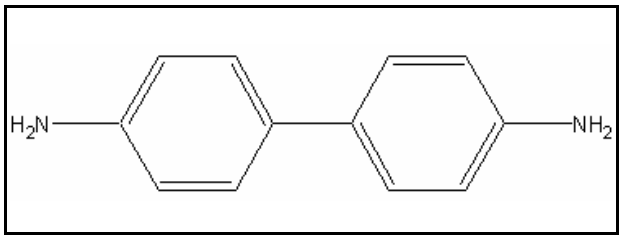
Indiana Department of Environmental Management
Office of Water - Water Quality Standards Section

TIER I HUMAN HEALTH CANCER CRITERIA

BENZIDINE

CAS RN:	92-87-5
Water Solubility:	
Log K_{ow}:	1.576 [P]
Risk Associated Dose:	4.348 x 10^{-8} mg/kg/day
Carcinogenicity Weight-of-Evidence Classification:	Class C; Possible human Carcinogen



Standard

The human health cancer criterion for benzidine in drinking water sources is 1.5 x 10^{-3} µg/L.
The human health cancer criterion for nondrinking water sources is 7.5 x 10^{-2} µg/L.

Calculations

Bioaccumulation Factor

BAF predicted based on Log K_{ow} (from Stephan 1993)
Log K_{ow} = 1.576 (CLOGP program), K_{ow} = 37.6703
Trophic level trophic level 3 FCM = 1.0; 4 FCM = 1.0

$f_{fd} = 1/(1+(0.00000024\ kg/L)(K_{ow})) = 1.0$

Baseline BAF_{T3} = (FCM)(K_{ow}) = (1.0)(37.6703) = 37.6703

Baseline BAF_{T4} = (1.0)(37.6703) = 37.6703

Human health BAF_{T3} = [(37.6703)(0.0182)+1](1.0) = 1.686

Human health BAF_{T4} = [(37.6703)(0.0310)+1](1.0) = 2.168

Risk Associated Dose:

From the IRIS database:

$RAD = 0.00001/q1^{*} = 0.00001/ 230$
$= 4.348 \times 10^{-8}$

Where:

RAD = Risk Associated Dose (mg/kg/day)
$q1^{*}$ = Cancer Slope Factor

Calculation of Criteria:

Non Drinking Water HCC = $[(4.348 \times 10^{-8})(70)]/0.01+[(0.0036)(1.686)+(0.0114)(2.168)]$

$= \mathbf{7.5 \times 10^{-2}\ \mu g/L}$

Drinking Water HCC = $[(4.348 \times 10^{-8})(70)]/2+[(0.0036)(1.686)+(0.0114)(2.168)]$

$= \mathbf{1.5 \times 10^{-3}\ \mu g/L}$

References

1. Stephen, C.E. 1993. Derviation of Proposed Human Health and Wildlife Bioaccumulation Factors for the Great Lakes Initiative. Environmental Research Laboratory, Office of Research and Development, U.S. EPA, Duluth, MN.

2. USEPA 1993. Integrated Risk Information System (IRIS database) chemical file for benzidine (CAS# 92-87-5).

3. Leo,A. and D.Weininger 1997. Daylight Software CLogP Version 3.15+ for Unix Pomona Medical Chemistry Project, Pomona College, Claremont, CA. Distributed by Daylight Chemical Information Systems, Inc., 3952 Claremont St., Irving, CA 92714 (Reference for the Log K_{ow})

Acronyms

ADE	Acceptable Daily Exposure
BAF	Bioaccumulation Factor
CAS RN	Chemical Abstract Service Registry Number
FCM	Food Chain Multiplier
IRIS	Integrated Risk Information System
K_{ow}	Octanol-Water Partition Coefficient
LOAEL	Lowest observed adverse effect level
NOAEL	No observed adverse effect level
P (superscript)	Predicted value
UF	Uncertainty factor

Revision History

September 17, 1997 - Criteria first developed
March 24, 2000 – Criteria rechecked (no modifications). Fact sheet updated.

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