Overview of endocrine disruptors in industry

(2005 – 2015)

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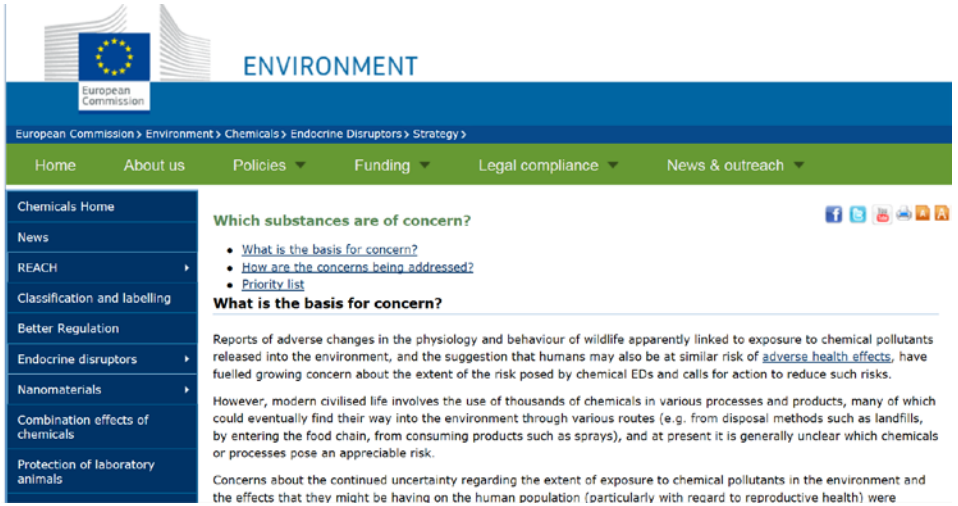
1 - Selection of substances

Selection of substances

- **Lack of shared definitions and no specific labelling**

- **Priority list from European Commission (564 susbtances)** [1]

  - Category 1 (194 substances) : evidence of endocrine disrupting activity in at least one species using intact animals
  - Category 2 (125 substances): at least some in vitro evidence of biological activity related to endocrine disruption
  - Category 3 and 3b: no evidence of endocrine disrupting activity or no data available

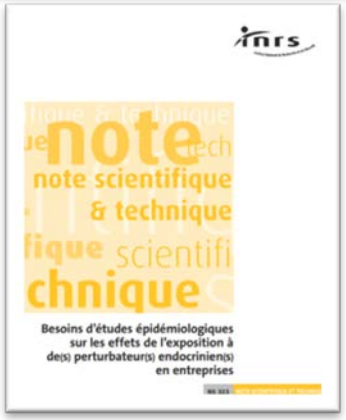


1 - Access database downloaded on http://ec.europa.eu/environment/chemicals/endocrine/strategy/substances_en.htm October 2015

Selection of substances

- **SIN list of EDs or suspected EDs published by ChemSec (non-profit organisation working on chemical hazards) [1]**
  - 80 substances
- **List of substances assessed or to be assessed by ANSES regarding endocrine disrupting activity [2]**
  - About 20 substances
- **List of substances identified in INRS Study (NS 323, 2013)**
  - About 100 substances

Total of 349 recognised or suspected endocrine disruptors



1 - http://sinlist.chemsec.org/ October 2015
2 - https://www.anses.fr/fr October 2015

2 - French product and exposure databases (2005 – 2015)

SEPIA
2005 – 2015

Manufacturers – Importers report full composition for :

- All biocides
- All products classified :
  - Acute toxicity cat 1, 2 and 3
  - STOT single and repeted exposure cat 1
  - CMR cat 1A and 1B
  - Skin corrosion cat 1A, 1B, 1C
- Products voluntarily reported (≈ 20%)

Not representative of the entire market …

How many and which recognised or suspected endocrine disruptors among the 349 are reported in products?

