REACH

N,N,N',N'-tetramethylhexamethylenediamine

EC number: 203-842-9 | CAS number: 111-18-2

Environmental fate & pathways

Bioaccumulation: aquatic / sediment

001 Weight of evidence | (Q)SAR

Administrative data

Endpoint:	bioaccumulation in aquatic species: fish
Type of information:	(Q)SAR
Adequacy of study:	weight of evidence
Reliability:	2 (reliable with restrictions)
Rationale for reliability incl. deficiencies:	results derived from a valid (Q)SAR model and falling into its applicability domain, with adequate and reliable documentation / justification
Remarks:	Based on the mean absolute errors of the models the confidence in the predicted results is high.
Justification for type of information:	1. SOFTWARE T.E.S.T. (version 4.2.1) (Toxicity Estimation Software Tool). US EPA, 2012. 2. MODEL (incl. version number) T.E.S.T. (version 4.2.1); BCF model 3. SMILES OR OTHER IDENTIFIERS USED AS INPUT FOR THE MODEL See section 'Test Material'. 4. SCIENTIFIC VALIDITY OF THE (Q)SAR MODEL See attached QMRF. 5. APPLICABILITY DOMAIN See attached QPRF. 6. ADEQUACY OF THE RESULT - The model is scientifically valid (see attached QMRF). - The model estimates the bioconcentration factor (BCF) as required information point under Regulation (EC) No 1907/2006 [REACH], Annex IX, 9.3.2 Bioaccumulation in aquatic species, preferably fish (see also attached QPRF). - See attached QPRF for reliability assessment.

Data source

Reference

Reference 1

Reference Type:	other: BCF calculation
Title:	Unnamed

Year:	2016
Report date:	2016

Reference 2

Reference Type:	other: Estimation software
Title:	T.E.S.T. (Toxicity Estimation Software Tool), v4.2.1
Author:	US EPA
Year:	2016
Bibliographic source:	United States Environmental Protection Agency, Washington, DC, USA

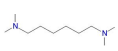
Materials and methods

Principles of method if other than guideline:	T.E.S.T. is a toxicity estimation software tool. The program requires only the molecular structure of the test item, all other molecular descriptors which are required to estimate the toxicity are calculated within the tool itself. The molecular descriptors describe physical characteristics of the molecule (e.g. E-state values and E-state counts, constitutional descriptors, topological descriptors, walk and path counts, connectivity, information content, 2d autocorrelation, Burden eigenvalue, molecular property (such as the octanol-water partition coefficient), Kappa, hydrogen bond acceptor/donor counts, molecular distance edge, and molecular fragment counts). Each of the available methods uses a different set of these descriptors to estimate the toxicity. The bioaccumulation factor (BCF) was estimated using several available methods: hierarchical clustering method; FDA method, single model method; group contribution method; nearest neighbor method; consensus method. The methods were validated using statistical external validation using separate training and test data sets. The experimental data set was obtained from several different databases (Dimitrov et al., 2005; Arnot and Gobas, 2006; EURAS; Zhao, 2008). From the available data set salts, mixtures and ambiguous compounds were removed. The final data set contained 676 chemicals. References: - Dimitrov, S., N. Dimitrova, T. Parkerton, M. Combers, M. Bonnell, and O. Mekenyan. 2005. Base-line model for identifying the bioaccumulation potential of chemicals. SAR and QSAR in Environmental Research 16:531-554. - Arnot, J.A., and F.A.P.C. Gobas. 2006. A review of bioconcentration factor (BCF) and bioaccumulation factor (BAF) assessments for organic chemicals in aquatic organisms. Environ. Rev. 14:257-297. - EURAS. Establishing a bioconcentration factor (BCF) Gold Standard Database. EURAS [cited 5/20/09]. Available from http://www.euras.be/eng/project.asp?ProjectId=92. - Zhao, C.; Boriani, E.; Chana, A.; Roncaglioni, A.; Benfenati, E. 2008. A new hybrid system of QSAR models for predicting bioconcentration factors (BCF). Chemosphere 73:1701-1707.
GLP compliance:	no

Test material

Test material information

Constituent 1



Reference substance name:	N,N,N',N'-tetramethylhexamethylenediamine
EC Number:	203-842-9
EC Name:	N,N,N',N'-tetramethylhexamethylenediamine
Cas Number:	111-18-2
Molecular formula:	C10H24N2
IUPAC Name:	[6-(dimethylamino)hexyl]dimethylamine
Test material form:	liquid

Test organisms

Test organisms (species): other: fish

Test conditions

Details on estimation of bioconcentration:

BASIS FOR CALCULATION OF BCF
- Estimation software: US EPA T.E.S.T. v4.2.1

Applied estimation methods:
- Hierarchical clustering
- FDA
- Single model
- Group contribution
- Nearest neighbor
- Consensus

Results and discussion

Bioaccumulation factor

Type:	BCF
Value:	9.92 L/kg
Remarks on result:	other: method: consensus (average of reasonable results from all models); log BCF = 1.0; Based on the mean absolute error, the confidence in the predicted BCF values is high.

Any other information on results incl. tables

Model details:

Method	Predicted value		Model statistics			MAE (in log10)			
						External test set		Training set	
	log BCF	BCF	r²	q²	No. of chemicals	Entire set	SC >= 0.5	Entire set	SC >= 0.5
Consensus method	1.00	9.92	-	-	-	0.51	0.38	0.42	0.42
Hierarchical clustering	1.12	13.09 (8.57-20.00)	0.748 - 0.981	0.669 - 0.970	12 - 540 (cluster models: 10)	0.54	0.91	0.23	0.14
Single model	1.16	14.59 (1.09-195.81)	0.764	0.733	540	0.54	0.48	0.53	0.53
Group contribution	1.33	21.40 (0.68-669.33)	0.719	0.527	499	0.62	0.56	0.60	0.83
FDA	-0.44	0.36 (0.05-2.39)	0.909	0.840	29	0.57	0.64	0.53	0.68
Nearest neighbor	1.81	65.3	-	-	3	0.60	0.51	0.55	0.38

Legend:

MAE = mean absolute error

SC = similarity coefficient

r² = correlation coefficient

q² = leave one out correlation coefficient

Applicant's summary and conclusion