4 December 2009

Substance name: **Anthracene oil, anthracene paste, anthracene fraction**
EC number: **295-275-9**
CAS number: **91995-15-2**

MEMBER STATE COMMITTEE SUPPORT DOCUMENT FOR IDENTIFICATION OF ANTHRACENE OIL, ANTHRACENE PASTE, ANTHRACENE FRACTION AS A SUBSTANCE OF VERY HIGH CONCERN BECAUSE OF ITS CMR, PBT AND vPvB PROPERTIES

Adopted on 4 December 2009

CONTENTS

TABLES

FOREWORD

Anthracene oil, anthracene paste, anthracene fraction is an UVCB substance (substance of unknown or variable composition, complex reaction products or biological materials). It is characterised by a variable and high content of polycyclic aromatic hydrocarbons (PAHs) and heterocyclic compounds.

One relevant constituent present in anthracene oil, anthracene paste, anthracene fraction in a concentration of 50-70 % is anthracene, which has been identified as a PBT-substance and has been placed on the Candidate List. Additionally other PAHs are present in anthracene oil, anthracene paste, anthracene fraction in individual concentrations equal to or above 0.1% (weight/weight), such as phenanthrene.

The vPvB properties of the latter constituent have been discussed already in the Annex XV transitional report for coal tar pitch, high temperature and before in the Risk Assessment Report (RAR) for coal tar pitch, high temperature, indicating that the data have already been assessed for validity and relevance by a competent EU body. Therefore in the present document most data for individual PAH have been taken directly from the Annex XV transitional report and the RAR for coal tar pitch, high temperature. The data for anthracene are not discussed again in this support document, but references to the Anthracene Annex XV-Dossier are placed at appropriate positions in the text.

Substance name: Anthracene oil, anthracene paste, anthracene fraction

EC Number: 295-275-9

CAS Number: 91995-15-2

- *The substance is identified as a carcinogen (category 2, R45) according to Article 57 (a) of Regulation (EC) 1907/2006 (REACH).*
- *The substance is identified as a mutagen (category 2, R46) according to Article 57 (b) of Regulation (EC) 1907/2006 (REACH).*
- *The substance is identified as a PBT according to Article 57 (d) of Regulation (EC) 1907/2006 (REACH).*
- *The substance is identified as a vPvB according to Article 57 (e) of Regulation (EC) 1907/2006 (REACH).*

Summary of how the substance meets the CMR (Cat 1 or 2), PBT or vPvB criteria, or is considered to be a substance of an equivalent level of concern.

PBT and the vPvB criteria

Anthracene oil, anthracene paste, anthracene fraction (for easier reading the substance is henceforth written in quotation marks) is a UVCB substance consisting of different constituents. Among them are various PAH. One relevant compound is anthracene, which is present in anthracene oil, anthracene paste, anthracene fraction in the range of 50-70 %. Anthracene has been placed on the Candidate List due to the identification as PBT-substance. Moreover, anthracene oil, anthracene paste, anthracene fraction consists of further PAH in concentrations > 0.1% (w/w) such as phenanthrene (25-45%), which fulfils the vPvB criteria.

Hence, anthracene oil, anthracene paste, anthracene fraction fulfils the PBT and the vPvB-criteria according article 57 d) and e) of the REACH regulation.

According to Annex VI, part 3, Table 3.2 of Regulation (EC) No 1272/2008[1] the classification as carcinogen (Carc. Cat.2, R45)[2] must be applied to anthracene oil, anthracene paste, anthracene fraction unless it can be shown that the substance contains less than 0.1 % w/w benzene (EINECS No 200-753-7) and less than 0.005 % w/w benzo[a]pyrene (EINECS No 200-028-5).

Pursuant to Annex IV of Commission Regulation (EC) No 790/2009[3] as of 1 December 2010 the classification as mutagen (Muta. Cat.2; R46) must be applied to anthracene oil, anthracene paste,

[1] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

[2] This corresponds to a classification Carc. 1B; H350 in Annex VI, part 3, Table 3.1 of Regulation (EC) No 1272/2008.