Déclaration - Synapse

INRS and CAPTV validation

… But large database

SEPIA – INRS
(≈ 80 000 products)

BNPC - CAPTV

COLCHIC 2005 – 2015

French Insurance and INRS laboratories

- Individual exposure measurements (56%)
- Ambiant concentration measurements (40%)
- Process emission (2%)
- Product composition (2%)

Not representative of all workplaces and companies

Which recognised or suspected endocrine disruptors among the 349 are in the workplace atmosphere?

How is the worker exposed?

… But large database

COLCHIC

384 557 Measurements

20 123 Measurements campaign

139 683 Sampling

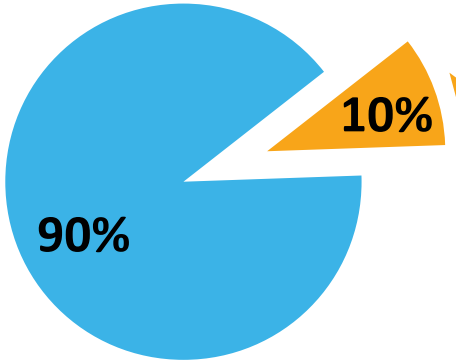
INRS validation

3 - Results

Recognised or suspected endocrine disruptors in products reported in SEPIA (2005 – 2015)

Products **without** recognised or suspected endocrine disruptors

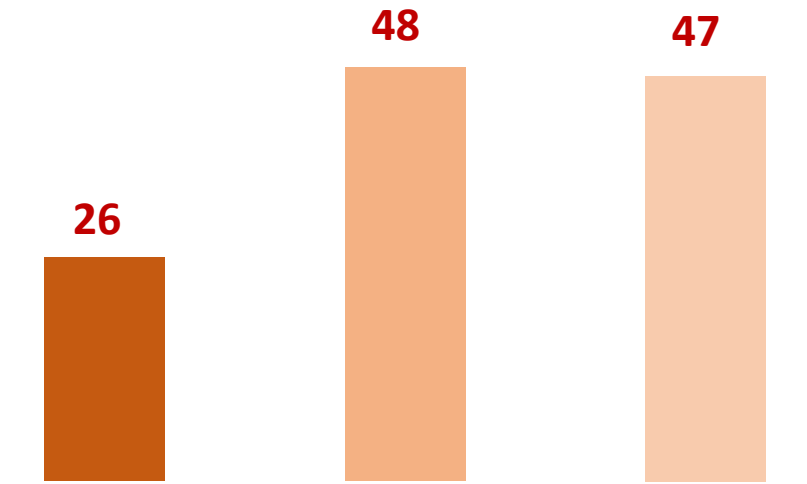
Products **with** recognised or suspected endocrine disruptors



SEPIA

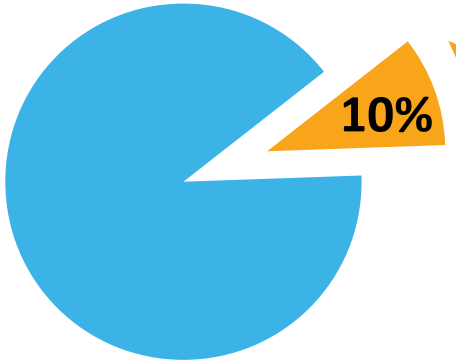
80 000 products

121 recognised or suspected endocrine disruptors found in products



Recognised or suspected endocrine disruptor measurements in COLCHIC (2005–2015)

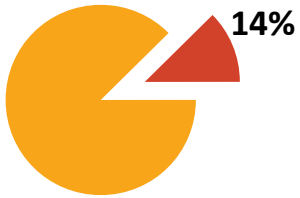
Nb of measurements concerning a recognised or a suspected endocrine disruptor in COLCHIC



COLCHIC

384 557 measurements

37 697 measurements in COLCHIC



5373 measurements above the detection limit concerning **16 different substances**

Different use categories and examples

Antioxidant food additives
Gasoline additives
UV treatment additives
Biocides
Bisphenols
Monomers / Synthesis intermediates
Fragrances
Crop and plant protection products
Plasticisers
Flame retardants
Solvents
Degradation products

