

What Goes There?

The Inception and Development of Chemical Regulatory Legislation

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The Inception and Development of Chemical Regulatory Legislation

Topics for Today

- What is chemical regulatory legislation?
- How did it come about (history)?
- The culprits (representative bad guys)
- The (final) trigger incident
- Legislation (化審法 (kashinhō), TSCA, etc.)
- Basic features of chemical regulatory legislation
- Other countries
- REACH
- Resources

Chemical Regulatory Legislation

What does it mean?

A subset of consumer protection law

Addresses potentially hazardous substances in commerce

Ensures that manufacturers /importers / distributors adhere to safe manufacturing, storage, handling, and transportation practices

Protect employees and the general public

Chemical Regulatory Legislation

What is our focus today?

Chemical substances

not previously known to be harmful

The unknown unknowns

(Not known toxins, poisons, warfare agents, biocides)

Chemical Regulatory Legislation

Where did it come from?

Related to pure food and drug laws

Food and wine purity regulations in ancient Rome

Reinheitsgebot (German Beer Purity Law), 1516

US Pure Food and Drug Act, 1906

But, it was a reaction to specific incidents, and largely
one chemical family

Chemical Regulatory Legislation History

Industrial experiences

1827-1890: PCBs first generated as byproducts in the LeBlanc process for making washing soda (sodium carbonate) at factory in Lampertheim, South Hesse (DE)

1927: PCBs were first manufactured commercially (inadvertently, along with related dioxins / dibenzofurans) by the Anniston Ordnance Company (=> Swann Chemical Company => Monsanto => Solutia)

1930: 23/24 workers in the plant had acne-like pustules on face/body, experience loss of energy, appetite, libido, other skin ailments (classic initial PCB exposure symptoms)

1936: USPHS documents symptoms of systemic poisoning symptoms among workers inhaling the fumes, and in employee family members from work clothing contact; three Halowax Co workers died; autopsies showed significant liver damage

1937 - 1947 multiple cases of employee health damage, corroborated by medical studies

Chemical Regulatory Legislation History

Industrial experiences (cont.)

1949: Explosion at Monsanto plant in Nitro, WV; Monsanto published manipulated data on health damage and deaths

1950: GE instruction manual: “transformer [PCBs] may be handled in the same manner as mineral oil.”

1951-1959: internal company memos document health damage, public position is that PCBs are safe; management must choose: promote employee health vs. bankruptcy

1968: Kanemi *yushō* incident in Japan; prompts European and American workers to question safety of PCBs; at a Westinghouse employee meeting, spokesman dips hands into PCB liquid to demonstrate safety

Chemical Regulatory Legislation History

Related non-industrial poisonings

1947: "X-disease" in American cattle (dioxin-like compounds in feed)

1957: "Chick edema disease" in American poultry (TCDD-contaminated feed)

1968: "Oil disease/油症 (*yushō*)" in Japan (PCB/TCDD-contaminated rice bran oil)

1971: "Times Beach (US) crisis" (PCB/TCDD-contaminated oil spread on dusty roads)

1979: "Oil disease/油症 (*yóuzhèng*)" in Taiwan (PCB/TCDD-contaminated rice bran oil)

1999: Belgian livestock fed PCB/TCDD-contaminated feed

2008: Irish pigs fed PCB/TCDD-contaminated feed

Chemical Regulatory Legislation History

Scientific/medical findings

1937: Harvard School of Public Health meeting on the problem of “systemic effects” of certain chlorinated hydrocarbons including [PCBs]

1949: In aftermath of Nitro (WV) plant explosion, Monsanto scientists publish falsified data in JAMA, downplay hazards

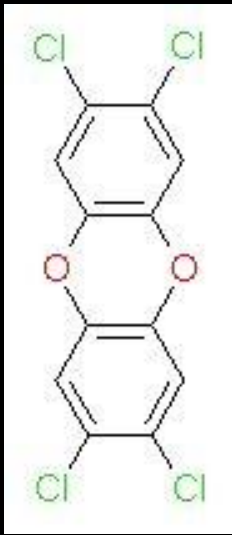
1956: Monsanto learns PCBs contain dioxins/dibenzofurans – kept secret

1962: Rachel Carson publishes "Silent Spring" about cumulative effects of DDT

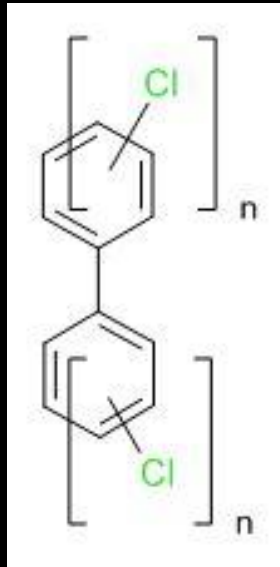
1964: Dr. Soren Jensen (SE) investigates DDT in environment, but finds pervasive "mystery" substances (he names them PCBs); bioaccumulation up the food chain; related Monsanto internal findings released (published in 1966)

1969: Robert Riseborough (US) published data that support Jensen's findings

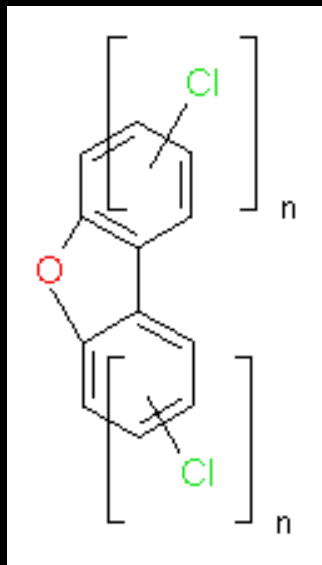
The Culprits



TCDD



PCBs



PCDFs

Highly lipophilic (fat-soluble)

Very slow biodegradation

Extremely stable

Good insulating properties

Significant bioaccumulation

Significant biomagnification

(very slow release from fatty tissues)