[3] Commission Regulation (EC) No 790/2009 of 10 August 2009 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (1st ATP)

anthracene fraction unless the substance contains less than 0.1 % w/w benzene (EINECS No 200-753-7).[4]

Hence, anthracene oil, anthracene paste, anthracene fraction is a substance meeting the criteria for identification as a carcinogen and mutagen according to Article 57(a) and 57 (b) of the REACH Regulation where the conditions for its classification have been met.

Registration number(s) of the substance or of substances containing the substance:

Not available.

[4] Pursuant to the 1st ATP, the classification according to Table 3.1 of Annex VI, part 3, of Regulation (EC) No 1272/2008 will as of 1 December 2010 be mutagen category 1B, H340.

JUSTIFICATION

1 IDENTITY OF THE SUBSTANCE AND PHYSICAL AND CHEMICAL PROPERTIES

1.1 Name and other identifiers of the substance

Chemical Name: Anthracene oil, anthracene paste, anthracene fraction

EC Number: 295-275-9

CAS Number: 91995-15-2

IUPAC Name:

1.2 Composition of the substance

According to the EC inventory Anthracene oil, anthracene paste, anthracene fraction (CAS-Number 91995-15-2*)* is a complex combination of hydrocarbons from the distillation of anthracene obtained by the crystallization of anthracene oil from bituminous high temperature tar and boiling in the range of 330 °C to 350 °C. It contains chiefly anthracene, carbazole and phenanthrene. Additionally minor constituents might be present but are not reported. The following composition data refers to the information provided by industry in the IUCLID files.

Chemical Name: Anthracene

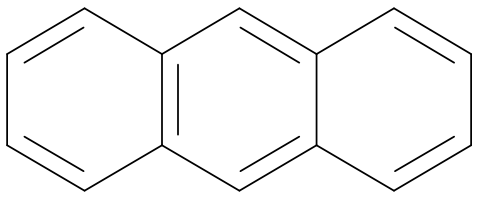
EC Number: 204-371-1

CAS Number: 120-12-7

IUPAC Name: Anthracene

Molecular Formula: C14H10

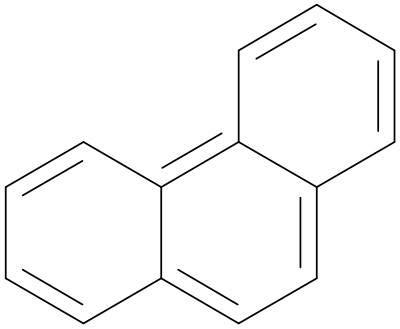
Structural Formula:

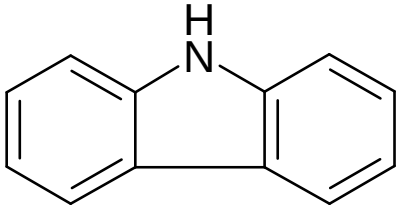


Molecular Weight: 178.23

Typical concentration (% w/w):

Concentration range (% w/w): 50-70

Chemical Name:	Phenanthrene
EC Number:	201-581-5
CAS Number:	85-01-8
IUPAC Name:	Phenanthrene
Molecular Formula:	C14H10
Structural Formula:	
Molecular Weight:	178.23
Typical concentration (% w/w):	
Concentration range (% w/w):	25-45

Chemical Name:	Carbazole
EC Number:	201-696-0
CAS Number:	86-74-8
IUPAC Name:	9*H*-carbazole
Molecular Formula:	C12H9N
Structural Formula:	
Molecular Weight:	167.21
Typical concentration (% w/w):	
Concentration range (% w/w):	1-5

1.3 Physico-chemical properties

Table 1: Summary of the physic-chemical properties of anthracene oil, anthracene paste, anthracene fraction

