TC NES SUBGROUP ON IDENTIFICATION OF PBT AND VPVB SUBSTANCES

RESULTS OF THE EVALUATION OF THE PBT/VPVB PROPERTIES OF:

Substance name: Coal tar pitch, high temperature

EC number: 266-028-2

CAS number: 65996-93-2

Molecular formula: Not available

Structural formula: Not available

Summary of the evaluation:

Coal tar pitch, high temperature is a UVCB substance, which contains several PAHs having PBT/vPvB-properties. Most of the PAHs contained in the substance have a DT_{50} value both in soil and sediment > 420 days hence meeting the P- and vP-criteria. Of the PAHs included, several fulfil the vB-criterion or the B-criterion, based on either mussel or fish. Many of the PAHs included meet the T-criterion, based on either ecotoxicology or human toxicology. The PBT-properties of the product itself cannot be assessed due to its variable contents. However, since most of the (higher molecular) PAHs are present in CTPHT in > 0.1 %, it is concluded that CTPHT is considered to be a PBT and vPvB substance.

JUSTIFICATION

1 IDENTIFICATION OF THE SUBSTANCE AND PHYSICAL AND CHEMICAL PROPERTIES

Name: Coal tar pitch, high temperature
EC Number: 266-028-2
CAS Number: 65996-93-2
IUPAC Name: -
Molecular Formula: Not available
Structural Formula: Not available
Molecular Weight: Not available
Synonyms: Anode pitch, binder pitch, electrode pitch, hard pitch, soft pitch, vacuum pitch, CTPHT (abbreviation)

1.1 Purity/Impurities/Additives

The contents of high temperature coal tar pitch (CTPHT) are variable and partly unknown and it belongs to the UVCBs (Unknown, of Variable Composition, or of Biological origin). A significant part of its contents are a manifold of polyaromatic substances, including alkylated compounds. Therefore, this evaluation focuses on the properties of polycyclic aromatic hydrocarbons (PAHs), in particular the 16 EPA-PAHs[1] (for a full rationale see European Commission, 2008). In Table 1 concentrations of these PAHs are indicated for two representative pitches.

Table 1: Concentrations of the 16 EPA-PAHs in coal tar pitch, high temperature (European Commission, 2008).

Substance	CAS	Impregnation pitch (mg/kg)	Binder pitch (mg/kg)
Naphthalene	91-20-3	n.d.	n.d.
Acenaphthene	83-32-9	390	432
Acenaphthylene	208-96-8	n.d.	n.d.
Fluorene	86-73-7	144	472
Anthracene	120-12-7	737	1311
Phenanthrene	85-01-8	3874	6299
Fluoranthene	206-44-0	17389	17389
Pyrene	129-00-0	14849	9449
Benz[*a*]anthracene	56-55-3	15008	7715
Chrysene	218-01-9	14041	8053
Benzo[a]pyrene	50-32-8	12924	10021
Benzo[*b*]fluoranthene	205-99-2	17408	12131
Benzo[*k*]fluoranthene	207-08-9	8704	6065
Benzo[*ghi*]perylene	191-24-2	9945	8664
Dibenzo[*a,h*]anthracene	53-70-3	2209	1749
Indeno[*1,2,3-cd*]pyrene	193-39-5	11106	9061

[1] Naphthalene, acenaphthene, acenaphthylene, fluorene, anthracene, phenanthrene, fluoranthene, pyrene, benz[*a*]anthracene, chrysene, benzo[*a*]pyrene, benzo[*b*]fluoranthene, benzo[*k*]fluoranthene, benzo[*ghi*]perylene, dibenzo[*a*,*h*]anthracene, and indeno[*1*,*2*,*3*-*cd*]pyrene.

1.2 Physicochemical properties

The physicochemical properties of CTPHT are summarized in Table 2 (taken from European Commission, 2008). In addition, Table 3 summarizes the physicochemical properties of the 16 EPA-PAHs.

Table 2: Physicochemical properties of CTPHT.

REACH ref Annex, §	Property	IUCLID section	Value	Comment
VII, 7.1	Physical state	3.1	black solid	at 20°C and 101.3 KPa
VII, 7.2	Melting point	3.2	65-150 °C	softening range [a)]
VII, 7.3	Boiling point	3.3	>360 °C	at 1013 hPa
VII, 7.4	Relative density	3.4 density	1.15-1.40 g/m^3	at 20 °C [a,b)]
VII, 7.5	Vapour pressure	3.6	<0.1 <10	at 20 °C at 200 °C [a,c)]
VII, 7.6	Surface tension	3.10	--	not applicable
VII, 7.7	Water solubility	3.8	~0.040 mg/L	16 EPA PAHs, at a loading of 10 g/L at 22 °C [d,e)]
VII, 7.8	Partition coefficient n-octanol/water (log value)	3.7 partition coefficient	--	not applicable
VII, 7.9	Flash point	3.11	>250 °C	[a,f)]
VII, 7.10	Flammability	3.13	non flammable	84/449/EEC [g)]; Coal tar pitch, when heated above its initial boiling point, may generate vapours that may ignite in the presence of air and a source of ignition
VII, 7.11	Explosive properties	3.14	not explosive	[a)]
VII, 7.12	Self-ignition temperature		>450 °C	at 1013 hPa [a,h)]
VII, 7.13	Oxidising properties	3.15	not oxidizing	[a)]

[a)] CCSG (2006) *Internal communication*, Coal Chemicals Sector Group/CEFIC; [b)] ASTM (2004) *Standard Test Method for Relative Density of Solid Pitch and Asphalt* (Displacement Method), ASTM D71-94, American Society for Testing and Materials (ASTM); [c)] OECD (1995) *Vapour Pressure.* OECD Guideline for the Testing of Chemicals No. 104, Organisation for Economic Co-operation and Development (OECD); [d)] Rütgers VFT (1999a) *Untersuchung zur Extrahierbarkeit von EPA-PAK's aus Pechstaub;* [e)] Rütgers VFT (1999b) *Untersuchung zur Extrahierbarkeit von EPA-PAK's aus Pechstaub. Fortsetzung der Versuche des Zwischenberichts vom 23.2.99;* [f)] ISO (2002) *Determination of flash point-Pensky-Martens closed cup method.* ISO 2719. International Organisation for Standardisation (ISO); [g)] EC (1984) Commission Directive 84/449/EEC of 25 April 1984 adapting to technical progress for the sixth time Council Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances. *Official Journal* 251, 19/09/1984: 1-223; [h)] DIN (2003) DIN 51794, Ausgabe 2003-05, Prüfung von Mineralölkohlenwasserstoffen-Bestimmung der Zündtemperatur. Deutsches Institut für Normung e.V. (DIN).