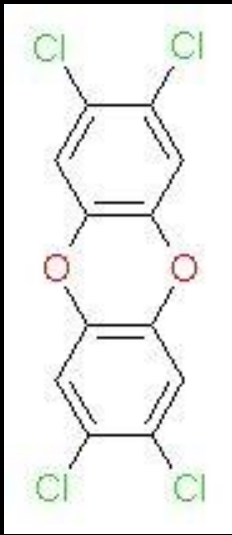
Initially thought to be innocuous

PCBs = polychlorinated biphenyls contain traces of

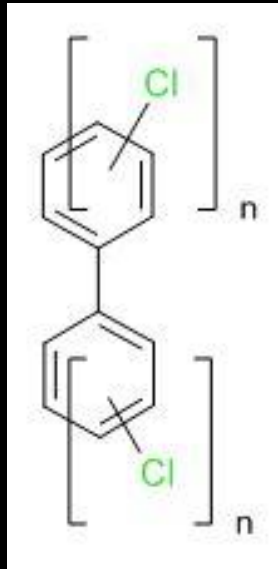
PCDFs = polychlorinated dibenzofurans, and

“dioxin” = 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

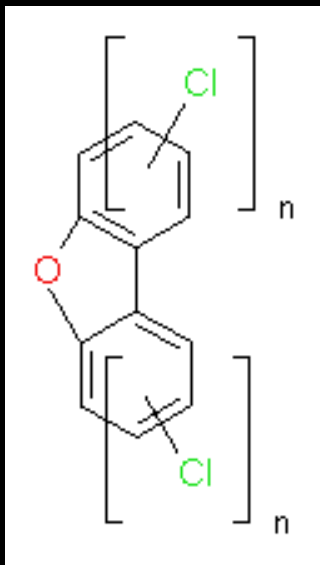
The Culprits



TCDD



PCBs



PCDFs

Symptoms produced:

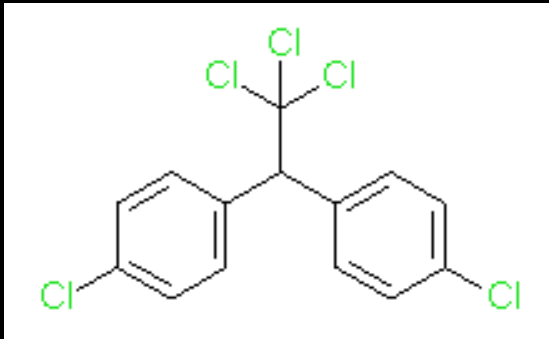
- dermal and ocular lesions
- hormonal imbalances
- cancers
- lowered cognitive ability
- immune compromise
- motor control problems
- traverses the placental & mammary barriers

Utility of PCBs

- coolants & insulating fluids (transformer oil) for transformers and capacitors, e.g., in old fluorescent light ballasts
- stabilizing additives in flexible PVC coatings for electrical wiring and electronic components
- fixatives in microscopy
- sealants (for caulking in schools & commercial buildings)
- paints
- pesticide extenders
- plasticizers in paints & cements
- cutting oils
- reactive flame retardants
- lubricating oils
- hydraulic fluids
- wood floor finishes
- surgical implants
- de-dusting agents
- water-proofing compounds
- casting agents
- vacuum pump fluids
- adhesives
- carbonless copy ("NCR") paper

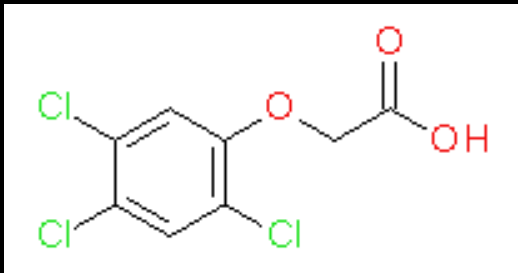
Rachel Carson in “Silent Spring”

Warned about the hazards to the ecosystem posed by persistent pesticide residues



DDT

Found evidence that poorly controlled pest eradication programs (e.g., the USDA's 1957 fire ant eradication program) were correlated with detrimental effects on bird populations



2,4,5-T

Later work documented detrimental effects from poorly controlled use of herbicides, like 2,4,5-T (Agent Orange)

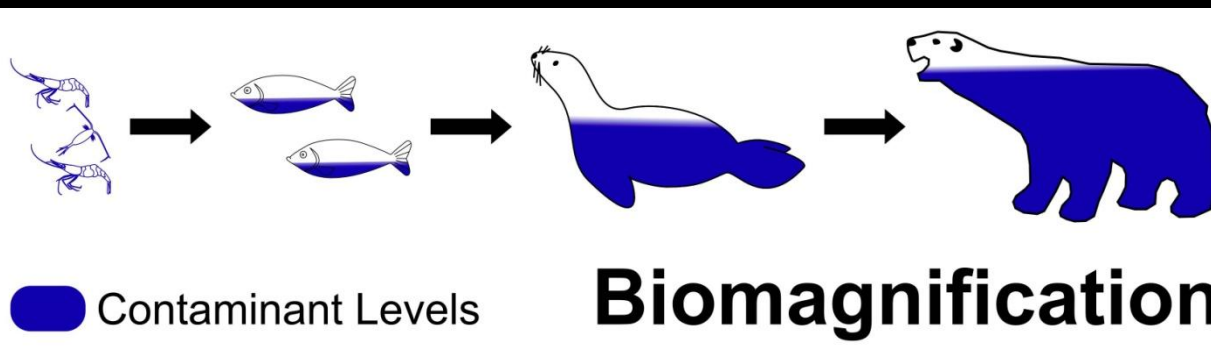
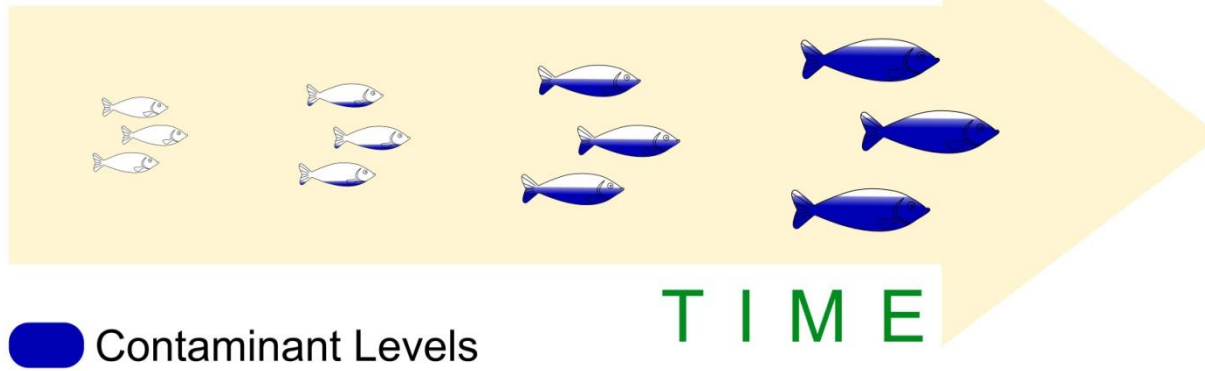
She was right....,

and not only about pesticide residues...