REACH ref Annex, §	Property	IUCLID section	Value	[enter comment/reference or delete column]
VII, 7.1	Physical state at 20°C and 101.3 kPa	3.1	Solid	
VII, 7.2	Melting/freezing point	3.2	170-200 °C	IUCLID datafile; Depending on the concentration of the different substances
VII, 7.3	Boiling point	3.3	300-350 °C	IUCLID datafile; Depending on the concentration of the different substances
VII, 7.5	Vapour pressure	3.6	< 0.01 Pa	IUCLID datafile; Depending on the concentration of the different substances
VII, 7.7	Water solubility	3.8	< 1.29 mg/l	IUCLID datafile; Depending on the concentration of the different substances
VII, 7.8	Partition coefficient n-octanol/water (log value)	3.7 partition coefficient	3.84 – 4.68	IUCLID datafile; Depending on the concentration of the different substances

2 CLASSIFICATION AND LABELLING

2.1 Classification in Annex VI of Regulation (EC) No 1272/2008

Anthracene oil, anthracene paste, anthracene fraction has index number 648-106-00-1 in Annex VI, part 3, Tables 3.1 and 3.2 of Regulation (EC) No 1272/2008[5].

Its classification has been updated under the same index number in Annex IV of Commission Regulation (EC) No 790/2009[6]. Classification as mutagen (Muta. Cat.2; R 46) has been added.

Pursuant to Annex IV of Commission Regulation (EC) No 790/2009 anthracene oil, anthracene paste, anthracene fraction will as of 1 December 2010 be listed in Table 3.2 (the list of harmonised classification and labelling of hazardous substances from Annex I to Directive 67/548/EEC) of Annex VI, part 3, of Regulation (EC) No 1272/2008 as shown in Table 2.

Table 2: Classification and labelling of anthracene oil, anthracene paste, anthracene fraction according to Annex VI, part 3, Table 3.2 of Regulation (EC) No 1272/2008 as of 1 December 2010 .

Name	CAS-No	Index-No	Classification	Labelling	Notes
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2	648-106-00-1	Carc. Cat. 2; R45 Muta. Cat.2; R46	T; R45-46; S 53 – 45	HJM

Notes:

H: *The classification and label shown for this substance applies to the dangerous property indicated by the risk phrases in combination with the category of danger shown. Manufacturers, importers and downstream users of this substance shall be obliged to carry out an investigation to make themselves aware of the relevant and accessible data which exists for all other properties to classify and label the substance. The final label shall follow the requirements of section 7 of Annex VI to Directive 67/548/EEC.*

J: *The classification as a carcinogen or mutagen need not apply if it can be shown that the substance contains less than 0.1 % w/w benzene (EINECS No 200-753-7).*

M: *The classification as a carcinogen need not apply if it can be shown that the substance contains less than 0.005 % w/w benzo[a]-pyrene (EINECS No 200-028-5).*

The harmonised classification and labelling of anthracene oil, anthracene paste, anthracene fraction as hazardous substance according to Regulation (EC) No 1272/2008 (Annex VI, part 3, Table 3.1 (the list of harmonised classification and labelling of hazardous substances)) as of 1 December 2010 is provided in Table 3.

[5] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

[6] Commission Regulation (EC) No 790/2009 of 10 August 2009 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (1st ATP)

Table 3: Classification and labelling of „anthracene oil, anthracene paste, anthracene fraction according to Annex VI, part 3, Table 3.1 of Regulation (EC) No 1272/2008 as of 1 December 2010.

Name	CAS-No	Index-No	Classification	Labelling	Notes
Anthracene oil, anthracene paste, anthracene fraction	91995-15-2	648-106-00-1	Carc. Cat. 1B; H350 Muta. Cat. 1B H340	GHS08 Dgr H350 H340	HJM

Notes:

H: *The classification and labelling shown for this substance applies to the hazardous property(ies) indicated by the hazard statement(s) in combination with the hazard class(es) and category(ies) shown. The requirements of Article 4 for manufacturers, importers or downstream users of this substance apply to all other hazard classes and categories. For hazard classes where the route of exposure or the nature of the effects leads to a differentiation of the classification of the hazard class, the manufacturer, importer or downstream user is required to consider the routes of exposure or the nature of the effects not already considered.*

J: *The classification as a carcinogen or mutagen need not apply if it can be shown that the substance contains less than 0.1 % w/w benzene (EINECS No 200-753-7).*