Table 3: Physicochemical properties of the 16 EPA-PAHs.

Substance	CAS nr	Molecular formula	Molecular weight (g/mol)	Melting point (°C)	Boiling point (°C)	Water solubility (µg/L)	Log K_{OW} (-)
Naphthalene	91-20-3	$C_{10}H_8$	128.2	81	217.9 [d)]	31900 [a)]	3.34 [d)]
Acenaphthene	83-32-9	$C_{12}H_8$	154.2	96	278	3910 [b)]	4.00 [f)]
Acenaphthylene	208-96-8	$C_{12}H_{10}$	150.2	92	279	16100 [b)]	3.62 [g)]
Fluorene	86-73-7	$C_{13}H_{10}$	166.2	115-116	295 [f)]	1800 [a)]	4.22 [f)]
Anthracene	120-12-7	$C_{14}H_{10}$	178.2	216.4	342 [f)]	47 [a)]	4.68 [e)]
Phenanthrene	85-01-8	$C_{14}H_{10}$	178.2	100.5	340	974 [a)]	4.57 [e)]
Fluoranthene	206-44-0	$C_{16}H_{10}$	202.3	108.8	375	200 [a)]	5.20 [e)]
Pyrene	129-00-0	$C_{16}H_{10}$	202.3	156	360	125 [a)]	4.98 [f)]
Benz[*a*]anthracene	56-55-3	$C_{18}H_{12}$	228.3	160.7	435	10.2 [a)]	5.9 [e)]
Chrysene	218-01-9	$C_{18}H_{12}$	228.3	253.8	448	1.65 [a)]	5.81 [e)]
Benzo[*a*]pyrene	50-32-8	$C_{20}H_{12}$	252.3	175	496	1.54 [a)]	6.13 [e)]
Benzo[*b*]fluoranthene	205-99-2	$C_{20}H_{12}$	252.3	168.3	481	1.28 [a)]	6.12 [g)]
Benzo[*k*]fluoranthene	207-08-9	$C_{20}H_{12}$	252.3	217	480	0.93 [a)]	6.11 [e)]
Benzo[*ghi*]perylene	191-24-2	$C_{22}H_{12}$	276.3	277	545 [j)]	0.14 [a)]	6.22 [e)]
Dibenz[*a,h*]anthracene	53-70-3	$C_{22}H_{14}$	278.4	266.6	524	0.82 [b)]	6.50 [f)]
Indeno[*1,2,3-cd*]pyrene	193-39-5	$C_{22}H_{12}$	276.3	163.6	536	0.1 [c)]	6.58 [g)]

The data presented in the table were taken form Mackay D, Shiu WY, Ma KC (1992) *Illustrated Handbook of Physical-Chemical Properties and Environmental Fate of Organic Chemicals.* Lewis Publishers, Boca Raton, FL. [a)] The values for water solubility were based on generated column methods using geometric means; [b)] The values for water solubility were based on shake-flask using geometric means; [c)] For indeno[*1,2,3-cd*]pyrene no data were available, a default value of 0.1 µg/L was used; [d)] The values for log K_{OW} were based on slow-stirring/generator column using average values; [e)] The values for log K_{OW} were based on slow-stirring methods using average values; [f)] The log K_{OW} values were based on the shake-flask method; [g)] The log K_{OW} values were calculated using ClogP model; [h)] The values for vapour pressure were based on manometry/gas saturation using geometric means; [i)] The values for vapour pressure were based on gas saturation using geometric means; [j)] The values for vapour pressure were based on gas saturation/effusion using geometric means; [k)] The values for vapour pressure were based on effusion method using geometric means; [l)] The values for vapour pressure were estimated using EPIWIN; [m)] The selected values for the Henry's constant were based on batch/gas stripping/wetted-wall column using geometric means; [n)] The selected values for the Henry's constant were based on batch/gas stripping using geometric means; [o)] The selected values for the Henry's constant were based on gas stripping using geometric means; [p)] The selected values for the Henry's constant were based on batch column using geometric means; [q)] No data were available, so constants were calculated using EUSES 2.0; [r)] Measurements were performed at 20 °C.

2 MANUFACTURE AND USES

Coal tar pitch, high temperature (CTPHT) is obtained via distillation of high temperature coal tar (CAS 65996-89-6). Distillation of coal tar results also several other products such as anthracene oil (CAS 90640-80-5). CTPHT is produced within the European Union by ten companies at eleven sites in nine countries. Production volume at these sites was ca. 817,800 tonnes in 2004 and the production capacity was 1127,000 tonnes. An import of 91,600 tonnes and export of 355,600 for the same year have been reported. Based on these volumes the consumption of coal tar pitch in the EU is estimated to be approximately 554,000 tonnes per year.

An overview of the uses of CTPHT is presented in Table 4. Pitch is for most of these uses first processed or blended to obtain specific pitch types (electrode pitch, pitch coke, special pitches and pitch oil blends). Coal tar pitch is mainly used as a binding agent. The major users of CTPHT for anodes are primary aluminium smelters.

Table 4: Use pattern for coal tar pitch, high temperature. Sales in the EU in 2003.

Application	Industry category [a)]	Use category [b)]	Quantity(tpa)	Percentage of total sales
Anodes	8	2	322,500	71.3
Electrodes	8	2	81,400	18.0
Refractories	0	2	22,500	5.0
Road construction	16	2	800	0.2
Active carbon	0	2	7,900	1.7
Heavy duty corrosion protection	14	2/39	4,700	1.0
Roofing	16	2	3,200	0.7
Clay pigeons	0	2	5,800	1.3
Coal briquetting	9	2	3,700	0.9
Total			452,400	100

[a)] Industrial category 0 is others; industrial category 8 is metal extraction, refining and processing industry; industrial category 9 is mineral oil and fuel industry; industrial category 14 is paints, lacquers and varnishes industry; industrial category 16 is engineering industries: civil and mechanical. [b)] Use category 2 is adhesives and binding agents and use category 39 is non-agricultural biocides.