- Jensen's ubiquitous mystery compound wasn't a pesticide
- Present in wildlife samples from 1935, before DDT was used (bioaccumulation)
- Present all over Sweden and surrounding seas
- Traces in hair samples taken from his wife and 3 children
- Highest family levels in his nursing infant daughter (biomagnification)
- Obtained authentic samples from industry to confirm
- Highest contamination found in a white-tailed eagle (biomagnification in an apex predator)

Bioaccumulation & Biomagnification

Bioaccumulation



Rumblings

EU Directive 67/548/EEC:

“Approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances which are placed on the market in the Member States of the Community.”

Definitions and labeling guidelines for commercial chemicals

Annex I: notes, names of elements and substance classes

Annex II: danger symbols (pictograms)

Annex III: risk phrases

Annex IV: safety phrases

Directed creation of the European Inventory of Existing Commercial Chemical Substances (EINECS)

Rumblings

US National Environmental Act of 1969

Every major new project requires an
Environmental Impact Assessment (EIA)

However, pertained only to governmental projects, only
tangentially regulated chemicals (e.g., pesticide programs)

US Council on Environmental Quality 1971 Report

Detailed problems caused by toxic chemicals in the United States
highlighted the need for regulation

The Trigger

Kanemi Oil Poisoning Incident (1968) (Kyūshū, Japan)

Kanemi Oil Company manufactured rice bran oil

Oil was deodorized by a heating process step

PCB heat transfer medium was circulated through pipes

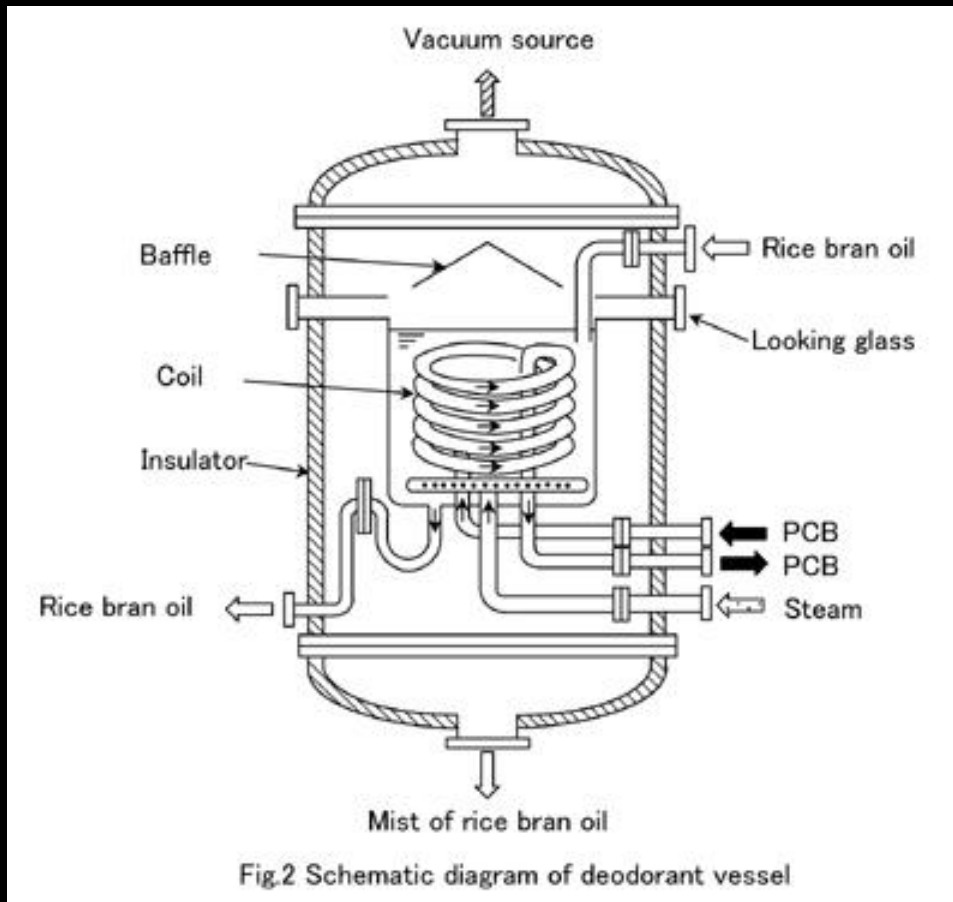
PCBs leaked through the pipes into the rice bran oil

This oil was sold as poultry feed and cooking oil

The result was “Oil Disease” (油症/yushō): 1,300 local residents affected; all local babies symptomatic, 2/12 stillborn; more than 50 deaths in ensuing years

The Trigger

Kanemi Oil Poisoning Incident



PCB used as heat transfer medium

Operators noticed drop in PCB levels, then simply replenished supply without investigating

Even after facts uncovered, contaminated oil was “recycled”, remixed with fresh rice bran oil

400,000 poultry deaths; 14,000 Japanese citizens affected

Report from: 失敗知識データベース
(Failure Knowledge Database)

[<http://www.sozogaku.com/fkd/en/cfen/CB1056031.html>]

化審法 (*kashinhō*)

Modern Chemical Regulatory Legislation began in Japan with 化審法 (*kashinhō*) 1973

化学物質審査規制法
"Chemical Substances Control Law" (CSCL)

Direct consequence of the Kanemi Oil
Poisoning Incident in Japan (1968)

化審法 (*kashinhō*)

Aim: imposed strict pre-marketing evaluation of chemical substances to prevent environmental contamination

Targets chemical substances known to pose a risk of damaging human health, or a risk of damaging the growth or reproduction of animals and plants.