Focus on the **54 substances**

- Most frequently observed in product (found in more than 10 products)
- Measurements in workplace air (>Detection limit)

+++ = more than 100 products or measurements

++ = more than 10 products or measurements

+ = less than 10 products or measurements

NO = Not observed

Different use categories and examples of substances

Primary use	Source	Name	CAS	Nb products in SEPIA	Nb measurements in COLCHIC
Antioxidant food additives	SIN LIST	BHT E321	128-37-0	+++	NO
	CE cat 1	BHA	25013-16-5	++	NO
Gasoline additives	CE cat 1	(MTBE)	1634-04-4	NO	++
	ANSES	(ETBE)	637-92-3	NO	++
UV treatment additives	CE cat 1	2-ethyl-hexyl-4-methoxycinnamate	5466-77-3	++	NO
	CE cat 2	2-hydroxy-4-methoxy-benzophenone	131-57-7	++	NO

Focus on MTBE and ETBE

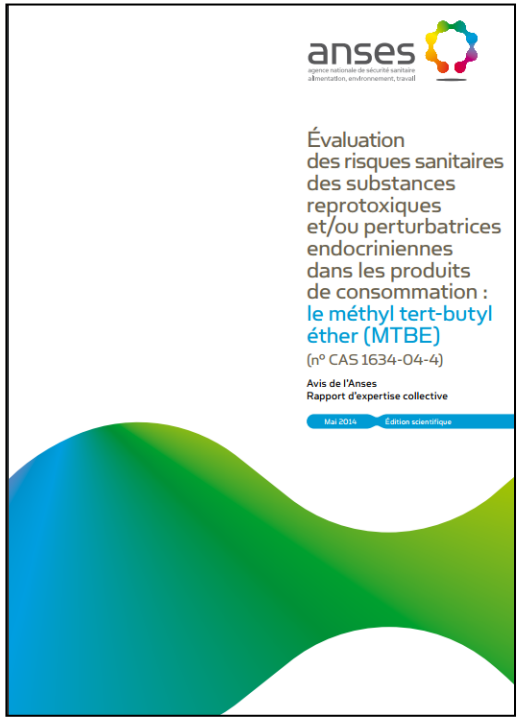
- MTBE is the main source of methanol recovery in gasoline
- ETBE is the main source of ethanol recovery in gasoline

2% to 4 % in gasoline

CAS	Name	Nb measurements	min (mg/m3)	median (mg/m3)	max (mg/m3)	95th (mg/m3) * 1
637-92-3	ETBE	160	0	1	65	8
1634-04-4	MTBE	55	0,2	1,5	53,8	22,5

ANSES, based on INRS exposure data, assessed risk for MTBE in 2014 and concluded that

40% of the situations involving gasoline filling station operators showed a risk to fertility



1- Colchic database 2005 -2015

Different use categories and examples of substances

Primary use	Source	Name	CAS	Nb product in SEPIA	Nb measurements in COLCHIC
Biocides	CE cat 1	Methyl p-Hydroxybenzoate	99-76-3	+++	NO
	CE cat 1	n-propyl p-hydroxybenzoate	94-13-3	+++	NO
	CE cat 2	o-phenylphenol	90-43-7	+++	NO
	CE cat 1	Boric acid	10043-35-3	+++	NO
	CE cat 1	Phenol, nonyl-	25154-52-3	++	NO
	CE cat 2	p-cresol	106-44-5	++	NO
	ANSES	4-nonylphénol	84852-15-3	++	NO
	CE cat 1	ethyl 4-hydroxybenzoate	120-47-8	++	NO
	CE cat 1	n-Butyl p-Hydroxybenzoate	94-26-8	++	NO
	ANSES	isobutyl parabène	4247-02-3	++	NO
	CE cat 2	4-chloro-3-methylphenol	59-50-7	++	NO