3 CLASSIFICATION AND LABELLING

The substance is currently classified according to the Directive 67/548/EEC:

Carc. Cat 2, T; R45 May cause cancer.

It should be noted that a more extended classification proposal for human health was agreed by TC C&L in October 2006. This proposal, in which Note H was deleted, has been forwarded to ECHA and most probably will be agreed in the 1st ATP to Annex VI of CLP, once entered into force. The proposal reads as follows: Carc. Cat. 1, R45; Muta. Cat. 2, R46; Repr. Cat. 2, R60-61; Xi, R41, R43.

Next to this (extended) classification, the classification proposal N, R50/53 for environment was agreed by TC NES, but not yet discussed in TC C&L.

4 ENVIRONMENTAL FATE PROPERTIES

4.1 Degradation (P)

4.1.1 Abiotic degradation

PAHs are oxidised by the OH- and NO_3-radicals and O_3 in the atmosphere. Lifetime of 2- to 4-ring PAHs ranges according to available data from a few hours to several days. This indirect photolysis occurs mainly for PAHs in gas phase. The EU risk assessment of CTPHT (European Commission, 2008) applied the first-order rate constants of photochemical degradation listed in Table 5. These rate constants correspond to atmospheric degradation half-lives of less than two days.

Larger PAHs are present in the atmosphere adsorbed to fine particles which reduces degradation rate considerably. Direct phototransformation rates for particle bound PAHs are depending on the carbon content of the substrate. Life-times of one hour up to eight days for 4- to 6-ring PAHs adsorbed to particles have been experimentally determined.

Table 5: Rate constants for reaction with atmospheric OH radicals (cm^3 $molecule^{-1}$ s^{-1}). For details and references, see European Commission (2008).

nr	PAH	K_{OH}	Reference a)
1	Naphthalene	$2.16.10^{-11}$	EC (2001)
2	Acenaphthene	$1.00.10^{-10}$	EC (2001)
3	Acenaphthylene	$4.20.10^{-9}$	EC (2001)
4	Fluorene	$1.30.10^{-11}$	EC (2001)
5	Anthracene	$1.30.10^{-10}$	EC (2001)
6	Phenanthrene	$3.10.10^{-11}$	EC (2001)
7	Fluoranthene	$5.00.10^{-11}$	EC (2001)
8	Pyrene	$5.00.10^{-11}$	EC (2001)
9	Benz[*a*]anthracene	$1.22.10^{-10}$	Slooff *et al.* (1989)
10	Chrysene	$8.00.10^{-11}$	SRC (2004)
11	Benzo[*a*]pyrene	$5.00.10^{-11}$	SRC (2004)
12	Benzo[*b*]fluoranthene	$1.86.10^{-11}$	SRC (2004)
13	Benzo[*k*]fluoranthene	$5.36.10^{-11}$	SRC (2004)
14	Benzo[*ghi*]perylene	$8.69.10^{-11}$	SRC (2004)
15	Dibenz[*a,h*]anthracene	$5.00.10^{-11}$	SRC (2004)
16	Indeno[*1,2,3-cd*]pyrene	$6.46.10^{-11}$	SRC (2004)

a) EC (2001) Ambient Air Pollution by Polycyclic Aromatic Hydrocarbons (PAH). Position Paper. Prepared by the Working Group on Polycyclic Aromatic Hydrocarbons. July, 2001; Slooff W, Janus JA, Matthijsen AJCM, Montizaan GK, Ros JPM (1989) *Integrated Criteria Document PAHs.* RIVM report nr. 758474011. National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands; SRC (2004). Interactive PhysProp Database at URL: Demo http://www.syrres.com/esc/physdemo.htm. Syracuse Research Corporation (SRC)..

PAHs are stable against hydrolysis but they are subject to direct and indirect photochemical transformation also in water. Conditions supporting phototransformation exist up to a few centimetres depth below the water surface. As relevant exposure occurs in the whole water column and, in case of PAHs, especially in sediment and soil, photodegradation is not considered to have impact on the persistency in the environment.

4.1.2 Biotic degradation

PAHs up to four rings have been observed to biodegrade in aquatic screening tests in aerobic conditions and can be considered inherently biodegradable (without fulfilling the specific criteria). Larger PAHs are biodegraded very slowly. Anaerobic degradation is considered negligible for PAHs although some evidence on anaerobic transformation is available. Hence, PAHs are expected to be persistent in the anaerobic layer of marine sediments. Many microbial species present in soil are known to biodegrade PAHs. Biodegradation rates in water and soil seem to correlate with the adsorption potential of individual PAHs and thus PAHs with several rings are generally more persistent than PAHs of smaller size. The degradation rate is according to several studies dependent on several factors, including (bio)availability kinetics (water solubility and K_{OC}), temperature, adaptation degree of the micro-organisms and ageing (decreasing desorption of PAHs with increasing residence time). The EU risk assessment of CTPHT considered the biodegradation half-lives presented in Table 6 and Table 7 as representative for the various studies available.

Table 6: Suggested half-life classes of PAHs in various environmental compartments.

Class [a)]	Half-life (h)	
	Mean	Range
1	17	10-30
2	55	30-100
3	170	100-300
4	550	300-1000
5	1700	1000-3000 (42 -125 days)
6	5500	3000-10000 (125 – 420 days)
7	17000	10000-30000 (420 – 1250 days)
8	55000	> 30000

a) Classes as suggested by Mackay D, Shiu WY, Ma KC (1992) Illustrated Handbook of Physical-Chemical Properties and Environmental Fate of Organic Chemicals. Lewis Publishers, Boca Raton, FL.

Table 7: Persistency of PAHs according to the persistency classes from Table 6.