Amended three times: 1986, 2003, and 2009

Created the Japan Existing and New Chemical Substances (ENCS) List

化審法 (*kashinhō*)

Implementation:

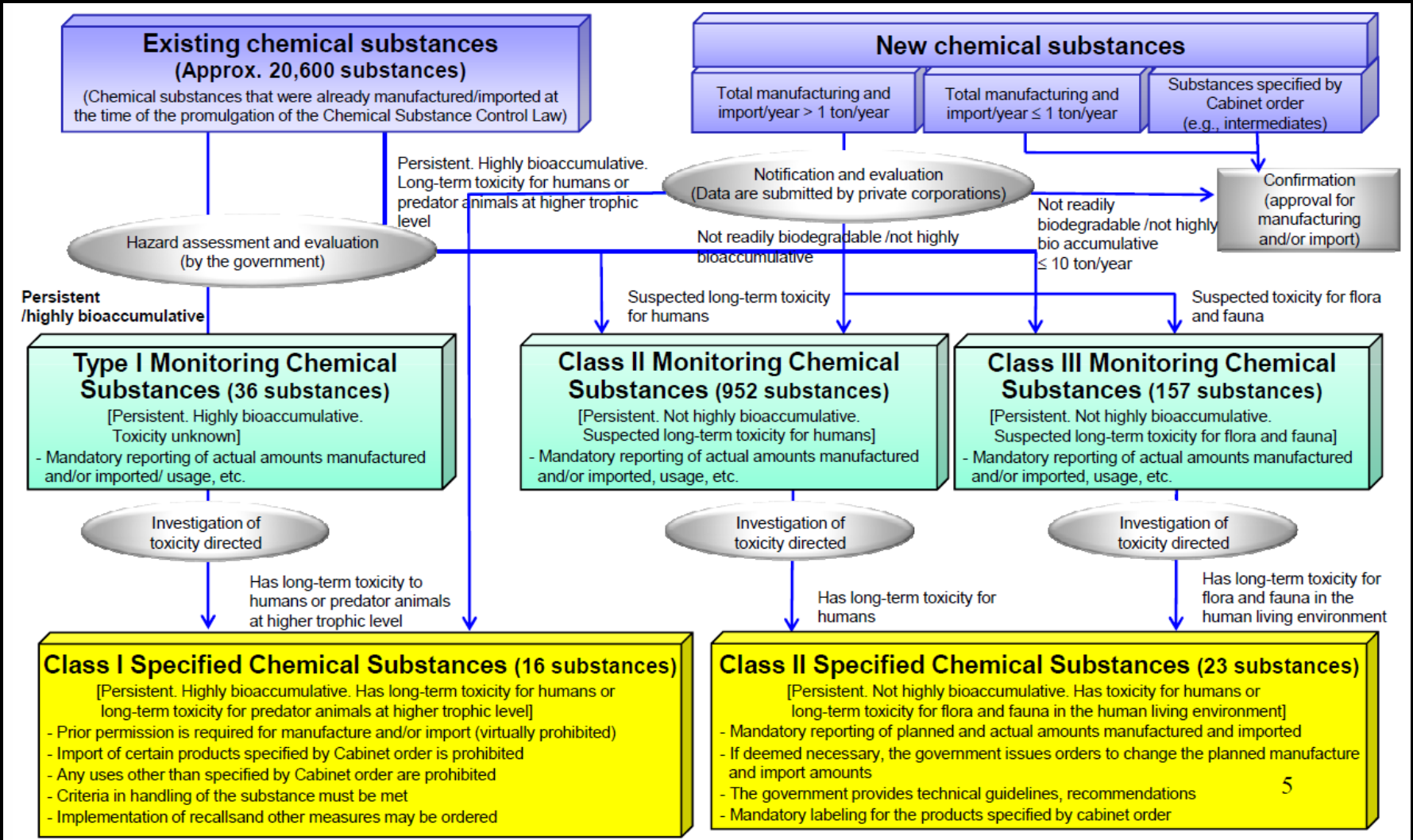
Examines import, manufacture, & use of industrial chemicals and refractory organic substances

Identifies persistence and health consequences

New requirements:

- Reporting obligations
- Testing obligations
- Restrictions

化審法 (*kashinhō*)



化審法 (*kashinhō*)

Simplified, 化審法 regulates...

- Persistent chemical substances (bioaccumulative / non-bioaccumulative) with long-term toxicity or ecotoxicity (Specified Chemical Substances, 2 classes),
- Persistent chemical substances (bioaccumulative / non-bioaccumulative) with unknown or suspected long-term toxicity or ecotoxicity (Monitored Chemical Substances, 3 classes)
- New Chemical Substances to be evaluated

Toxic Substances Control Act (TSCA) of 1976

Objectives:

Assess & regulate new commercial chemicals before entering market

Identify existing (1976) chemicals that pose an "unreasonable risk to health or to the environment", e.g., PCBs, lead, mercury, radon

Regulate distribution and use of those hazardous chemicals

Exceptions:

Research and small quantities

~60,000 existing (1976) chemicals assumed to be "safe", unless new data comes to light to document hazards

Toxic Substances Control Act

Created the TSCA inventory:

A list of “existing” commercial chemicals exempt from regulation

Following information is required for a chemical’s inclusion in the list:

- Name
- Chemical identity
- Proposed usage
- Amount of production
- Adverse effects on health and environment
- Exposures in the workplace
- Disposal practices

Chemical substances were innocent until proven guilty – no data, no regulation

Toxic Substances Control Act (TSCA) of 1976

Industry reaction?

The Scream, 1893 by Edvard Munch

www.edvardmunch.org/the-scream.jsp

Toxic Substances Control Act (TSCA) of 1976

Industry reaction? Mixed...

Some took the opportunity to reorganize their chemical substance data and inventory information into newly computerized systems

Many found coordination with the EPA, even intra-company coordination, to be challenging

Concerns arose:

- Disclosure of confidential business information
- Enough information provided, too much?
- Required responses to “trivial” health concerns from employees
- How to allocate resources and personnel to reporting tasks

Toxic Substances Control Act (TSCA) of 1976

EPA reaction? Also mixed...

