Regional Workshop on Tackling Plastic Pollution: Cooperation, Best Practices and Sustainable Solutions

Session 5: Addressing Chemicals of Concern in Plastics

13 March 2025

BASEL / ROTTERDAM / STOCKHOLM CONVENTIONS

Approaches and lessons learned from multilateral environmental agreements on chemicals and waste

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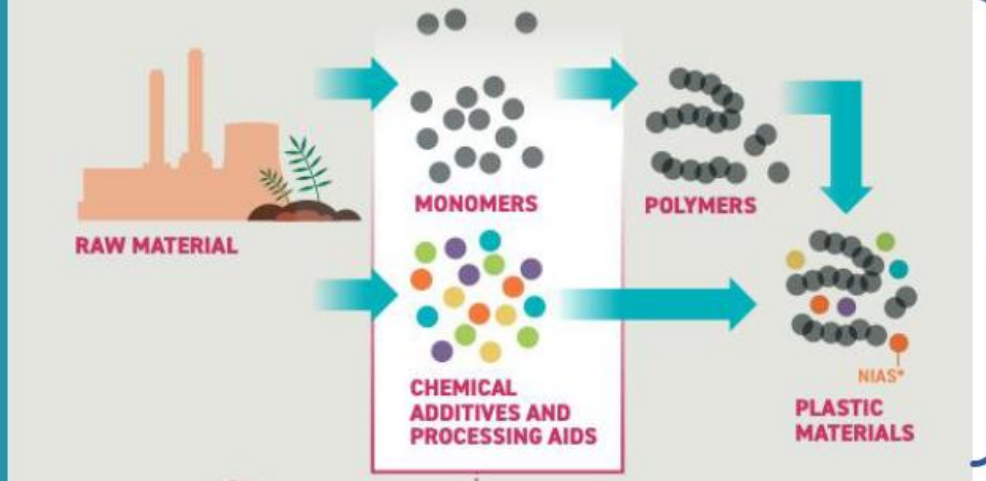
GLOBAL
GOVERNANCE
OF PLASTICS
AND ASSOCIATED
CHEMICALS
2023
SECRETARIAT OF THE BASEL, ROTTERDAM
AND STOCKHOLM CONVENTIONS
BASEL / ROTTERDAM / STOCKHOLM
CONVENTIONS
UN
environment
programme


ADDRESSING CHEMICALS
OF CONCERN IN PLASTICS
THROUGH MULTILATERAL
ENVIRONMENTAL AGREEMENTS
Secretariat of the Basel, Rotterdam
and Stockholm Conventions
CONVENTIONS
UN
environment
programme

CHEMICALS IN PLASTICS

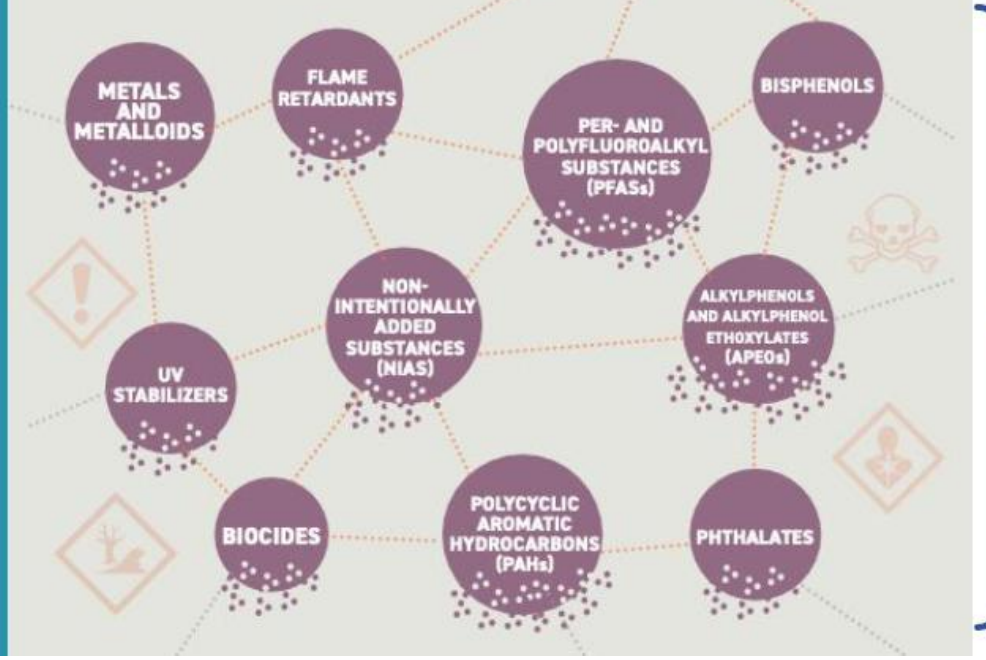
A TECHNICAL REPORT

UN environment programme



Most chemicals added during the polymerisation phase

Recent PlastChem report estimates **16,000+ chemicals**, out of which **6% are regulated globally**, and **4,200+ are considered chemicals of concern**



Ten groups of chemicals identified as being of concern due to their hazardous properties

UN environment programme

Chemicals in plastics: Impacts across production, use, recycling & disposal stages