Compound	Water	Soil	Sediment
Naphthalene	3	5	6
Acenaphthene [a)]	3	5	6
Acenaphthylene [a)]	3	5	6
Fluorene	4	6	7
Anthracene	4	6	7
Phenanthrene	4	6	7
Fluoranthene	4	7	8
Pyrene	5	7	8
Benz[*a*]anthracene	5	7	8
Chrysene	5	7	8
Benzo[*a*]pyrene	5	7	8
Benzo[*b*]fluoranthene [a)]	5	7	8
Benzo[*k*]fluoranthene	5	7	8
Benzo[*ghi*]perylene [a)]	5	7	8
Dibenz[*a,h*]anthracene	5	7	8
Indeno[*1,2,3-cd*]pyrene	5	7	8

[a)] Classified based on information from literature by the Rapporteur.

4.1.3 Other information

For the risk assessment it was decided to use the half-live classes presented in Section 4.1.2, although some measured data were available as well (for further details see European Commission, 2008).

4.1.4 Summary and discussion of persistence

Most of the (larger) PAHs in CTPHT have a DT_{50} value both in soil and sediment > 420 days, which means that CTPHT meets the P (persistent) and vP (very persistent) criteria.

4.2 Environmental distribution

4.2.1 Adsorption

Adsorption of the 16 EPA-PAHs to organic carbon (expressed as log K_{OC}) is between 3.13 (naphthalene) and 6.37 (indeno[*1,2,3-cd*]pyrene) according to the QSAR of Karickhoff *et al.* (1979; log K_{OC} = log K_{OW} – 0.21[2]). This QSAR was developed on the basis of data for several PAHs and chlorinated hydrocarbons.

According to several studies, sorption of PAHs in sediment and soil and thus bioavailability seems to be dependent on the residence time but also on the sediment/soil type and exposure level. This process called ageing could not yet be quantified sufficiently and it is therefore not taken into account in the PBT-assessment.

Based on newer information, sorption of PAHs to soils and sediments can be better described by a two-phase model. This model assumes that two main types of organic carbon exist: amorphous organic carbon, with a linear sorption, and black carbon (or carbonaceous geosorbents) with non-linear (Freundlich) sorption (Cornelissen *et al.*, 2005[3]). Although the two-phase model seems to be an improvement compared to the one-phase model according to a new adsorption study on PAHs in sediment (Ruus *et al.*, 2007[4]), in practice it can only be used when black carbon is measured on site.

Partitioning of PAHs to black carbon can be up to 60 times higher than partitioning to the organic carbon of sediment and soil. Nevertheless, most studies measuring bioaccumulation or ecotoxicity where sediments were amended with black carbon or soot-like materials did not observe decreased bioavailability of PAHs. Based on these considerations and the uncertainties on this topic, it was decided not to include a correction for binding to soot-like materials in the risk assessment.

4.2.2 Volatilisation

Based on the Henry's Law constants (see **Error! Reference source not found.**), naphthalene, acenaphthene, acenaphthylene, fluorene, anthracene, phenanthrene, fluoranthene and pyrene are volatile from water. For these compounds, but especially for naphthalene, volatilisation from water can be a significant route of distribution. Other PAHs are slightly or very slightly volatile from water.

4.2.3 Long-range environmental transport

It is well realised that many sources for PAH emissions to the environment exist, mostly unintentional sources due to various combustion processes (traffic, etc.). For this reason it is not

[2] Karickhoff SW, Brown DS, Scott TA (1979). *Water Res* 13: 241-248.
[3] Cornelissen G, Gustafsson O, Bucheli TD, Jonker MTO, Koelmans AA, Van Noort PCM (2005) *Environ Sci Technol* 39: 6881 -6895.
[4] Ruus A, Bøyum O, Grung M, Naes K (2007) *Particle affinity and bio-availability of PAHs associated with coal tar pitch.* NIVA report O-26066. Norwegian Institute for Water Research (NIVA), Oslo, Norway.

possible to estimate the long-range environmental transport of PAHs from CTPHT. Furthermore, risks of CTPHT are expected at a local scale (close to the source), rather than at a regional scale.

4.3 Bioaccumulation (B)

4.3.1 Screening data

According to octanol-water partitioning (see **Error! Reference source not found.**), screening criterion for bioaccumulation (log K_{OW} ≥ 4.5) is fulfilled for anthracene, phenanthrene, fluoranthene, pyrene, benz[*a*]anthracene, chrysene, benzo[*a*]pyrene, benzo[*b*]fluoranthene, benzo[*k*]fluoranthene, benzo[*ghi*]perylene, dibenz[*a,h*]anthracene, and indeno[*1,2,3-cd*]pyrene.

For acenaphthylene, chrysene, benzo[*b*]fluoranthene, benzo[*k*]fluoranthene, benzo[*ghi*]perylene, and indeno[*1,2,3-cd*]pyrene no test data on bioconcentration in fish are available. BCFWIN v2.15 estimates a BCF of 216 for acenaphthylene and values between 5,631 and 28,620 for the larger structures.

4.3.2 Measured bioaccumulation data

Accumulation of PAHs from solution to organism increases generally with increasing K_{OW} for animals with a lacking or weak ability to biotransform PAHs (see Table 8). A reverse pattern has been often observed (*e.g.*, in fish), which may be a result of an ability to metabolise larger PAHs faster, insufficient time of accumulation, reduced uptake due to declining bioavailability, or kinetic limitations.

Results from bioconcentration tests with fish are available for several PAHs (see Table 9) but for the largest PAHs only crustacean data are available. For benz[*a*]anthracene, chrysene, benzo[*k*]fluoranthene, benzo[*ghi*]perylene, dibenz[*a,h*]anthracene and indeno[*1,2,3-cd*]pyrene, BCFs in crustaceans range from 2,440 to 50,119 (European Commission, 2008). The crustacean BCF data confirm the increasing trend in BCF with increasing K_{OW}.

For benzo[*b*]fluoranthene, no test data are available.

Table 8: Bioconcentration factors in shellfish for the various PAHs. For more details and the references, see European Commission (2008).