M: *The classification as a carcinogen need not apply if it can be shown that the substance contains less than 0.005 % w/w benzo[a]-pyrene (EINECS No 200-028-5).*

3 ENVIRONMENTAL FATE PROPERTIES

3.1 Degradation

3.1.1 Stability

3.1.1.1 Phototransformation

Photolysis in the troposphere results in the formation of reactive hydroxyl (OH) and nitrate (NO_3) radicals and ozone (O_3), which react as oxidizing agent with organic compounds like PAHs. These radical and ozone reactions comprise the main degradation path of gas-phase PAH (Calvert *et al.*, 2002). The atmospheric behaviour of the main constituents of anthracene oil, anthracene paste, anthracene fraction is shown below in Table 4

Table 4: Phototransformation of the relevant constituents of anthracene oil, anthracene paste, anthracene fraction. The data are taken from the Annex XV transitional dossier for coal tar pitch, high temperature (The Netherlands - Bureau REACH, 2009).

PAH (number of rings)	Representative lifetime in air with respect to reaction with			
	OH		NO_3	O_3
	Summer	Winter		
Phenanthrene (2)	9.0 h	1.9 d	-	-
Carbazole (2) [a)]	9.6 h	-	-	-

a) Specially calculated for this support document using AOPwin v1.91

For all the substances (table 5) the transformation rate in particle phase is expected to be slower. Particle phase transformation is, however, not assumed to be of relevance for the overall atmospheric lifetime, because only up to 3 % of atmospheric anthracene has been observed to appear in particle phase (European Chemicals Agency, 2008d).

The constituent anthracene is stable against hydrolysis and photochemical transformation in water and sediments. This has been observed in laboratory and in “in situ” experiments. Half-lives for primary photodegradation in water have been reported in the range of 20 minutes to 125 hours depending on the experimental conditions used. The highest value corresponds to photolysis under simulated winter conditions.

Environmentally relevant exposure occurs in the whole water column and, in the case of the constituents of anthracene oil, anthracene paste, anthracene fraction especially in sediment and soil. Photodegradation can be expected to be a relevant removal pathway in the environment only in very shallow clear waters and in the first few centimetres layer of the water column. Therefore aquatic photodegradation is not considered to have relevant impact on the overall persistency of anthracene oil, anthracene paste, anthracene fraction in the environment.

3.1.1.2 Hydrolysis

Hydrolysis as a way of abiotic degradation can be considered as not relevant for the main constituents of anthracene oil, anthracene paste, anthracene fraction because of their chemical structures. Anthraquinone has been identified as the main abiotic degradation product of anthracene (European Chemicals Agency, 2008d). Because of the similar chemical structure (condensed aromatic rings) similar assumptions for hydrolytic behaviour of the other constituents of anthracene oil, anthracene paste, anthracene fraction can be made.

3.1.2 Biodegradation

3.1.2.1 Biodegradation estimation

In the table below phenanthrene was allocated to persistence classes on the basis of model calculations (Mackay *et al.*, 1992). These half-lives were applied in the Annex XV transitional report of coal tar pitch, high temperature (The Netherlands - Bureau REACH, 2009)

Table 5: Half-life classes of phenanthrene (The Netherlands - Bureau REACH, 2009)

Substance	Water		Soil		Sediment	
	class	Half-life [d]	Class	Half-life [d]	class	Half-life [d]
Phenanthrene	4	13 – 42	6	125 – 420	7	420 – 1250

3.1.2.2 Screening tests

In a 28 day ready biodegradability test (MITI I, OECD 301C) using 100 mg l^{-1} PAH, respectively, and 30 mg l^{-1} sludge no ready biodegradation was detected for phenanthrene (54% BOD) and carbazole (0% BOD) (MITI-List, 2002).

Coover and Sims tested the persistence of PAHs in an unacclimated agricultural sandy loam soil in dependence of the temperature (Coover and Sims, 1987). Due to the method used for extraction and analysis, it remains unclear to which extent evaporation, adsorption and biodegradation may have contributed to the elimination process. The soil was spiked with a standard solution of 16 PAHs and incubated for 240 days. At 10°C 36% of phenanthrene was remaining. With increasing temperature the elimination increased to 19% (2%) of remaining phenanthrene, at 20°C (30°C).

