyglycoletber and ethoxylated fatty alcohol | Ruco-Egalisierer RF | Leveling agent | Unknown | yellowish, clear liquid |
|  | aliphatic esteralcohol | Verolan GBK | Acid-producing component | Unknown | colorless, clear liquid |
|  | stearylamide | Loxamid S | Separating agent | 283.5 | colorless beads |
|  | Na oleate | Liga Natriumoleat | Emulsifying agent | 304.5 | yellowish solid |
|  | Na stearate | Liga Natriumsterat R/D | Emulsifying agent | 306.5 | colorless to yellowish solid |
|  | Hexabromobiphenyls | Firemaster FF-1; | Flame retardant | 627.6 | White solid/tan powder |
|  | Pentachlorobenzene | PeCB | Flame retardant | 250.3 | White/colorless crystals |
|  | Hexachlorobenzene (ISO and DDT) | Perchlorobenzene | Fungicide | 284.8 | White crystalline solid |
|  | Dichlorodiphenyltichloroethane (DDT) | 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) | Biocide | 354.49 | Colorless crystalline solid |
|  | chlorodifluoromethane | HCFC-22;  R-22 | Blowing agent | 86.47 | Colorless gas |
|  | dichlorotrifluoroethane | Freon 123 | Blowing agent | 152.93 | Colorless gas |
|  | dichlorofluoroethanes | Freon 141 | Blowing agent | 116.94 | Colorless liquid |
|  | dichloropentafluoropropanes | Freon 225 | Blowing agent | 202.93 | Colorless liquid |
|  | bromochlorodifluoromethane | Freon 12B1;  Halon 1211 | Blowing agent | 165.36 | Colorless gas |
|  | bromotrifluoromethane | Halon 1301;  R13B1;  Halon 13B1;  BTM | Blowing agent | 148.91 | Colorless gas |
|  | Dibromotetrafluoroethanes | R-114B2;  Halon 2402 | Blowing agent | 259.82 | Colorless liquid |
|  | 1,2,3,4,5,6-hexachlorocyclohexane (HCH (ISO)) | Lindane;  HCH | Flame retardant | 290.8 | Colorless solid |
|  | aldrin (ISO) | (1*R*,4*S*,4a*S*,5*S*,8*R*,8a*R*)-1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-dimethanonaphthalene | Biocide | 364.9 | Colorless solid |
|  | chlordane (ISO) | 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane | Flame retardant | 409.76 | Thick liquid ranging from colorless to amber |
|  | heptachlor (ISO) | 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-1*H*-4,7-methanoindene | Biocide | 373.32 | White to tan solid |
|  | mirex (ISO) | Dodecachlorooctahydro-1*H*-1,3,4-(epimethanetriyl)cyclobuta[*cd*]pentalene | Flame retardant | 545.55 | White crystalline solid |
|  | benzyl alcohol | Phenylmethanol | Plasticizer | 108.14 | Colorless liquid |
|  | Hydroxybenzene | Phenol | Plasticizer | 94.11 | White crystalline solid (commercial product is clear liquid) |
|  | diethyl ether | Ether | Plasticizer | 74.12 | Clear liquid |
|  | 4-methylpentan-2-one | methyl isobutyl ketone (MIBK) | Plasticizer | 100.16 | Colorless liquid |
|  | n-butyl acetate | Butyl ethanoate | Plasticizer | 116.16 | Clear liquid |
|  | palmitic acid | Hexadecanoic acid | Plasticizer/lubricant | 256.4 | White crystals |
|  | dioctyl orthophthalates | Vinicizer 85 | Plasticizer | 390.6 | Clear oily liquid |
|  | dinonyl orthophthalates | Bisoflex 91 | Plasticizer | 418.6 | Colorless liquid |
|  | didecyl orthophthalates | Vinicizer 105 | Plasticizer | 446.7 | Clear viscous liquid |
|  | phthlatic anhydride | Isobenzofuran-1,3-dione Phthalic | Plasticizer | 148.1 | White solid powder |
|  | terephthalic acid | Benzene-1,4-dicarboxylic acid | Plasticizer | 166.13 | White solid |
|  | dimethyl terephthalate | 1,4-Benzenedicarboxylic acid dimethyl ester | Plasticizer | 194.19 | White solid |
|  | tris(2,3-dibromopropyl) phosphate | Fyrol HB 32 Tris | Flame retardant | 697.61 | Pale yellow solid |
|  | 2-(N,N-Diethylamino)ethylchloride hydrochloride | 2-Chloro-N,N-diethylethanamine hydrochloride | Biocide | 172.09 | White crystal solid |
|  | 2-(N,N-Diethylamino)ethanethiol | Diethylcysteamine | Biocide | 133.26 | Colorless to pale orange oil |
|  | diethyl ethylphosphonate | Phosphonic acid, ethyl-, diethyl ester | Plasticizer/Antistatic agent | 166.16 | Colorless liquid |
|  | 2,4,6-tripropyl-1,3,5,2,4,6-trioxatriphosphinane 2,4,6-trioxide | Propylphosphonic anhydride | Flame retardant | 318.18 | Exclusively sold in ethyl acetate solution |
|  | 2,2,4-trimethyl-1,2-dihydroquinoline | TMQ | Antioxidant | 173.25 | Dark cloudy copper-yellow colored liquid |
|  | polychlorinated biphenyls | PCBs | Flame retardant | Unknown | Clear-yellow liquid |
|  | polychlorinated terphenyls | PCTs | Plasticizers; flame retardants; lubricants | Unknown | Clear-yellow liquids |
|  | polybrominated biphenyls | PBBs | Flame retardants | Unknown | White solids |
|  | tetra-, penta-, hexa-, hepta-, octobromodiphenyl ethers | PBDEs (polybrominated diphenyl ethers) | Flame retardants | Unknown | Clear/amber/pale solids (Unknown) |

Source: J. N. Hahladakis, C. A. Velis, R. Weber, E. Iacovidou, and P. Purnell, “An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling,” *Journal of Hazardous Materials*, vol. 344, pp. 179–199, Feb. 2018, doi: [10.1016/j.jhazmat.2017.10.014](https://doi.org/10.1016/j.jhazmat.2017.10.014).

**H. Symbols and Notations**

= Total annual plastics released (kg/yr)

= spills during collection

= resulted from littering

= resulted from mechanical recycling

= resulted from incineration

= resulted from landfilling

= Plastics released rate (kg/(yr·site)

= spills during mechanical recycling

= equipment cleaning release

= spills during incineration

= Annual mass flow rate (kg/yr)

= processed during collection

= processed during mechanical recycling

= processed during incineration

= Loss fraction

= spill during collection

= equipment cleaning during recycling

= Exposure rate (mg particles/(day·worker)

= inhalation risk

= during mechanical recycling

= during incineration

= during landfilling

= dermal contact

= during mechanical recycling

= during incineration

= during landfilling

= Number (unit/yr)

= sites

= mechanical recycling facilities

= incineration facilities

= landfilling sites

= exposure incident

= during mechanical recycling

= during incineration

= during landfilling

= fraction of chemical additives

= in plastic

= in incinerator ash

= in landfill leachate

= surface area of contact (cm2)

= rate of breathing (m3/hr)

= duration (days·yr-1)

= process operation

= mechanical recycling facility

= incineration

= landfilling site

= toxic exposure

= mass value expected in an incident (mg/incident)

= chemical additives

= incinerator ash

= in landfill leachate

= liquid-skin contact in landfill (mg·cm2/incident)