Compound	Species	BCF	R [a)]	Test system [b)]	Type [c)]	References
Naphthalene	*Mytilus edulis*	50	4	S	equilibrium (total)	Widdows *et al.* (1983)
Anthracene	*Utterbackia imbecillis* (larvae)	345	2	R	equilibrium (parent)	Weinstein & Polk (2001)
	Perna viridis	380189 [d)]	3	R	k_1/k_2 (parent)	Richardson *et al.* (2005)
Phenanthrene	*Mytilus edulis*	1240	1	F	k_1/k_2 (parent)	McLeese & Burridge (1987)
	Mya arenaria	1280	1	F	k_1/k_2 (parent)	McLeese & Burridge (1987)
	Modiola modiolus	3.1	3	S	equilibrium (parent)	Palmork & Solbakken (1981)
Fluoranthene	*Mytilus edulis*	5920	1	F	k_1/k_2 (parent)	McLeese & Burridge (1987)
	Mya arenaria	4120	1	F	k_1/k_2 (parent)	McLeese & Burridge (1987)

Compound	Species	BCF	R [a)]	Test system [b)]	Type [c)]	References
	Perna viridis	245471 [d)]	3	R	k_1/k_2 (parent)	Richardson *et al.* (2005)
Pyrene	*Mya arenaria*	6430	1	F	k_1/k_2 (parent)	McLeese & Burridge (1987)
	Mytilus edulis	4430	1	F	k_1/k_2 (parent)	McLeese & Burridge (1987)
	Utterbackia imbecillis (larvae)	1054	2	R	equilibrium (parent)	Weinstein & Polk (2001)
	Dreissena polymorpha	16000 [e)]	2	S	k_1/k_2 (total=parent)	Bruner *et al.* (1994)
	Dreissena polymorpha	13000 [f)]	2	S	k_1/k_2 (total=parent)	Bruner *et al.* (1994)
	Dreissena polymorpha	35000 [g)]	2	S	k_1/k_2 (total=parent)	Bruner *et al.* (1994)
	Dreissena polymorpha	43000 [h)]	2	S	k_1/k_2 (total=parent)	Gossiaux *et al.* (1996)
	Dreissena polymorpha	37000 [i)]	2	S	k_1/k_2 (total=parent)	Gossiaux *et al.* (1996)
	Perna viridis	891251 [d)]	4	R	k_1/k_2 (parent)	Richardson *et al.* (2005)
Benzo[a]pyrene	*Mytilus edulis*	12000 [j)]	3	S	k_1/k_2 (total)	Skarphéðinsdóttir *et al.* (2003)
	Mytilus edulis	244	3	F	equilibrium (total)	Moy & Walday (1996)
	Dreissena polymorpha	84000 [e)]	2	S	k_1/k_2 (total=parent)	Bruner *et al.* (1994)
	Dreissena polymorpha	41000 [f)]	2	S	k_1/k_2 (total=parent)	Bruner *et al.* (1994)
	Dreissena polymorpha	77000 [g)]	2	S	k_1/k_2 (total=parent)	Bruner *et al.* (1994)
	Dreissena polymorpha	133000 [k)]	2	S	k_1/k_2 (total=parent)	Gossiaux *et al.* (1996)
	Dreissena polymorpha	142000 [l)]	2	S	k_1/k_2 (total=parent)	Gossiaux *et al.* (1996)
	Perna viridis	169824 [d)]	4	R	k_1/k_2 (parent)	Richardson *et al.* (2005)

[a)] Reliability score: 1-reliable without restrictions, 2-reliable with restrictions, 3-unreliable, 4-not assignable; [b)] S: static exposure system, F: flow-through system, R: static renewal system; [c)] k1/k2: uptake rate/depuration rate, total: total compound concentration (including transformation products), parent: parent compound concentration, NS, not steady state; [d)] based on lipid weights; [e)] 21 mm size class with high lipid content; [f)] 21 mm size class with low lipid content; [g)] 15 mm size class; [h)] average BCF obtained from 4 experiments at ambient field temperatures (individual BCFs were 33000, 22000, 77000, and 39000); [i)] average BCF obtained from 6 experiments after acclimatization to lab temperatures (individual BCFs were 32000, 48000, 41000, 39000, 24000, and 39000); [j)] based on dry weights; [k)] average BCF obtained from 11 experiments at ambient field temperatures (individual BCFs were 77000, 49000, 191000, 167000, 132000, 165000, 150000, 197000, 40000, 24000, and 273000); [l)] average BCF obtained from 12 experiments after acclimatization to lab temperatures (individual BCFs were 190000, 83000, 61000, 197000, 220000, 116000, 40000, 147000, 215000, 270000, 107000, and 62000).

Table 9: Bioconcentration factors in fish for the various PAHs. For more details and the references, see European Commission (2008).

Compound	Species	BCF	R [a)]	Test system [b)]	Type [c)]	References
Naphthalene	*Brachydanio rerio* (eggs)	1820 [d)]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (eggs)	1738 [d)]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)

Compound	Species	BCF	R [a)]	Test system [b)]	Type [c)]	References
	Brachydanio rerio (larvae)	1778 [d)]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	1259 [d)]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Pimephales promelas	302	2	S	k_1/k_2 (parent)	De Maagd (1996)
	Leuciscus idus melanotus	30	4	S	k_1/k_2 (unclear)	Freitag *et al.* (1982)
	Cyprinodon variegatus	895 [e)]	1	F	k_1/k_2 (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	999 [f)]	1	F	k_1/k_2 (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	692 [e)]	1	F	equilibrium (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	714 [f)]	1	F	equilibrium (parent)	Jonsson *et al.* (2004)
	Lepomis macrochirus	310 [f)]	2	F	k_1/k_2 (total=parent)	McCarthy & Jimenez (1985)
	Lepomis macrochirus	320 [e)]	2	F	k_1/k_2 (total=parent)	McCarthy & Jimenez (1985)
	Oncorhynchus mykiss	22-340 [e)]	3	S	k_1/k_2 (total)	Melancon & Lech (1978)
	Oncorhynchus mykiss	24-585 [f)]	3	S	k_1/k_2 (total)	Melancon & Lech (1978)
Acenaphthene	*Lepomis macrochirus*	387	2	S	equilibrium (total)	Barrows *et al.* (1980)
Fluorene	*Poecilia reticulata*	2230	3	S	k_1/k_2 (parent)	De Voogt *et al.* (1991)
	Poecilia reticulata	1050 [g)]	2	R	equilibrium (parent)	De Voogt *et al.* (1991)
	Poecilia reticulata	3500	2	S	equilibrium (parent)	De Voogt *et al.* (1991)
Anthracene	*Brachydanio rerio*	10400	3	S	k_1/k_2 (total)	Djomo *et al.* (1996)
	Lepomis macrochirus	900	2	S	k_1/k_2 (total)	Spacie *et al.* (1983)
	Lepomis macrochirus	675	3	S	k_1/k_2 (corrected)	Spacie *et al.* (1983)
	Oncorhynchus mykiss	9000-9200	3	R	k_1/k_2 (parent)	Linder *et al.* (1985)
	Oncorhynchus mykiss	779	3	R	equilibrium (parent)	Linder *et al.* (1985)
	Pimephales promelas	6760	2	S	k_1/k_2 (parent)	De Maagd (1996)
	Poecilia reticulata	7260	3	S	k_1/k_2 (parent)	De Voogt *et al.* (1991)
	Poecilia reticulata	4550 [g)]	2	R	equilibrium (parent)	De Voogt *et al.* (1991)
	Poecilia reticulata	6000	2	S	equilibrium (parent)	De Voogt *et al.* (1991)