Marine Litter and Plastic Waste

GRID ARENDAL
A UNEP Partner

BASEL CONVENTION

Fact Sheet #5

For more information consult "Drowning in Plastics - Marine Litter and Plastic Waste Vital Graphics" p
the BRS Secretariat and GRID-Arendal. Available from link https://bit.ly/3GOrz8E

Plastic additives

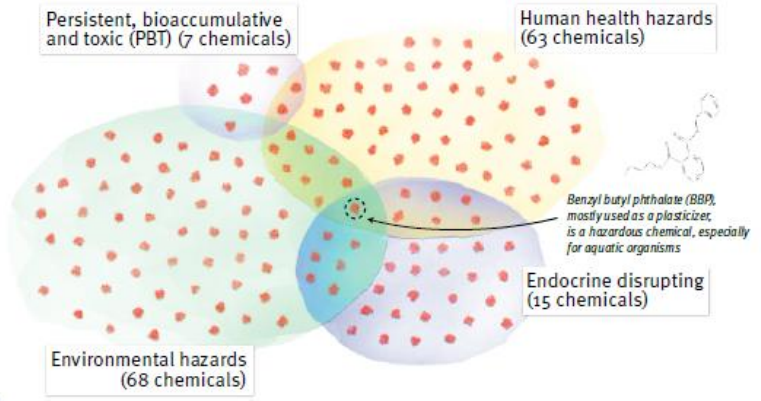
Every plastic item contains additives that determine the properties of the material and influence the cost of production (Stenmarck et al. 2017). Typical additives include stabilisers, fillers, plasticisers, colourants, as well as functional additives such as flame retardants and curing agents (Figure 1). Some plastic additives are hazardous to human health and the environment (Stenmarck et al. 2017.

Leakage and degradation

Plastics are composed of chains of poly
be weakly bound to the polymers or
matrix. The weakly bound additives can leach out of the plastics during normal use, when in landfills, or following improper disposal in the environment (Wagner and

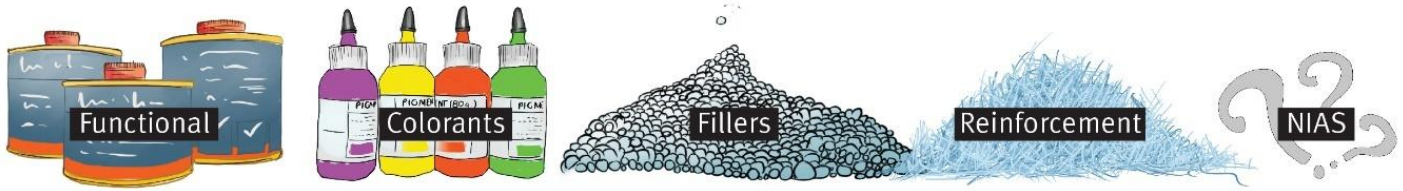
Hazardous chemicals in plastics

A 2018 study found that 3,377 chemicals are potentially associated and 906 chemicals are likely associated with plastic packaging. Out of these, 148 have been identified as most hazardous (Groh et al. 2018).



Source: Groh et al. (2018). Illustration by GRID-Arendal (2020).

Five types of plastic additives



Functional additives include for example stabilizers, antistatic agents, flame retardants, plasticizers, lubricants, slip agents, curing agents, foaming agents, biocides, etc.

Colorant are substances such as dyes or pigments added to give color to plastic. Some of them are added to give a bright transparent color.

Fillers are added to change and improve physical properties of plastics. They can be minerals, metals, ceramics, bio-based, gases, liquids, or even other polymers.

Reinforcement are used to reinforce or improve tensile strength, flexural strength and stiffness of the material. E.g. glass fibres, carbon fibres, etc.

NIAS are chemicals that arrive in products from processes such as reaction by-products or break down products

Sources: Hansen et al. (2013). Illustration by GRID-Arendal (2020).

Binding multilateral instruments addressing chemicals in plastic products

BASEL

- **Plastic Waste Amendments** (Annex II, VIII, IX) clarify plastic waste subject to the Basel Convention provisions, including types of **polymers, resins, hazardous constituents**, mixtures of plastics.
- Process for amending Annexes VIII and IX: **A proposal by a Party**, consideration by the **OEWG**, followed by the **COP**.

ROTTERDAM

- **PIC procedure for international trade in hazardous chemicals** and pesticides. **15 chemicals or groups of chemicals** listed are associated with plastics.
- Process for amending Annex III to list a new chemical: **Notifications of FRAs from 2 PIC regions**, review by the **Chemical Review Committee** pursuant to Article 5 and Annex II, consideration by the COP.

STOCKHOLM

- Global control of **persistent organic pollutants (POPs)**. **17 chemicals or groups of chemicals** listed are associated with plastics.
- Process for amending Annex A, B or C to list a new chemical: **A proposal by a Party**, review by the **POPs Review Committee** pursuant to **Article 8, Annex D, E, F**, consideration by the COP.