Mandated to create centralized databases for chemical substance data, inventory information, health effects data, disposal data:

Chemical Substances Information Network (CSIN)

No specific guidelines for data quality

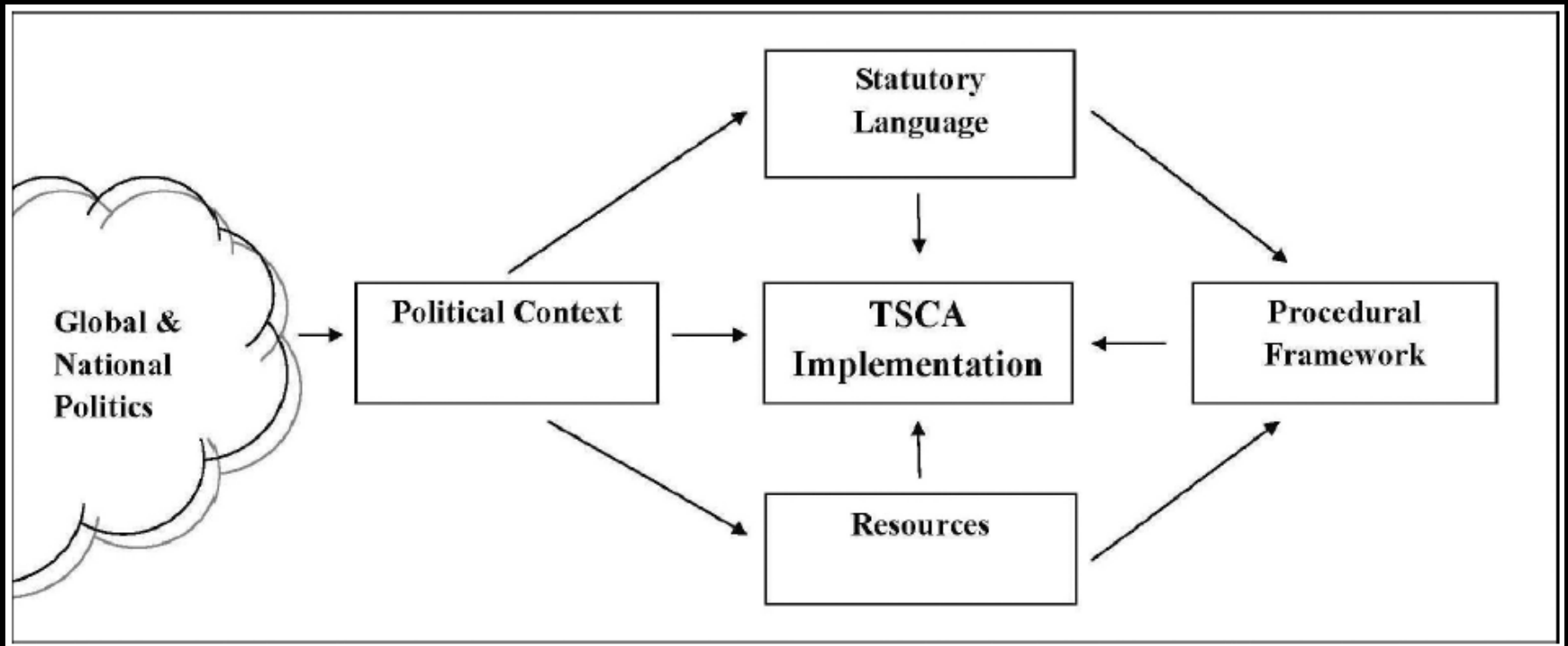
Required cooperation between ~25 Federal agencies, and within EPA

Redundant information requests due to poor intra-EPA communications

Regular postponement of deadlines due to implementation issues

Toxic Substances Control Act (TSCA) of 1976

Factors affecting the implementation of TSCA



TSCA – Companies and institutions step up:

National Library of Medicine (1977)

Offers access to its computerized chemical dictionary to aid companies with their compliance

Chemical Abstracts Service (1979)

Aided in preparing the TSCA inventory using its computerized resources from 120,000 reports of chemical substances manufactured in or imported into the US from 1975-1979

BASF (1980)

"Information-Reporting Procedures under the Toxic Substances Control Act (TSCA), Subsection 8(e)" (Vogt & Kerfoot)

Monsanto (1983)

"Management of TSCA-Mandated Information" (Elmer & Conduray)

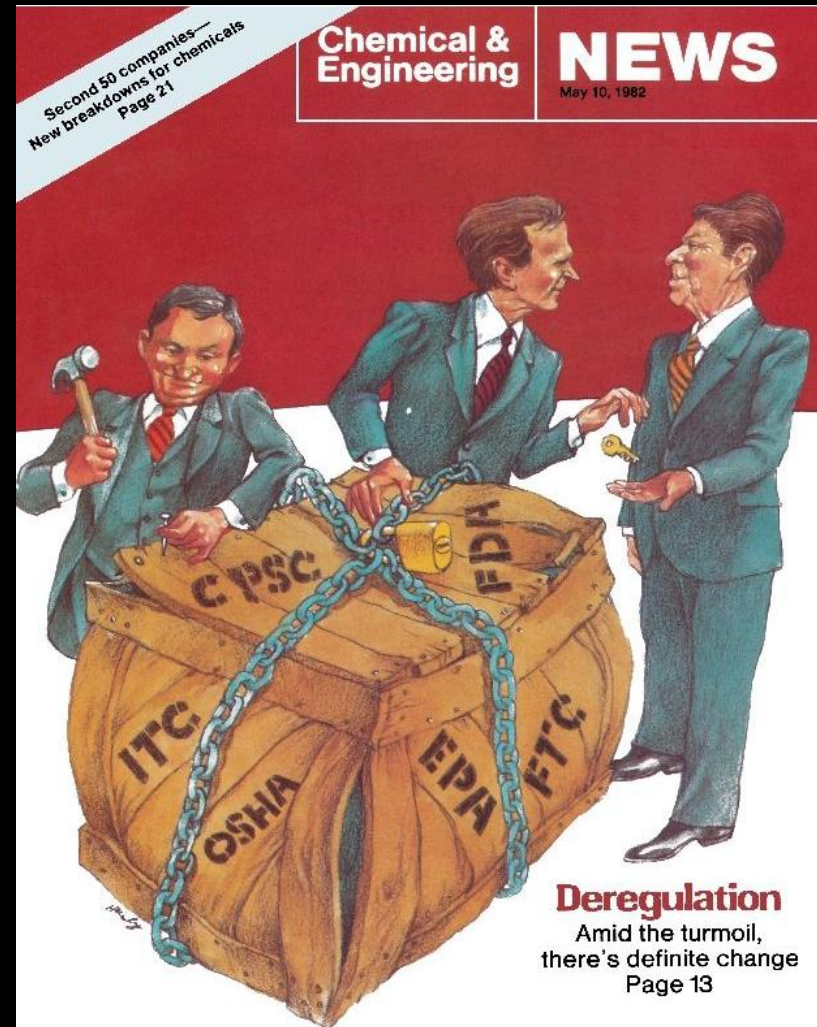
And complain and rejoice:

Chem. & Engin. News Headlines

“Toxic Substances Act may damage industry”
(1977)

“Toxic Substances Act continues to draw flak”
(1978)

“Proposed chemical rules dismay industry”
(1979)



Basic Features of Chemical Regulatory Legislation

- ❖ Creates a centralized and searchable list of “existing” presumed safe chemical substances, sometimes lists of banned or controlled chemical substances (continually updated)
- ❖ Requires company inventories of chemical substances, and reporting of newly acquired data: physicochemical, medical, environmental,... (continually updated)
- ❖ Requires notification (pre-manufacture or pre-marketing) by companies for new chemical substances, approval requires data packages with testing results

European Union

EU Directive 79/831/EEC:

Referred to as the Sixth Amendment

What's new?

Requires European companies to notify the government before they market new (properly packaged and labeled) chemicals.

Pre-marketing notification in EU, as opposed to pre-manufacturing notification in US

("Existing" substances still grandfathered in, and exemptions for research and small quantities)

EU Directive 79/831/EEC

Each European company must give separate notification for a new chemical (TSCA exempts 2nd and later companies)

Provides for regular, more extensive (and expensive) follow-up reporting and testing over time

However, once review is complete in one member state, results must be accepted in all member states

Each EEC country must implement its own premarket notification laws, regulations, and administrative provisions.

Elaborated upon EINECS (parallel to TSCA Inventory)

EC Inventory

Includes

EINECS (European Inventory of Existing Commercial Substances)
1967 => 1979 => 1981 => 1990

ELINCS (European List of Notified Chemical Substances)
From Seventh Amendment 1992

NLP (No-Longer Polymers, substances removed from polymer exclusion)
From Seventh Amendment 1992

Searchable in 22 European languages (BG, CS, DA, DE, EL, EN, ES, ET, FI, FR, HU, IT, LT, LV, MT, NL, PL, PT, RO, SK, SL, SV), but much content available only in EN

Accessible at [<https://echa.europa.eu/information-on-chemicals/ec-inventory>]

Japan

化学物質審査規制法

"Chemical Substances Control Law" (CSCL)
1973, amended 1986, 2003 and 2009

Japan Existing and New Chemical Substances (ENCS)

Maintained by the Japan National Institute of Technology Evaluation (NITE)

[http://www.nite.go.jp/en/chem/chrip/chrip_search/srhInput]

[http://www.nite.go.jp/chem/chrip/chrip_search/srhInput]

Canada

Canadian Environmental Protection Act (1988, amended 1999)

Created the Lists of Substances (Domestic Substances List, Export Control List, Non-Domestic Substances List, Priority Substances List, List of Toxic Substances, Virtual Elimination List and Waste or other matter that may be disposed of at sea)

[<http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=D44ED61E-1>]

[<http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=Fr&n=D44ED61E-1>]

Australia

Created in the Industrial Chemicals (Notification and Assessment) Act 1989 (ICNA Act)

Established the National Industrial Chemicals Notification and Assessment Scheme (NICNAS)

Manages the Australian Inventory of Chemical Substances (AICS), a database of over 40,000 industrial chemicals that is used to determine permissibility to manufacture and/or import chemicals or a product containing chemicals into Australia.

[<https://www.nicnas.gov.au/>]

New Zealand

Hazardous Substances & New Organisms Act
(HSNO Act) June 1996

Established the New Zealand Inventory of Chemicals (NZIoC) in 2007

[<http://www.epa.govt.nz/search-databases/Pages/nzioc-search.aspx>]

China

Ministry of Environmental Protection of PRC
中华人民共和国环境保护部
created in 2008

formerly

Leading Team for Environmental Protection (1974)

National Environmental Protection Agency (1984)

[<http://english.mep.gov.cn/>]

[<http://www.mep.gov.cn/>]

Created the Inventory of Existing Chemical Substances Produced or Imported in China (IECSC)

[http://www.mep.gov.cn/gkml/hbb/bgg/201301/t20130131_245810.htm]

Korea

Toxic Chemical Control Act (TCCA), 1991

Divided on Jan 1, 2015 into Korea Registration and Evaluation of Chemicals (K-REACH) and Chemicals Control Act (CCA).

K-REACH: registration and evaluation of substances

CCA: control of hazardous substances and response to chemical accidents.

Established the National Chemicals Information System in 2006

<http://ncis.nier.go.kr/ncis/Index>

<http://ncis.nier.go.kr/main/Main.jsp>

Russian Federation

Current Chemical and Biological Safety
governed by 7 Federal Acts (1997-2004)

Consolidation and harmonization with international norms is in progress.

An inventory exists, under :

Federal Service for Supervision of Consumer Rights Protection and Human Welfare

федеральная служба по надзору в сфере защиты прав потребителей и благополучия
человека

Russian Registry of Potentially Hazardous Chemical and Biological Substances

Российского регистра потенциально опасных химических и биологических веществ

[<http://www.rpohv.ru/online/>] searchable in Russian

Mexico

Inventario Nacional de Sustancias Químicas de México (INSQ) Mexico National Chemicals Inventory

2008-2010 – Database design, prioritization criteria, preliminary listings, categorization criteria, legal appraisals, public comment

2011-2013 – Evaluation of data sources, data gathering mechanisms, IT development, public comment

2013-2015 – Implementation of data gathering, updating of inventory

2009 version [www2.inecc.gob.mx/publicaciones/consultaPublicacion.html?id_pub=684]

REACH

Registration, Evaluation, Authorisation and Restriction of Chemicals (2006)

Strictest chemical regulatory legislation to date

Expanded EINECS, ELINCS, & NLP

Established the **European Chemicals Agency** to manage technical, scientific & administrative aspects

Provides **International Uniform Chemical Information Database (IUCLID)** software to facilitate capture, storage, maintenance and exchange of data on intrinsic and hazard properties of chemical substances