Compound	Species	BCF	R [a]	Test system [b]	Type [c]	References
	Leuciscus idus melanotus	910	4	S	k_1/k_2 (unclear)	Freitag *et al.* (1982)
Phenanthrene	*Brachydanio rerio* (eggs)	9120 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (eggs)	12303 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	7943 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	6309 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Gadus morhua (larvae)	10715 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Gadus morhua (larvae)	14454 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Clupea harengus (larvae)	20893 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Clupea harengus (larvae)	21380 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Scophthalmus maximus (larvae)	11220 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Scophthalmus maximus (larvae)	11482 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio	13400 [d]	3	S	k_1/k_2 (total)	Djomo *et al.* (1996)
	Pimephales promelas	6760	2	S	k_1/k_2 (parent)	De Maagd (1996)
	Leuciscus idus melanotus	1760	4	S	k_1/k_2 (unclear)	Freitag *et al.* (1982)
	Cyprinodon variegatus	810 [e]	1	F	k_1/k_2 (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	2229 [f]	1	F	k_1/k_2 (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	700 [e]	1	F	equilibrium (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	1623 [f]	1	F	equilibrium (parent)	Jonsson *et al.* (2004)
Fluoranthene	*Pimephales promelas* (juveniles)	9054	2	S	equilibrium (parent)	Weinstein & Oris (1999)
	Pimephales promelas	3388	2	S	k_1/k_2 (parent)	De Maagd (1996)
	Pimephales promelas (larvae)	14836	1	F	k_1/k_2 (parent)	Cho *et al.* (2003)
Pyrene	*Brachydanio rerio* (eggs)	10000 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (eggs)	30200 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	54954 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	53703 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)

Compound	Species	BCF	R [a]	Test system [b]	Type [c]	References
	Gadus morhua (larvae)	60256 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Gadus morhua (larvae.)	85114 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Clupea harengus (larvae)	97724 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Clupea harengus (larvae)	128825 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio	4300	3	S	k_1/k_2 (total)	Djomo *et al.* (1996)
	Poecilia reticulata	4810	3	S	k_1/k_2 (parent)	De Voogt *et al.* (1991)
	Poecilia reticulata	11300 [g]	2	R	equilibrium (parent)	De Voogt *et al.* (1991)
	Poecilia reticulate	2700	2	S	equilibrium (parent)	De Voogt *et al.* (1991)
	Cyprinodon variegatus	145 [e]	1	F	k_1/k_2 (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	97 [f]	1	F	k_1/k_2 (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	50 [e]	1	F	equilibrium (parent)	Jonsson *et al.* (2004)
	Cyprinodon variegatus	53 [f]	1	F	equilibrium (parent)	Jonsson *et al.* (2004)
Benz[a]anthracene	*Leuciscus idus melanotus*	350	4	S	NS (unclear)	Freitag *et al.* (1985)
	Pimephales promelas	200-265	2	S	k_1/k_2 (parent)	De Maagd (1996); De Maagd *et al.* (1998)
Benzo[*a*]pyrene	*Brachydanio rerio* (eggs)	20893 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (eggs)	290000 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	331131 [d]	3	R	equilibrium (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (larvae)	436516 [d]	3	R	k_1/k_2 (total = parent)	Petersen & Kristensen (1998)
	Brachydanio rerio (adult)	3600	3	S	k_1/k_2 (total)	Djomo *et al.* (1996)
	Leuciscus idus melanotus	480	4	S	k_1/k_2 (unclear)	Freitag *et al.* (1982)
	Salmo salar	2310	3	S	k_1/k_2 (total)	Johnsen *et al.* (1989)
	Lepomis macrochirus	3208	3	F	k_1/k_2 (total); unfed	Jimenez *et al.* (1987)
	Lepomis macrochirus	608	2	F	k_1/k_2 (total); fed	Jimenez *et al.* (1987)
	Lepomis macrochirus	4900	3	F	k_1/k_2 (total)	Spacie *et al.* (1983)
	Lepomis macrochirus	2657	3	F	k_1/k_2 (total)	McCarthy & Jimenez (1985)

Compound	Species	BCF	R a)	Test system b)	Type c)	References
	Lepomis macrochirus	30	3	F	k_1/k_2 (parent)	McCarthy & Jimenez (1985)
	Lutjanus argentimaculatus	3.28	3	S	k_1/k_2 (total)	Wang & Wang (2006)
Dibenz[*a,h*]anthracene	*Leuciscus idus melanotus*	10	4	S	k_1/k_2 (unclear)	Freitag *et al.* (1982)

a) Reliability score: 1-reliable without restrictions, 2-reliable with restrictions, 3-unreliable, 4-not assignable; b) S: static exposure system, F: flow-through system, R: static renewal system; c) k1/k2: uptake rate/depuration rate, total: total compound concentration (including transformation products), parent: parent compound concentration, NS, not steady state; d) based on dry weights; e) low exposure concentrations; f) high exposure concentrations; g) preferred by the author.