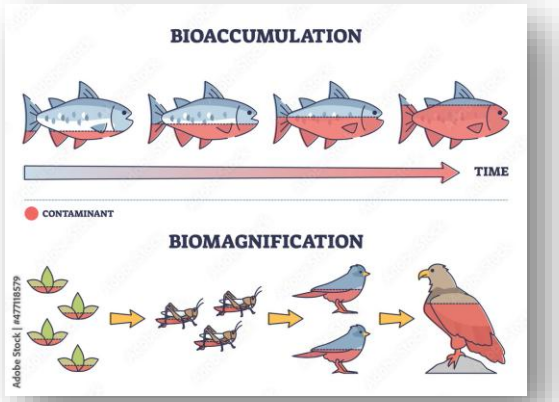
MINAMATA CONVENTION ON MERCURY

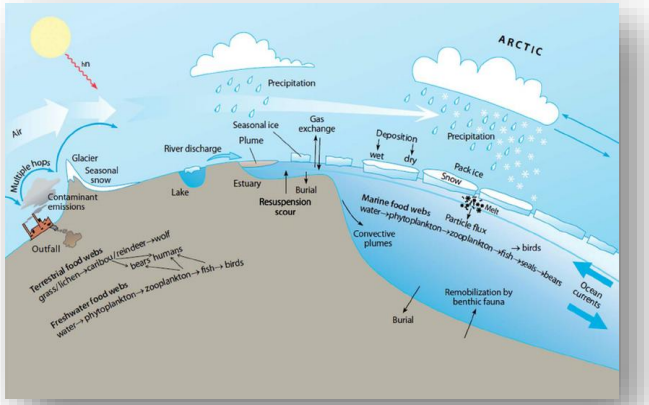
- **Mercury and mercury-added products** and processes are regulated to minimize their use and emissions.
- Process for amending Annex A (mercury-added products) and Annex B (processes): **A proposal by a Party**, consideration by the COP. **Ad hoc experts' group** may be established by the COP as necessary.
- Mercury is used in Annex B manufacturing processes, including **polyurethane production** and **vinyl chloride monomer (VCM) manufacturing**.

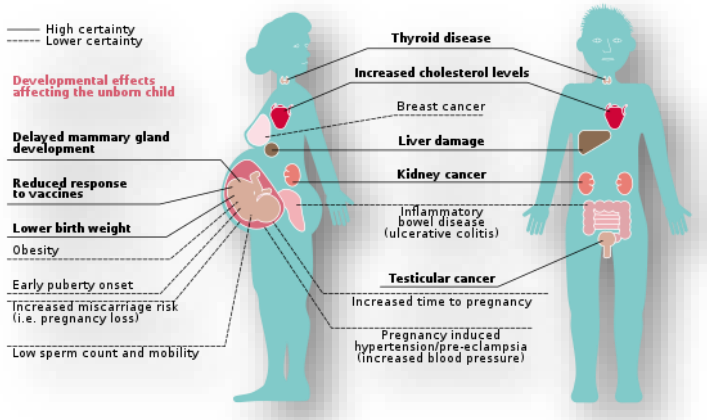
Vienna Convention MONTREAL PROTOCOL

- Global control of substances listed in the annexes to the **Montreal Protocol**.
- Assessment and review of control measures pursuant to **Article 6** by the Protocol's **assessment panels**.
- Process for amending Annexes A, B, C and E or an additional annex: **A proposal by a Party**, consideration by the MOP.
- ODSs are mainly refrigerants but also function as **blowing agents in XPS and PUFs**, aerosol propellants, fire extinguishers, fumigants, and **chemical feedstocks, including fluoropolymers**.
- HFCs, as greenhouse gases, serve as **blowing agents in XPS and PUFs** for expansion and insulation.

Stockholm Convention on Persistent Organic Pollutants







A group of organic compounds that possess characteristics of:

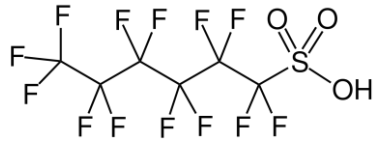
- **Persistence**
- **Bio-accumulation**
- **Adverse effects**
- **Potential for long-range environmental transport**

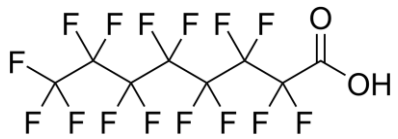
Plastics-related chemicals under the Stockholm Convention

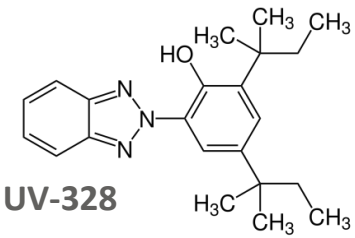
34 POPs
17 plastics-related chemicals

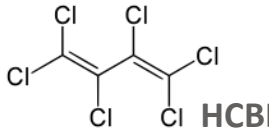
Annex A

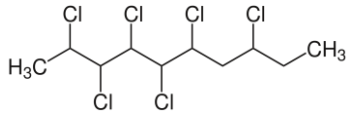
Elimination
Specific exemptions

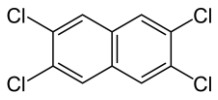

PFHxS, its salts and PFHxS-related compounds

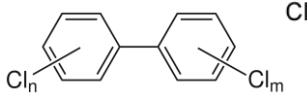

PFOA, its salts and PFOA-related compounds

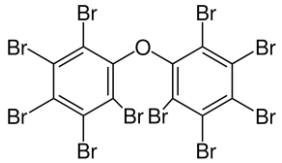

UV-328

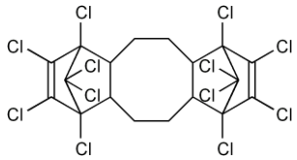

HCBD

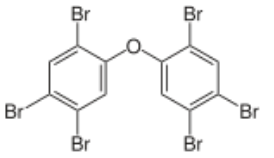
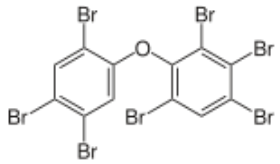