Different use categories and examples of substances

Primary use	Source	Name	CAS	Nb product in SEPIA	Nb measurements in COLCHIC
Bisphenol	CE cat 1	Bisphenol A	80-05-7	+++	NO
	CE cat 2	Bisphenol A diglycidyl ether	1675-54-3	NO	+
Monomers / Synthesis intermediates	CE cat 1	Resorcinol	108-46-3	+++	NO
	CE cat 2	4-tert-Butylphenol	98-54-4	++	NO
	SIN list	Naphthalene	91-20-3	NO	++
	CE cat 1	Epichlorohydrin	106-89-8	++	++
Fragrances	ANSES	méthylsalicylate	119-36-8	+++	NO

Different use categories and examples of substances

Primary use	Source	Name	CAS	Nb product in SEPIA	Nb measurements in COLCHIC
Crop and plant protection products	CE cat 1	Terbutryn	886-50-0	+++	NO
	CE cat 2	Permethrin	52645-53-1	+++	NO
	CE cat 2	Piperonyl butoxide	51-03-6	+++	NO
	CE cat 2	Cypermethrin	52315-07-8	+++	NO
	CE cat 1	Deltamethrin	52918-63-5	+++	NO
	CE cat 1	Zineb	12122-67-7	++	NO
	CE cat 2	Carbendazim	10605-21-7	++	NO
	CE cat 1	Mancozeb	616-995-5	++	NO
	CE cat 2	Prochloraz	67747-09-5	++	NO
	CE cat 2	Diuron	330-54-1	++	NO
	CE cat 1	Bifenthrin	82657-04-3	++	NO
	CE cat 1	Cyhalothrin	91465-08-6	++	NO
	CE cat 2	Bioallethrin = d- trans allethrin	584-79-2	++	NO
	CE cat 2	Fenothrin = sumithrin	26002-80-2	++	NO

Different use categories and examples of substances

Primary use	Source	Name	CAS	Nb product in SEPIA	Nb measurements in COLCHIC
Plasticisers	CE cat 1	Diethyl phthalate (DEP)	84-66-2	+++	+
	CE cat 2	diisononyl phthalate = 1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	++	++
	CE cat 1	Di-n-butylphthalate (DBP)	84-74-2	++	++
	CE cat 1	Butylbenzylphthalate (BBP)	85-68-7	++	+
	CE cat 2	Diisobutylphthalate	84-69-5	++	NO
	CE cat 1	Di-(2-ethylhexyl)phthalate (DEHP)	117-81-7	++	++
Flame retardants	CE cat 1	Intermediate chain chlorinated paraffins	85535-85-9	++	NO

Different use categories and examples of substances

Primary use	Source	Name	CAS	Nb product in SEPIA	Nb measurements in COLCHIC
Solvents	CE cat 1	Cyclotetrasiloxane	556-67-2	+++	+
	CE cat 1	Styrene	100-42-5	+++	+++
	CE cat 1	Nonylphenolethoxylate	9016-45-9	++	NO
	CE cat 2	Perchloroethylene	127-18-4	NO	+++
	CE cat 2	Carbon disulphide	75-15-0	NO	++
	CE cat 1	Trichlorobenzene	12002-48-1	NO	++
	SIN list	Hexane	110-54-3	NO	+++
Degradation products	CE cat 1	Benzo[a]pyrene	50-32-8	NO	+++
	CE cat 2	Benz(a)anthracene	56-55-3	NO	+++

4 - Conclusion

Conclusion

- 54 substances appear to be a priority and should be the subject of special attention in industry
- Hygienists need more information to detect endocrine disruptors in industry!

The classification and labelling must evolve to inform users of such effects.

- Hygienists must consider endocrine disruptors as CMR:

Eliminate the risk first or failing that, reduce exposure to as low as possible!

- Substitution is the best way but not an easy way!

Don’t rush into substitution before having toxicological data on substitutes!

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Institut National de Recherche et de Sécurité

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Thanks for your attention

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