3.1.2.3 Simulation tests

Biodegradation in soil

Biodegradation rates of several PAH in soil depend on several factors like soil type, pH, moisture content, oxygen and nutrient contents and soil microbial population. In addition, vegetation has been observed to enhance microbial biodegradation in the rhizosphere. Some of these factors may also explain why the half-lives observed under laboratory conditions are much shorter than those obtained from long-term field-based experiments (The Netherlands - Bureau REACH, 2009). The results of Wild et al. (1991) and Wild and Jones (1993) demonstrate the difference of tests conducted for several PAHs in field conditions compared to laboratory tests. Wild et al. (1991) observed an elimination half-life of 5.7 years for phenanthrene. In this field experiment soils were enriched with PAH-contaminated sludge (Wild *et al.*, 1991).

In another study Wild and Jones (1993) derived different half-lives in a microcosm study with four soil types (Wild and Jones, 1993). The elimination half-lives for phenanthrene were 83 – 193 days. It has to be noted that the latter results are derived from a greenhouse study and should therefore not be used for the P-assessment. Various studies on PAH-contaminated soils have shown that the number of PAH-degrading microorganisms and the degrading capacity are much higher in PAH-contaminated soils than in pristine soils indicating that adaptation has occurred (Jonsson et al., 2004; European Commission, 2008; The Netherlands - Bureau REACH, 2009).

Grosser et al. (1991) studied the mineralization of ^{14}C-labeled carbazole in three different soils. The mineralization was measured by application of serum bottle radiorespirometry. The incubation was set up for 184 days, but after 60 days the curves had become asymptotic. The mineralization of carbazole was measured between undetectable and 46% within the test duration.

The fate of several PAHs in two different soils were tested by Park et al.(1990).The half-life of phenanthrene was calculated in the range of 27 and 53 days (second soil: 13 – 18 days).

Table 6: Half-lives for PAHs in soil (of relevant constituents of anthracene oil, anthracene paste, anthracene fraction)

Substance	Result	Reference
Phenanthrene	$DisDT_{50}$ =5.7 years (field study)	(Wild *et al.*, 1991)
	$DisDT_{50}$ =83 – 193 d (microcosm study)	(Wild and Jones, 1993)
	Elimination half- life in two different soils: $DisDT_{50}$ = 27 – 53 d $DisDT_{50}$ = 13 – 18 d	(Park *et al.*, 1990)
	$DisDT_{50}$ =8.5 years (field study)	(Wild *et al.*, 1991)
Carbazole	Degradation half-life: $DegDT_{50}$ > 184 d (undetectable – 46% mineralization in 184 d)	(Grosser *et al.*, 1991)

3.1.3 Summary and discussion of persistence

Anthracene which is a main constituent of anthracene oil, anthracene paste, anthracene fraction has been placed on the Candidate List due to its identification as a PBT-substance (European Chemicals Agency, 2008d).

Moreover, anthracene oil, anthracene paste, anthracene fraction consists of further hardly degradable PAH constituents. The model calculations by Mackay et al. (1992) indicate that phenanthrene shows a half-life in sediment of more than 180 days. Additionally in a field study half-lives of 5.7 years for phenanthrene have been measured in soil (Wild *et al.*, 1991).

Screening studies (OECD TG 301C) show, that phenanthrene and carbazole as further constituents of anthracene oil, anthracene paste, anthracene fraction - are not readily biodegradable (MITI-List, 2002).

Further studies show relatively long dissipation times for carbazole in soil ($DegDT_{50}$ > 184 d) (Grosser *et al.*, 1991).

Hence, several constituents of anthracene oil, anthracene paste, anthracene fraction fulfil the P and the vP criteria according to Annex XIII of the REACH regulation.

3.2 Environmental distribution

3.2.1 Adsorption/desorption

The organic carbon partitioning coefficient log K_{OC} was calculated for the main constituents using the equation log K_{OC} = 0.81 * log K_{OW} + 0.10 (European Chemicals Agency, 2008b). The results are shown below in Table 7.