SCCPs

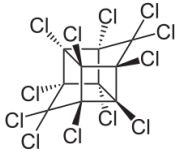

PCNs

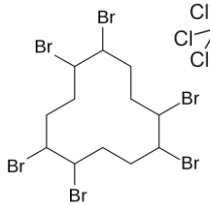

PCBs

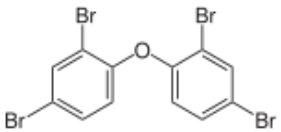
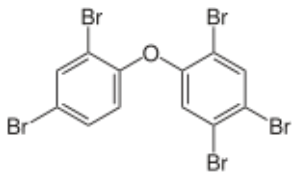

DecaBDE

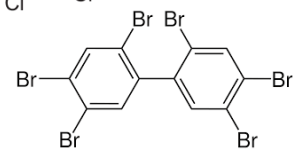

Dechlorane Plus



HexaBDE and HeptaBDE (C-OctaBDE)


Mirex

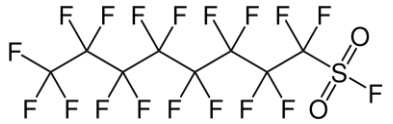

HBCDD



TetraBDE and PentaBDE (C-PentaBDE)


Hexabromobiphenyl

Annex B

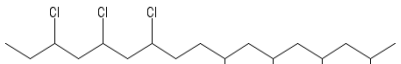
Restriction
Acceptable purposes



PFOS, its salts and PFOSF

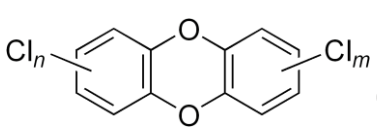
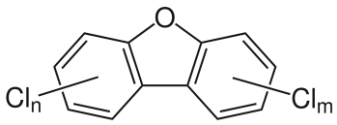
Annex C