Usual exceptions for small quantities and research

REACH - Innovations

- No manufacturing or marketing without registration
- To reduce testing burdens, provides for substance information exchange forums (SIEFs) between manufacturers, importers, and data holders, allows cooperation to prepare registration dossiers; accepts a single registration dossier
- For any article containing chemical substances (namely, any article), the constituent chemical substances must be registered.
- **Employs the “Precautionary Principle”, i.e., chemical substances are guilty until proven innocent**

Precautionary Principle

Where scientific evidence is insufficient, inconclusive, or uncertain, and preliminary scientific evaluation indicates reasonable grounds for concern of potentially hazardous effects on the environment, or the health of humans, animals, or plants, the precautionary principle requires intervention to maintain the highest warranted level of protection

(probable cause)

REACH - Registration

Chemicals to be registered in 3 phases by tonnage:

> 1000 tonnes a year, or substances of highest concern: first 3 years;

100-1000 tonnes a year: first 6 years;

1-100 tonnes a year: first 11 years.

REACH - Evaluation

Two types of evaluation: dossier & substance

Dossier evaluation - authorities examine testing proposals to avoid unnecessary animal tests, and check the compliance with registration requirements.

Substance evaluation - on suspicion that a substance presents a risk to human health or the environment, due to similarities with known deleterious substances; thus, all registration dossiers submitted for a substance are examined together along with any other available information.

REACH – Authorization & Restriction

Substances of concern must be authorized for use

After reviewing all available data on chemicals substances under suspicion, and consideration of alternative substances or processes...

An authorization requires that the risks (not hazards alone) from the use of such substances are either adequately controlled or justified on socio-economic grounds.

If warranted, use restrictions to be introduced across the European Community

REACH – Tools

International Uniform Chemical Information Database

IUCLID (v.5) facilitates capture, storage, maintenance and exchange of data on intrinsic and hazard properties of chemical substances to meet data submission requirements for REACH (*et alia*); [<https://iuclid.eu/>]

ECHA-Term

Multilingual chemical terminology [<https://echa-term.echa.europa.eu/home>]

Information on chemicals

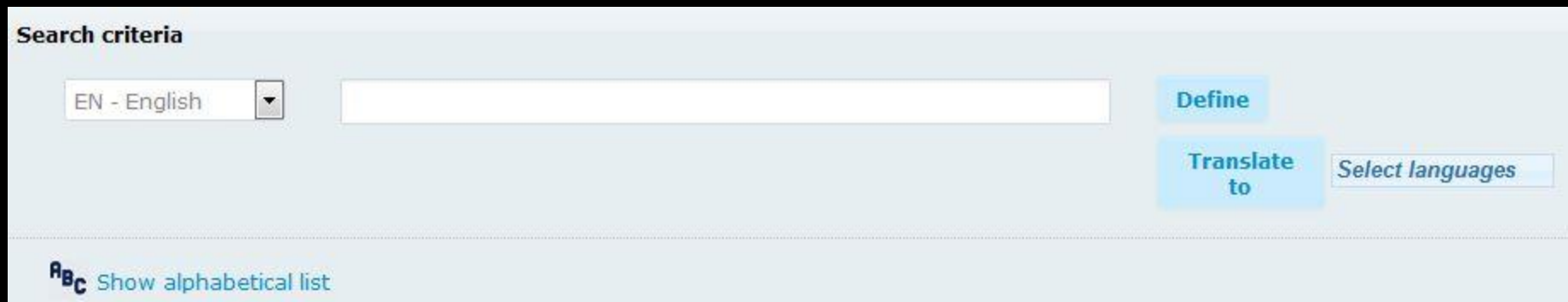
Searchable database of chemical names, data, hazardous properties, classification & labeling [<https://echa.europa.eu/information-on-chemicals/>]

REACH -Terminology

ECHA-Term

Multilingual chemical terminology

Search window:



The screenshot shows the search interface for ECHA-Term. It features a search criteria section with a language dropdown menu set to 'EN - English', a search input field, and buttons for 'Define', 'Translate to', and 'Select languages'. At the bottom, there is a link to 'Show alphabetical list'.

Search criteria

EN - English

Define

Translate to

Select languages

Show alphabetical list

[<https://echa-term.echa.europa.eu/home>]


REACH -Terminology



ECHA-Term definition



Search criteria


EN - English [Define](#)

[Translate to](#)

 [Show alphabetical list](#) Your last 10 queries:

Result 1-1 of 1 for Bioaccumulation  

Chemical legislation, REACH, CLP   [Full entry](#)

EN **bioaccumulation** ★★★★★ @ 

Definition Progressive increase in the amount of a substance in an organism or part of an organism which occurs because the rate of intake exceeds the organism's ability to remove the substance from the body.


REACH -Terminology

ECHA-Term translation



Search criteria



EN - English [Define](#)





[Translate to](#)

 [Show alphabetical list](#)

Your last 10 queries:

Result 1-1 of 1 for Bioaccumulation  

Chemical legislation, REACH, CLP   [Full entry](#)

EN	bioaccumulation	★★★★+@		
HR	bioakumulacija	★★★★+@		

REACH - Terminology

ECHA - Term translation (icons)



1

2

3

4

1. Rating
2. Reference
3. Context
4. Definition

REACH – Chemical data

Information on up to 120,000 chemicals (20 January 2016) in three layers: infocard, brief profile and detailed source data

Search

Search for Chemicals Advanced search

Hexafluoroacetone

Search by name, EC number or CAS Registry number

Name	EC / List no.	CAS no.
Hexafluoroacetone	211-676-3	684-16-2
2-Propanone, hexafluoro-, trihydrate IUPAC name: Hexafluoroacetone Hydrate	629-519-6	34202-69-2
Hexafluoroacetone azine	630-884-9	1619-84-7
Hexafluoroacetone dimethyl ketal	633-289-2	754-50-7

Showing 4 results.