Table 7: Log K_{OW} and log K_{OC} data of the relevant constituents present in anthracene oil, anthracene paste, anthracene fraction

Substance	CAS-No.	log K_{OW} [a)]	log K_{OC}	K_{OC} (l/kg) [b)]
Phenanthrene	85-01-8	4.57	3.80	6,309
Carbazole	86-74-8	3.84	3.21	1,621

a) Values were taken from Annex XV transitional report – CTPHT (European Chemicals Agency, 2009); b) calculation of K_{OC} according to Guidance document R.7a

It can be concluded that anthracene oil, anthracene paste, anthracene fraction has a high potential to adsorb to organic matter and that it is not or only little mobile in soil and sediment.

3.2.2 Volatilisation

For the substance anthracene oil, anthracene paste, anthracene fraction no measured data are available at the moment. According to the constituents' Henry's Law constants anthracene oil, anthracene paste, anthracene fraction is expected to be moderately volatile. The calculated values are shown in Table 8 using the equation for Henry's law constant documented in Guidance Document R.16 (European Chemicals Agency, 2008b).

3.2.3 Distribution modelling

For the main constituents of anthracene oil, anthracene paste, anthracene fraction the behaviour in the wastewater treatment plant was calculated under the assumption that no biodegradation occured (k=0/h). The results are shown in Table 8.

Table 8: Henry constants and volatilisation of main constituents in municipal waste water treatment plants.

Substance	Henry-constant[a]	Distribution of PAH in STP[b]			
	(Pa*m³/mol)	% to air	% to water	% to sludge	% degraded
Phenanthrene	4.76	4.4	53.5	42.1	0.0
Carbazole	0.01	0.0	83.3	16.7	0.0

[a] calculation of Henry's Law coefficient according to Guidance Document R.16 (European Chemicals Agency, 2008c); [b] values for distribution in STP calculated with SimpleTreat 3.0 (debugged version, 7 Feb 97)

Due to the partitioning to solids, low to medium concentrations of these PAHs in aqueous solutions are expected. The share of volatilised anthracene oil, anthracene paste, anthracene fraction constituents depends on the composition of the oil. Nevertheless volatilisation is not considered as a relevant route of distribution for anthracene oil, anthracene paste, anthracene fraction.

3.3 Bioaccumulation

3.3.1 Aquatic bioaccumulation

3.3.1.1 Bioaccumulation estimation

Based on the substance's log K_{OW} range from 3.84 – 4.68 constituents of anthracene oil, anthracene paste, anthracene fraction are expected to bioaccumulate.

3.3.1.2 Measured bioaccumulation data

Bioaccumulation of various PAH has been measured in various species. Several studies have been discussed in detail in the risk assessment report of anthracene (de Voogt et al., 1991; Djomo et al., 1996; de Maagd, 1996) and in the Annex XV transitional report for coal tar pitch, high temperature (McLeese et al., 1987; Bruner et al., 1994; Petersen and Kristensen, 1998). The most relevant studies and results are summarized in Table 9.

Table 9: Bioaccumulation factors in fish for phenanthrene (The Netherlands - Bureau REACH, 2009)

Substance	Species	BCF	R[a)]	Test system [b)]	Type [c)]	References
Phenanthrene	***Mollusca***					
	Mytilus edulis	1240	1	F	k1/k2	(McLeese et al., 1987)
	Mya arenaria	1280	1	F	k1/k2	(McLeese et al., 1987)
	Fish					
	Cyprinodon variegatus	810[d)]	1	F	k1/k2 (parent)	(Jonsson et al., 2004)
	Cyprinodon variegatus	2229[e)]	1	F	k1/k2 (parent)	(Jonsson et al., 2004)
	Cyprinodon variegatus	700[d)]	1	F	equilibrium (parent)	(Jonsson et al., 2004)
	Cyprinodon variegatus	1623[e)]	1	F	equilibrium (parent)	(Jonsson et al., 2004)
	Pimephales promelas	6760	2	S	k1/k2 (parent)	(de Maagd, 1996)
	Pimephales promelas	3388	2	S	k1/k2 (parent)	(de Maagd, 1996)

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

3.3.2 Summary and discussion of bioaccumulation

The bioaccumulation potential of anthracene has been described in the Annex XV-Dossier for identifying anthracene as a SVHC (European Chemicals Agency, 2008d). Anthracene has been placed on the Candidate List due to its identification as a PBT-substance (European Chemicals Agency, 2008a).