Under review
POPs Review Committee


Long-chain PFCAs


MCCPs

Unintentional releases
BAT/BEP



Dioxins and furans

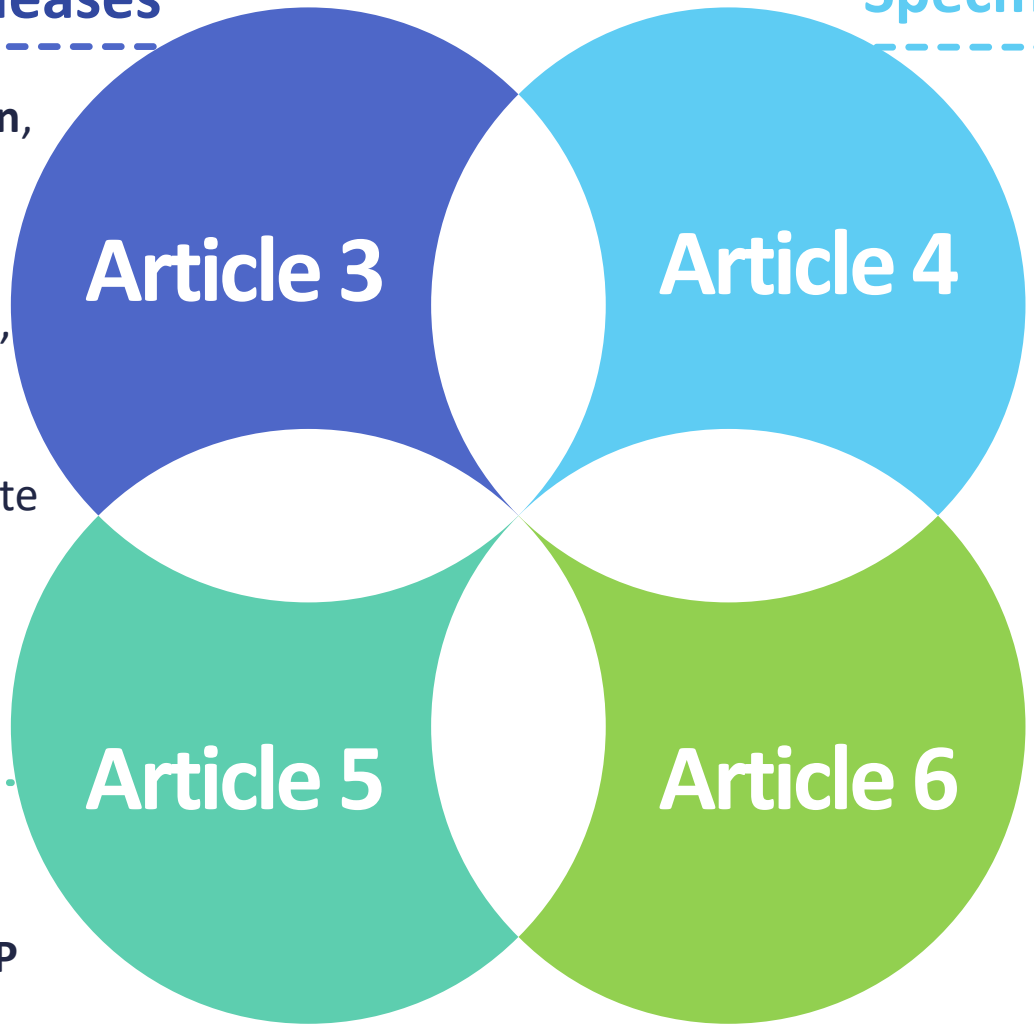
Stockholm Convention key provisions

Intentional releases

- **Prohibit use and production**, except for exempted applications
- **Prohibit import and export**, except for exempted applications and for environmentally sound waste management

Specific exemptions

- Parties may **register for specific exemptions**, which generally expire after **five years** unless otherwise specified.
- Once no Parties are registered for an exemption, new registrations are no longer permitted, though a **review process** exists for **five-year extension** requests.



Unintentional releases

- Develop and implement **national action plans**, **promote the use of BAT/BEP**
- Report on progress regarding the **reduction of unintentional releases of POPs**.

POPs stockpiles and waste

- Identify **stockpiles and wastes containing POPs**
- Ensure that **POPs wastes are managed and disposed of in an environmentally sound manner** (**Basel Convention technical guidelines**)

Chemicals of concern not covered by the Stockholm Convention

There are **many** other organic chemicals with adverse effects to human health and/or environment that are not listed under the Stockholm Convention.

These may be:

- Currently under review by the POPRC, but have not been listed yet
- Do not meet the criteria for listing under the Stockholm Convention
- Do not have enough information to determine
- No Parties have submitted a proposal for listing

Some of them are chemicals associated with plastics….

Examples:

- Polycyclic aromatic hydrocarbons (PAHs)
- Polybrominated dibenzo-*p*-dioxins (PBDDs), dibenzofurans (PBDFs)
- Linear alkylbenzenes (LABs); Alkylphenols including nonylphenol (NP), octylphenol (OP)
- PFASs that are not (yet) listed under the Stockholm Convention
- Bisphenols including bisphenol A (BPA); Phthalates

Process for listing a new chemical under the Stockholm Convention

A Party submits a proposal with information specified in Annex D

POPRC decides whether the proposal fulfills the **screening criteria in Annex D**

POPRC develops a **risk profile (Annex E information)** and decides whether:

POPRC develops RME **(Annex F socio-economic considerations)**; makes a recommendation to COP

COP decides whether to list the chemical in Annex A, B and/or C

The chemical is likely as a result of its long-range environmental transport to lead to significant adverse human health and/or environmental effects such that <u>global action is warranted</u>.

POPs Review Committee (POPRC)

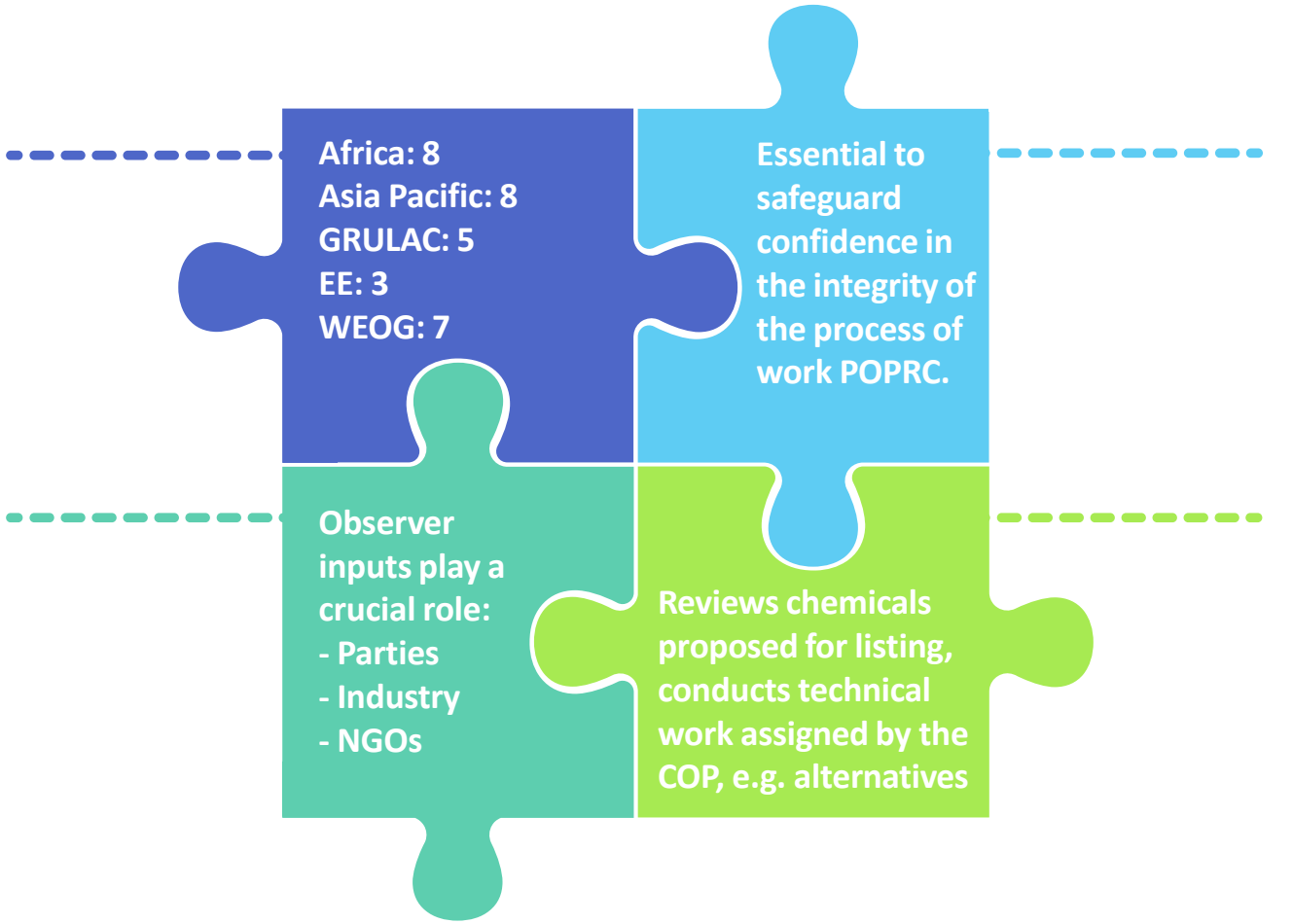
Subsidiary body to the Stockholm Convention