Relevant exposure to PAHs occurs in the sediment and soil. Accumulation from sediment has been studied for several PAHs (Table 10). An overall realistic worst case BSAF of 1 (based on lipid weight of fish and organic matter of sediment) from these studies could be derived. No information on the accumulation of metabolites of PAHs is available.

Table 10: Biota-sediment accumulation factors (BSAFs) of polycyclic aromatic hydrocarbons in fish as summarized by Van der Oost *et al.* (2003)[5].

Species	ΣPAH	Dimensions a)	Reference b)
Antarctic fish (*Notothenia gibberifrons*)	0.24-1.25	DW:DW	McDonald *et al.* (1995)
Brown bull-head (*Ictalurus nebulosus*)	1-6	FW:DW	Baumann & Harshbarger (1995a)
Brown bull-head (*Ictalurus nebulosus*)	0.01-0.10	LW:OM	Van der Oost *et al.* (1991a)
Eel (*Anguilla anguilla*)	0.04-0.56	LW:OM	Van der Oost *et al.* (1994)
Killifish (*Fundulus heteroclitus*)	0.001-0.012	DW:DW	Elskus & Stegeman (1989)
Pike (*Esox lucius*)	0.02-0.09	LW:OM	Van der Oost *et al.* (1991a)
Roach (*Rutilus rutilus*)	0.02-0.13	LW:OM	Van der Oost *et al.* (1991a)
Sunfish (*Lepomis macrochirus*)	0.00001-0.8	LW:OM	Thomann & Komlos (1999)

a) DW, dry weight; FW, fresh weight; LW, lipid weight; OM, organic matter or organic carbon; b) See Van der Oost *et al.* (2003) for details and references.

Biomagnification of PAHs occurs in certain aquatic food webs not including fish. In general, no biomagnification of parent PAHs seem to occur in aquatic or terrestrial food webs due to relative rapid metabolism and excretion of PAHs by vertebrates and some invertebrates. Wan et al. (2007[6]) clearly demonstrated trophic dilution in a marine food web. However, it should be recognized that the available bioaccumulation data cover the parent compounds and practically no information on food web transfer of PAH metabolites is available.

4.3.3 Other supporting information

Not available.

4.3.4 Summary and discussion of bioaccumulation

The variable composition of CTPHT hampers a solid conclusion on the bioaccumulation of this compound. BCF values for the 16 EPA-PAHs, which are all found in CTPHT, are in many cases above 5000, thus fulfilling the very-bioaccumulative criterion. For CPTHT it appears therefore reasonable to classify this compound as vB.

5 HUMAN HEALTH HAZARD ASSESSMENT

[5] Van der Oost R, Beyer J, Vermeulen NPE (2003) *Environ Toxicol Pharmacol* 13: 57-149.
[6] Wan Y, Jin X, Hu J, Jin F (2007) *Environ Sci Technol* 41:3109-3114.

5.1 Mutagenicity

Numerous genotoxicity studies with coal tar, coal tar waste, coal tar products, and individual PAHs demonstrated the genotoxicity of these substances[7]. According to the Directive 1999/45/EC relating to the classification, packaging and labelling of dangerous preparations[8], preparations containing more than 0.1% of category 1 or 2 mutagens need to be classified as a category 1 or 2 mutagen. CTPHT contains a variable amount of mutagenic PAHs, whose individual mutagenic effects are considered to be at least additive in nature. Therefore, based on the available genotoxicity data on CTPHT, CTPVHT, coal tar, coal tar waste, coal tar products, and individual PAHs, and the fact that the amount of category 2 mutagenic PAHs in CTPHT is estimated to be more than 0.1% (on a weight/weight basis) in almost all circumstances, classification of CTPHT as a category 2 mutagen is proposed (T; R46).

5.2 Carcinogenicity

Based on the available experimental and epidemiological data on the carcinogenicity of CTPHT and CTPVHT and the evaluation of these data by the IARC, CTPHT and CTPVHT has to be classified as a category 1 carcinogen (for an extended review on carcinogenicity data see European Commission, 2008).

5.3 Toxicity for reproduction

CTPHT may contain up to 1.5% benzo[*a*]pyrene, which is classified as toxic for reproduction (category 2). According to the Directive 1999/45/EC relating to the classification, packaging and labelling of dangerous preparations[8], preparations containing more than 0.5% of a substance classified as toxic for reproduction in category 2 should be classified as a toxic for reproduction. For these reasons it is proposed to classify CTPHT as toxic to reproduction (for an extended rationale see European Commission, 2008).

6 ENVIRONMENTAL HAZARD ASSESSMENT

In this section only the key studies used for PNEC derivations are summarized. Further details can be found in European Commission (2008).

6.1 Aquatic compartment (including sediment)

Table 11 summarises the key studies for the different PAHs for fresh and marine water organisms, and Table 12 summarises those for the different PAHs for sediment organisms.

Table 11: Effect concentrations for the key studies for the various PAHs for fresh and marine water organisms (for further details, see European Commission, 2008).

Compound	Effect concentration (µg/L)	Species	Test details
Naphthalene	20	*Oncorhynchus mykiss*	Fresh water, early life stage EC_{10}
Anthracene	1	*Daphnia pulex*	Fresh water, 24h LC_{50}
Phenanthrene	10	*Micropterus salmoides*	Fresh water, 7d $EC_{10\text{-mortality}}$
Fluoranthene	0.1	*Pleuronectes americanus*	Marine water, 96h LC_{50}

[7] ATSDR (2002) *Toxicological Profile for Wood Creosote, Coal Tar Creosote, Coal Tar, Coal Tar Pitch, and Coal Tar Pitch Volatiles.* US Dep. Health & Human Services: 1-354; WHO (1998) *Selected non-heterocyclic polycyclic aromatic hydrocarbons.* Environmental Health Criteria, 202, IPCS, World Health Organization, Geneva, Switzerland.
[8] EC (1999) Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999. *Official Journal* L 200, 30/07/1999: 1-68.