Moreover, a further constituent of anthracene oil, anthracene paste, anthracene fraction has bioaccumulation potential, too. The BCF values of phenanthrene are >5000 in several studies.

In summary, two constituents, of anthracene oil, anthracene paste, anthracene fraction fulfil the B and/or the vB criteria according to Annex XIII of the REACH regulation.

4 HUMAN HEALTH HAZARD ASSESSMENT

Not considered in this document.

5 ENVIRONMENTAL HAZARD ASSESSMENT

5.1 Aquatic compartment (including sediment)

Anthracene oil, anthracene paste, anthracene fraction consists of anthracene (50-70 %), which has already been identified as PBT-substance and has been added to the Candidate List (European Chemicals Agency, 2008). Therefore, the toxicity data are not presented here, again.

6 PBT, vPvB AND EQUIVALENT LEVEL OF CONCERN ASSESSMENT

6.1 Comparison with criteria from Annex XIII

Anthracene oil, anthracene paste, anthracene fraction is a UVCB substance consisting of a variety of different constituents. One main constituent is anthracene (50-70 %), which has already been identified as PBT-substance and has been added to the Candidate List (European Chemicals Agency, 2008d). Therefore, also anthracene oil, anthracene paste, anthracene fraction fulfils the PBT criteria according to Annex XIII of the REACH regulation.

Moreover, anthracene oil, anthracene paste, anthracene fraction consists of phenanthrene (25-45 %) which, also fulfils the criteria of Annex XIII.

In a field study a half-life of 5.7 year for phenanthrene has been measured in soil (Wild et al., 1991). Therefore, the P and the vP criteria are fulfilled

In one study conducted with fish (Pimephales promelas) a BCF value > 5000 was measured (de Maagd, 1996). This means that the B and the vB criteria are fulfilled, too.

6.2 Summary and overall conclusion on the PBT, vPvB or equivalent level of concern properties

In accordance with the guidance available for assessment of multi-constituent and UVCB substances, the PBT assessment for anthracene oil, anthracene paste, anthracene fraction focuses on the assessment of its PAH-constituents present in concentrations ≥ 0.1% w/w[7] such as anthracene (presence 50-70%) and phenanthrene (25-45%).

An overview on the conclusions drawn on persistence, potential for bioaccumulation and toxicity to human health and/or the environment based on comparison of the data presented for two indicator PAH-constituents of anthracene oil, anthracene paste, anthracene fraction with the PBT/vPvB criteria of Annex XIII of the REACH Regulation is provided in Table 10.

Table 10: Overview on conclusions on fulfilment of the (v)P-, (v)B- or T-criteria of Annex XIII of the REACH Regulation for the two indicator PAH-constituents of anthracene oil

Substance	Persistence	Bioaccu-mulation	Toxicity Human health	Toxicity Aquatic Environment	Conclusion
Anthracene	vP	B	-	T	PBT
Phenanthrene	vP	vB	-	-	vPvB

Based on the data available, it is concluded that

- phenanthrene fulfils the vPvB criteria, but not the PBT criteria,
- anthracene fulfils the PBT criteria, but not the vPvB criteria.

In summary, anthracene oil, anthracene paste, anthracene fraction needs to be considered as a substance with both vPvB and PBT properties because of the above conclusions on the vPvB and

[7] Chapter R.11 (PBT assessment) of the guidance on information requirements and chemical safety assessment (ECHA)

PBT properties of its constituents anthracene and phenanthrene. It is concluded that anthracene oil, anthracene paste, anthracene fraction is a substance containing at least 75% of PAH constituents with vPvB or PBT properties.

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