Membership

31 Members designated by Parties with expertise in chemical assessment or management.

Observers

All Parties and observers to the Stockholm Convention are observers to the POPs Review Committee.



Conflict of interest procedure

Decision SC-1/8, amended by SC-4/20 provides rules of procedure for preventing and dealing with conflicts of interest.

Mandate

Decision SC-1/7, amended by SC-4/20 and SC-5/11 provides the terms of reference of the POPs Review Committee

Annex D screening criteria

Persistence

- Half-life of the chemical in water is >2 months, in soil is >6 months, in sediment is >6 months
- **Chemical is otherwise sufficiently persistent to justify its consideration** within the scope of the Convention

Bioaccumulation

- BCF or BAF in aquatic species for the chemical is >5,000, or logKow is >5
- A chemical presents other reasons for concern, such as high bio-accumulation in other species, high toxicity or ecotoxicity
- Monitoring data in biota indicating that the bio-accumulation potential of the chemical is **sufficient to justify its consideration** within the scope of the Convention

Potential for long-range environmental transport

- **Measured** levels of the chemical in locations distant from the sources of its release
- Monitoring data showing that LRTP of the chemical, with the **potential for transfer to a receiving environment**, may have occurred via air, water or migratory species
- Environmental fate properties and/or **model results** that demonstrate that the chemical has a LRTP through air, water or migratory species, with the **potential for transfer to a receiving environment** in locations distant from the sources of its release. For a chemical that migrates significantly through the air, its half-life in air should be >2 days.

Adverse effects

- Evidence of adverse effects to human health or to the environment that justifies consideration of the chemical within the scope of this Convention.
- Toxicity or ecotoxicity data that indicate **the potential for damage** to human health or to the environment.

Annex E risk profile

To evaluate, whether the chemical is likely, as a result of its long-range environmental transport, to lead to significant adverse human health and/or environmental effects such that global action is warranted.

a) Sources (Production, use, releases)

b) Hazard assessment for the endpoint

c) Environmental fate (**including properties linked to environmental transport**)

d) Monitoring data

e) Exposure in **local areas**, in particular as a result of **long-range environmental transport**, including information regarding bio-availability

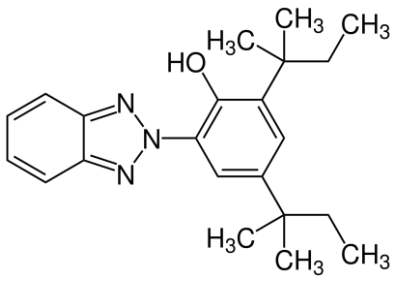
f) National and international risk evaluations, assessments or profiles and labelling information and hazard classifications

g) Status of the chemical under international conventions

UV-328

Presentation by Switzerland on its proposal in 2020

- Proposed by Switzerland in 2020
- UV stabilizer in plastics

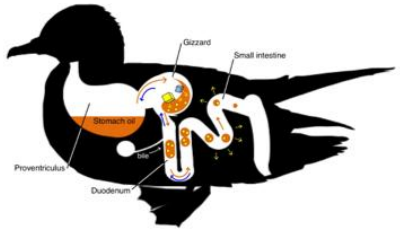


Potential for long-range transport – Transport with plastics in water

1) UV-328 in plastic waste ✓

2) Transport of plastic debris to remote regions ✓

3) Consumption of plastic debris by seabirds ✓



4) Uptake of UV-328 from ingested plastic debris ✓

ANNEX F

INFORMATION ON SOCIO-ECONOMIC CONSIDERATIONS

An evaluation should be undertaken regarding possible control measures for chemicals under consideration for inclusion in this Convention, encompassing the full range of options, including management and elimination. For this purpose, relevant information should be provided relating to socio-economic considerations associated with possible control measures to enable a decision to be taken by the Conference of the Parties. Such information should reflect due regard for the differing capabilities and conditions among the Parties and should include consideration of the following indicative list of items:

(a) Efficacy and efficiency of possible control measures in meeting risk reduction goals:

  (i) Technical feasibility; and

  (ii) Costs, including environmental and health costs;

(b) Alternatives (products and processes):

  (i) Technical feasibility;

  (ii) Costs, including environmental and health costs;

  (iii) Efficacy;

  (iv) Risk;

  (v) Availability; and

  (vi) Accessibility;

(c) Positive and/or negative impacts on society of implementing possible control measures:

  (i) Health, including public, environmental and occupational health;

  (ii) Agriculture, including aquaculture and forestry;

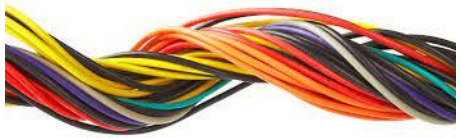
  (iii) Biota (biodiversity);

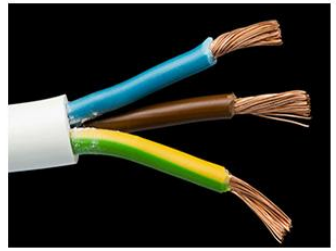
Annex F risk management evaluation stage

The Committee shall, based on the risk profile and the risk management evaluation, recommend whether the chemical should be considered by the Conference of the Parties for listing in Annexes A, B and/or C.

Listing stage

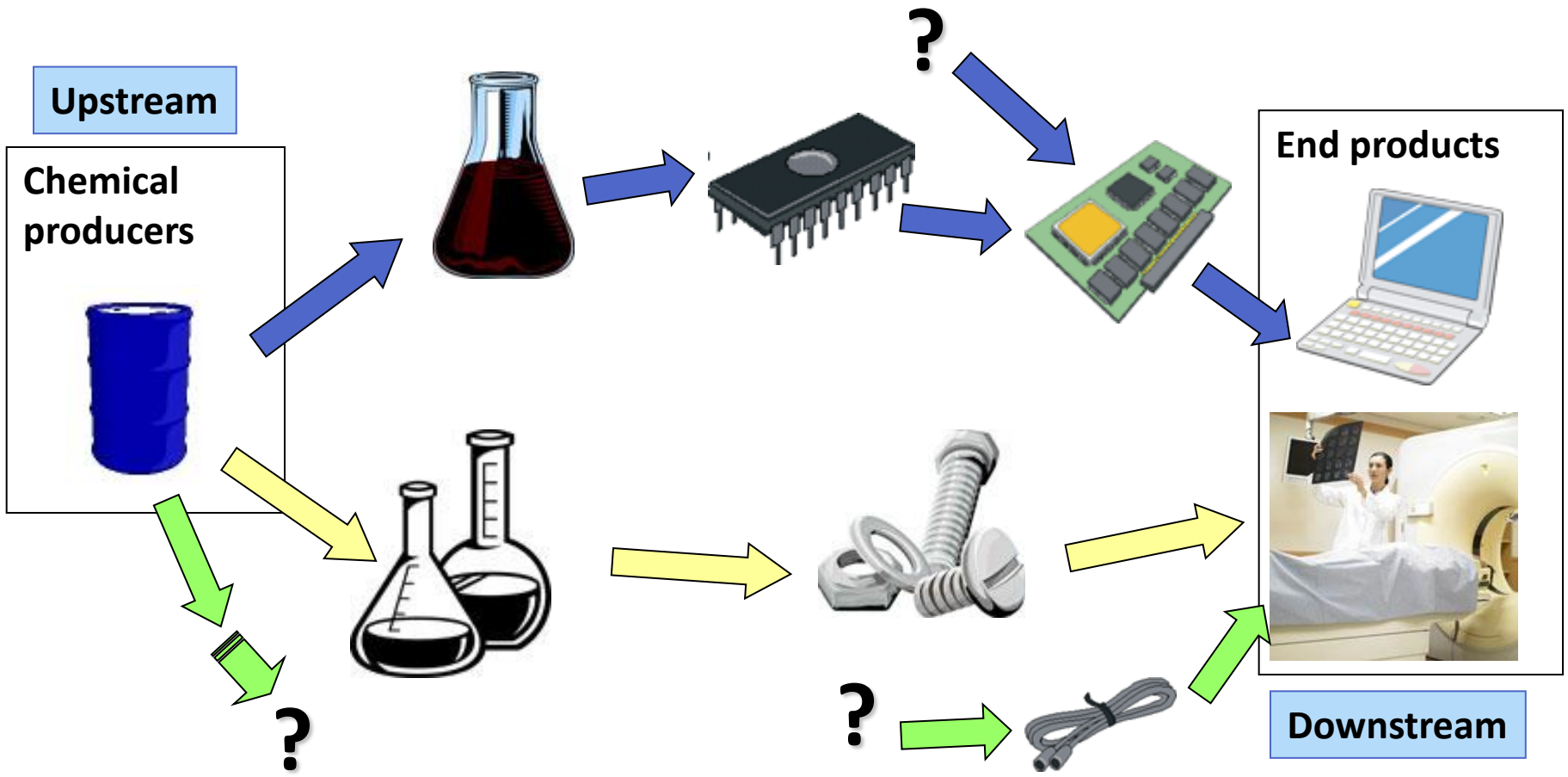
The Conference of the Parties, taking due account of the recommendations of the Committee, including any scientific uncertainty, shall decide, in a precautionary manner, whether to list the chemical, and specify its related control measures, in Annexes A, B and/or C.