Compound	Effect concentration (µg/L)	Species	Test details
Pyrene	0.23	*Mulinea lateralis*	Fresh water, acute LC_{50}
9H-Fluorene	15	*Daphnia magna*	Fresh water, 21 d $NOEC_{\text{-reproduction}}$
Acenaphthylene	64	*Ceriodaphnia dubia*	Fresh water, 7d $EC_{10\text{-reproduction}}$
Acenaphthene	38	*Pseudokirchneriella subcapitata*	Fresh water, $EC_{10\text{-growth}}$
Chrysene	0.7	*Daphnia magna*	Fresh water, LT_{50} of 48 h
Benz[*a*]anthracene	1.2	*Pseudokirchneriella subcapitata*	Fresh water, $EC_{10\text{-growth}}$
Benzo[*ghi*]perylene	0.082	*Ceriodaphnia dubia*	Fresh water, 7d $EC_{10\text{-reproduction}}$
Benzo[*k*]fluoranthene	0.17	*Danio rerio*	Fresh water, early life stage $EC_{10\text{-length}}$
Benzo[*a*]pyrene	0.22	*Crassostrea gigas*	Marine water, 48h $EC_{10\text{-shell development}}$ concentrations not verified
	0.5	*Ceriodaphnia dubia* and *Strongylocentrotus purpuratus*	Fresh water, 7d $EC_{10\text{-reproduction}}$, Marine water, 48h $NOEC_{\text{-deformities}}$
Dibenz[*a,h*]anthracene	0.14	*Pseudokirchneriella subcapitata*	Fresh water, $EC_{10\text{-growth}}$
Indeno[*1,2,3-cd*]pyrene	0.27	*Ceriodaphnia dubia*	Fresh water, 7d $EC_{10\text{-reproduction}}$

Table 12: The available key studies for different PAHs for sediment organisms (for further details, see European Commission, 2008).

Compound	Effect concentration (mg/kg_{dw})	Species	Test details
Naphthalene	2900	*Rhepoxynius abronius*	Marine, 10d $EC_{50\text{-reburial}}$
Anthracene	14	*Chironomus riparius*	Fresh water, 28d LC_{10}
Phenanthrene	50	*Hyalella azteca*	Fresh water, 14d $NOEC_{\text{mortality/growth}}$
	50	*Chironomus riparius*	Fresh water, 10d $NOEC_{\text{mortality/growth}}$
Fluoranthene	9.6	*Chironomus riparius*	Fresh water, 10d $LOEC_{\text{mortality/growth}}$
Pyrene	140	*Rhepoxynius abronius*	Marine, 10d $EC_{50\text{-reburial}}$
Acenaphthene	162-168	*Rhepoxynius abronius*	Marine, 10d $EC_{50\text{-reburial}}$

6.2 Terrestrial compartment

Table 13 summarises the key studies for PAH toxicity in terrestrial species.

Table 13. Key studies for the various PAHs for soil organisms.

Compound	Effect concentration (mg/kg_{dwt})	Species	Test details
Naphthalene	10	*Folsomia candida*	28d $NOEC_{\text{reproduction}}$
Anthracene	6.3	*Folsomia fimetaria*	21d $EC_{10\text{-reproduction}}$
Phenanthrene	18	*Folsomia fimetaria*	21d $EC_{10\text{-reproduction}}$
Fluoranthene	15	microbial community	28d $EC_{10\text{-nitrification}}$
Pyrene	10	*Folsomia candida*	28d $NOEC_{\text{reproduction}}$
9*H*-Fluorene	10	*Folsomia fimetaria*	21d $EC_{10\text{-reproduction}}$
Acenaphthylene	29	*Folsomia fimetaria*	21d $EC_{10\text{-reproduction}}$
Acenaphthene	1.9	*Lactuca sativa*	14d $NOEC_{\text{germination/shoot growth}}$
Benz[*a*]anthracene	0.79 [a)]	*Oniscus asellus*	47w $EC_{10\text{-growth}}$
Benzo[*a*]pyrene	0.53 [a)]	*Porcellio scaber*	47w $EC_{10\text{-growth}}$

[a)] This effect concentration is extrapolated from an experiment in which animals where exposed via food, rather than via soil.

6.2.1 Summary and discussion of environmental toxicity

The variable composition of CTPHT hampers a solid conclusion on the toxicity of this compound, but since some of the 16 EPA-PAHs, which are all found in CTPHT, show considerable toxicity in one or more environmental compartments, justifies to classify CTPHT as toxic. Furthermore, CTPHT has been classified as carcinogenic, mutagenic, and toxic for reproduction, emphasizing the toxic properties of (the constituents of) this compound.

7 PBT AND vPvB

7.1 PBT, vPvB assessment

Most of the PAHs contained in CTPHT have a DT_{50} value both in soil and sediment > 420 days hence meeting the P- and vP-criteria. Of the PAHs included, several fulfil the vB-criterion and or the B-criterion (based on BCFs for mussels or fish). Almost all PAHs included meet the T–criterion, based on either ecotoxicology or human toxicology. The PBT-properties of the product itself cannot be assessed due to its variable contents. However, since most of the (higher molecular) PAHs are present in CTPHT in > 0.1 %, it is concluded that CTPHT is considered to be a PBT and vPvB substance.

INFORMATION ON USE AND EXPOSURE

Coal tar pitch is mainly used as a binding agent in the production of carbon electrodes, anodes and Søderberg electrodes for instance for the aluminium industry. It is also used as a binding agent for refractories, clay pigeons, active carbon, coal briquetting, road construction and roofing. Furthermore small quantities are used for heavy duty corrosion protection (for details, see European Commission, 2008).

Workers can be exposed by inhalation or via skin. Exposure concentrations depend on type of work and availability/use of personal protective equipment (for details, see European Commission, 2008).

Consumer use was not identified by industry, not in literature nor on the Internet. Therefore the exposure to consumers to CTPHT can be considered negligible.

Any application of pitch and pitch containing products results into environmental release of PAHs. The release to the environment is influenced by the type of (production) process used and the degree to which emission abatement equipment is applied (for details, see European Commission, 2008).

OTHER INFORMATION

Unless separately indicated, the source of the information of this summary is:

European Commission, 2008. European Union Risk Assessment Report, Draft of May, 2008, Coal tar pitch, high temperature, CAS No: 65996-93-2, EINECS No: 266-028-2.