[<https://echa.europa.eu/information-on-chemicals>]






REACH – Chemical data

Information on up to 120 000 chemicals (20 January 2016) in three layers: infocard, brief profile and detailed source data

Infocard

Hexafluoroacetone

Other names: [Regulatory process names \[2\]](#) [IUPAC names \[3\]](#) 

Substance identity 	Hazard classification & labelling 	Properties of concern 
EC / List no.: 211-676-3 CAS no.: 684-16-2 Mol. formula: C3F6O	 <p><i>Danger!</i> According to the classification provided by companies to ECHA in CLP notifications this substance is fatal in contact with skin, is fatal if inhaled, causes damage to organs, causes severe skin burns and eye damage, is toxic if swallowed, may damage fertility or the unborn child, causes serious eye damage, contains gas under pressure and may explode if heated and causes skin irritation.</p>	

[about INFOCARD](#) - Last updated: 14/01/2016

TSCA update

- US Congress now (2016-17) considering modernization of TSCA
- Relatively lax earlier Federal regulation ⇒ many US States issued stronger substance restrictions (e.g., bisphenol A, phthalates, local “Right to Know” laws)
- Concern over growing patchwork of State regulations prompted chemical manufacturers to urge a Federal TSCA update
- Trade offs between increased muscle for EPA to intervene and restrict, less emphasis on costs to business vs. enforcement, and re-examination of chemicals previously deemed “safe” (grandfathered), à la REACH; industry will expect Federal pre-emption of stricter State and local regulations
- Concerns over throughput – current funding would support re-examination of ~5 chemical substances/year
- Very conservative estimate of ~500 actionable substances (among 60,000 grandfathered substances) means ~100 years to catch up w/out more funding

[Trasande JAMA 2016 315(15) 1565]

Opportunities for Translators

Chemical Registration consulting/compliance

Chemical Inspection and Regulation Service (CIRS) [www.cirs-reach.com]

ELC Group [www.elc-group.com]

Chementors (Chemical Safety Consulting) [www.chementors.eu]

B-Lands Consulting [www.reach-compliance.eu]

ChemSafetyPRO [<http://www.chemsafetypro.com>]

Chemical Registration alerting

Chemical Watch (Global Risk & Regulation News) [chemicalwatch.com]

The Acta Group [www.actagroup.com]

The REACH Centre [www.thereachcentre.com]

Ethanol REACH Association - Facilitating registration of ethanol, vinasses and fusel oil
[www.etoh-reach.com]

What did we learn today?

- Chemical regulatory legislation has evolved over decades, usually as reaction to series of disasters
- Industry gradually gets onboard, even discovers benefits; but still wary of regulation
- Can never completely predict physicochemical / biological properties; testing and evaluation needed
- The Precautionary Principle is burdensome, but necessary
- Regulation in the global marketplace = need for translation

Glossary

2,4,5-T	2,4,5-trichlorophenoxyacetic acid
Apex predator	Animal at the top of the food chain, e.g., eagles, polar bears, humans
Bioaccumulation	Progressive increase in the amount of a substance in (part of) an organism that occurs because the rate of intake (contact, respiration, ingestion) exceeds the organism's ability to remove the substance from the body
Bioconcentration	intake of a substance in an organism from the environment, and retention at concentrations higher than in that environment
Biodegradation	Decomposition of a chemical substance by the action of living organisms
Biomagnification	increase in concentration of a substance in the tissues of organisms at successively higher levels in a food chain
CAS	Chemical Abstracts Service
DDT	4',4"-dichloro-2,2-diphenyl-1,1,1-trichloroethane; 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane
Dioxin	shorthand for polychlorinated dibenzodioxin
EINECS	European Inventory of Existing Commercial Substances
ELINCS	European List of Notified Chemical Substances
Endocrine disruptor	chemical that can interfere with the body's endocrine system and produce adverse developmental, reproductive, neurological, and immune effects in either humans and wildlife
Hormonally active agent	synonym for endocrine disruptor
IUCLID	International Uniform Chemical Information Database
Lipophilic	fat-soluble; nonpolar
MSDS	material safety data sheet
NLP	No-Longer Polymers
Notified chemical substance	Chemical substance that has been the subject of a notification to the governmental body that enforces chemical regulatory legislation
PBT	persistent, bioaccumulative and toxic substance
PCB	polychlorinated biphenyls
PCDF	polychlorinated dibenzofuran
Persistent	resistant to environmental degradation through normal chemical, biological, and photolytic processes
Photodegradation	Decomposition of a chemical substance by the action of sunlight
POC	persistent organic pollutant
SDS	safety data sheet
SIEF	substance information exchange forum
SVHC	substances of very high concern
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
vPvB	very persistent and very bioaccumulative substance

National Chemical Substance Lists

Australian National Industrial Chemicals Notification and Assessment Scheme (NICNAS) [www.nicnas.gov.au/]

Asia-Pacific Chemical Inventory Search System (APCISS) [apciss.cirs-group.com/?l=en-us]

Canadian Environmental Protection Act Lists

[www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=D44ED61E-1]

[www.ec.gc.ca/lcpe-cepa/default.asp?lang=Fr&n=D44ED61E-1]

European Chemicals Agency (ECHA) Inventory [echa.europa.eu/information-on-chemicals/ec-inventory]

REACH – Chemical data [echa.europa.eu/information-on-chemicals]

REACH – Terminology [echa-term.echa.europa.eu/home]

Japan Existing and New Chemical Substances (ENCS)

[www.nite.go.jp/en/chem/chrip/chrip_search/srhInput]

[www.nite.go.jp/chem/chrip/chrip_search/srhInput]

China Inventory of Existing Chemical Substances Produced or Imported in **China** (IECSC)

[http://www.mep.gov.cn/gkml/hbb/bgg/201301/t20130131_245810.htm]

Korean National Chemicals Information System (NCIS)

[ncis.nier.go.kr/ncis/Index]

[ncis.nier.go.kr/main/Main.jsp]

México Inventario Nacional de Sustancias Químicas de **México** (INSQ) Mexico National Chemicals Inventory

2009 version [www2.inecc.gob.mx/publicaciones/consultaPublicacion.html?id_pub=684]

New Zealand Inventory of Chemicals (NZIoC) [www.epa.govt.nz/search-databases/Pages/nzioc-search.aspx]

Russian Federation Registry of Potentially Hazardous Chemical and Biological Substances

Российского регистра потенциально опасных химических и биологических веществ [www.rpohv.ru/online/]

United States TSCA Inventory [www.epa.gov/tsca-inventory]

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失敗知識データベース

Failure Knowledge Database

Hatamura Institute for the Advancement of Technology

[<http://www.sozogaku.com/fkd/en/index.html>]

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