IRC
Epoxy Floor Coating HB Grey
RC-2552

Special care is needed for industrial chemicals because they are used in numerous processes and parts:



Paint and Resin

Uses UV328 for weather and sunlight resistance

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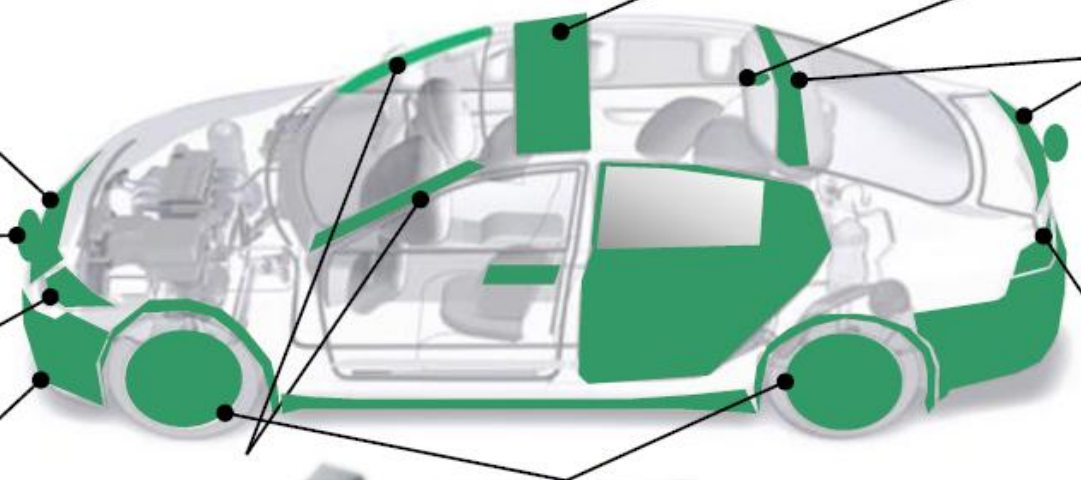
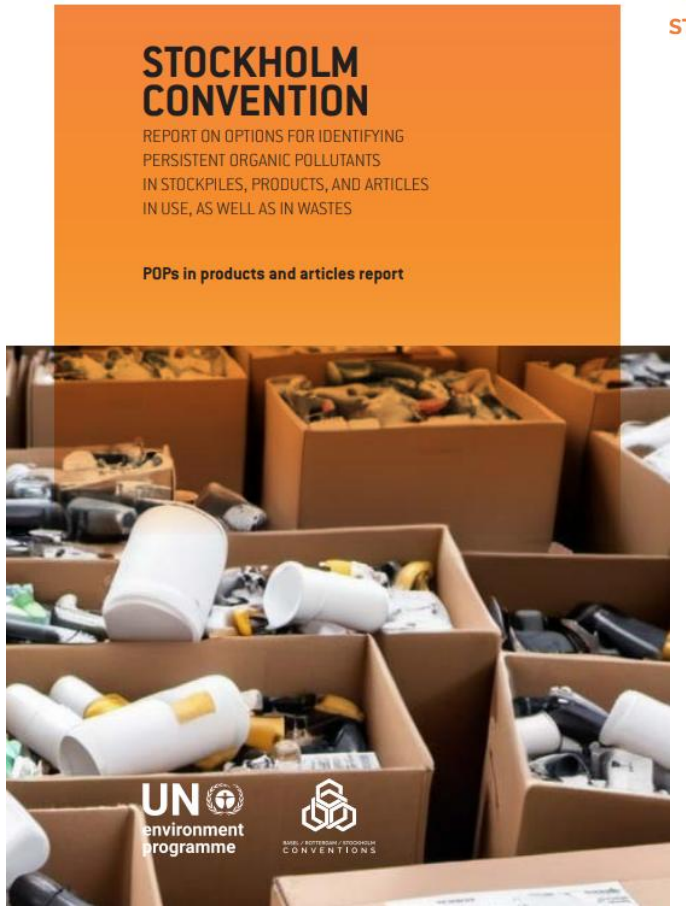


Source: JAPIA



Challenges with identifying POPs in products, articles, stockpiles and wastes

- **Capacity and cost barriers:** Limited resources, high costs, and technical constraints hinder chemical identification.
- **Labeling challenges:** Physical labels may degrade, be impractical for small components, or be ineffective when applied retrospectively.
- **Regulatory inconsistencies:** Varying global regulations complicate compliance and chemical tracking.
- **Data gaps and traceability issues:** Limited testing and missing information hinder monitoring across supply chains and waste management.
- **Complex value chains:** Multiple stakeholders, diverse materials, and technical constraints make identification difficult.

Approaches to labeling/identification: ISO 11469 in Argentina, GHS integration, Japan's digital identifiers for PFOS and PFOA, PCB equipment, Canada's tagging and identification for PCP-treated wood, EU's CE marking, CLP, Digital Product Passports

Thank you!

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