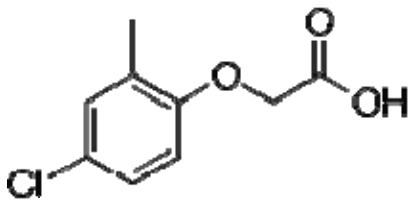
MCPA

Hazards	
	
IUPAC name	(4-Chloro-2-methylphenoxy)acetic acid
Other names	4-Chloro-*o*-tolyloxyacetic acid MCPA
Identifiers	
CAS number	[94-74-6]
SMILES	`Cl-C1=CC=C(OCC(=O)O)C(C)=C1`
Properties	
Molecular formula	$C_9H_9ClO_3$
Molar mass	200.62 g/mol
Appearance	white to light brown solid
Density	1.18-1.21 g/cm^3
Melting point	114-118 °C (387-391 K)
Solubility in water	Virtually insoluble, amine salt: 866 g/L

	ester: 5 mg/L
Hazards	
MSDS	External MSDS
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	

MCPA or **2-methyl-4-chlorophenoxyacetic acid** is a powerful, selective, widely-used phenoxy herbicide. The pure compound is a brown-colored powder.

History

Synthesis of MCPA was first reported by Synerholme and Zimmerman in 1945 and by Templeman and Foster in 1946.[1] Templeman and Foster were searching for a compounds with similar or greater selective activity than 1-naphthaleneacetic acid in inhibiting the growth of weeds while not adversely affecting the growth of cereal grains. They synthesized MCPA from the corresponding phenol by exposing it to chloroacetic acid and dilute base in a straightforward substitution reaction:[2]

$$\text{2-methyl-4-chlorophenol} + \text{ClCH}_2\text{CO}_2\text{H} + \text{base} \rightarrow \text{MCPA} + \text{base}\cdot\text{HCl}$$

Chemical use

Because it is inexpensive, MCPA is used in various chemical applications. Its carboxylic acid group allows the formation of conjugated complexes with metals (see below). The acid functionality makes MCPA a versatile synthetic intermediate for more complex derivatives.[3]

Commercial use

MCPA is used as an herbicide, generally as its salt or esterified forms. Used thus, it controls broadleaf weeds, including thistle and dock, in cereal crops and pasture. It is selective for plants with broad leaves, and this includes most deciduous trees. Clovers are tolerant at moderate application levels. It is currently classified as a restricted use pesticide. Its toxicity and biodegradation are topics of current research. One formulation is described by its manufacturer as "designed for specific markets that require the safest possible phenoxy product, primarily for use in the Pacific Northwest".[4] Though not extremely toxic,[5] it has recently been determined that MCPA can form complexes with metal ions and thereby increase their bioavailability,[6] though there is also work being done to utilize this ability.[7]

Brand names

The following commercial products contain MCPA.[5]

- Agritox
- Agroxone
- Chiptox
- Chwastox
- Cornox
- Methoxone
- Rhonox
- Tigrex
- Verdone Extra (UK)
- Weed-Rhap
- Weed'n'Feed[8]
- Weed-B-Gone
- Zero Bindii & Clover Weeder (Aus)

References

1. S. Budaver, ed. (1989). *The Merck Index (11th ed.)*. Merck & Co, Inc..
2. W.G. Templeman, W.A. Sexton (1946). "The Differential Effect of Synthetic Plant Growth Substances upon Plant Species. I. Seed Germination and Early Growth Responses to α-Naphthylacetic Acid and Compounds of General Formula arylOCHCOO". *Proceedings of the Royal Society of London* **133** (872): 300–313.
3. A. R. Prasad, T. Ramalingam, A. B. Rao, P. V. Diwan and P. B. Sattur (1989). "Synthesis and biological evaluation of 3-aryloxyalkyl-6-aryl-7H-s-triazolo3,4-b [1,3,4]thiadiazines*". *European Journal of Medicinal Chemistry* **25** (2): 199–201. doi:10.1016/0223-5234(89)90116-5.
4. "Chiptox". Nufarm. http://www.nufarm.com/USAg/Chiptoxr.
5. [a] [b] Extoxnet listing of MCPA
6. J. Kobylecka, B. Ptaszynski, R. Rogaczewski, A. Turek (2003). "Phenoxyalkanoic acid complexes. Part I. Complexes of lead(II), cadmium(II) and copper(II) with 4-chloro-2-methylphenoxyacetic acid (MCPA)". *Thermochimica Acta* **407** (1-2): 25–31. doi:10.1016/S0040-6031(03)00287-9.
7. R. Kruszynski, T.J. Bartczak, B. Ptaszynski and A. Turek (2002). "A Novel Lead- bis (4-Chloro-2-Methylphenoxy)- Acetate Polymeric Complex". *Journal of Coordination Chemistry* **55** (9): 1079–1089. doi:10.1080/0095897021000010035.
8. Yates Weed'n'Feed information page

v · d · e

Pest control:Herbicides

Anilides/Anilines	acetochlor · alachlor · asulam · butachlor · diethatyl · diflufenican · dimethenamid · flamprop · metazachlor · metolachlor · pendimethalin · pretilachlor · propachlor · propanil · trifluralin
Aromatic acids	aminopyralid · chloramben · clopyralid · dicamba · picloram ·

	pyrithiobac · quinclorac · quinmerac
Arsenicals	cacodylic acid · copper arsenate · DSMA · MSMA
Organophosphorus	bensulide · bilanafos · ethephon · fosamine · glufosinate · glyphosate · piperophos
Phenoxy	2,4-D · 2,4-DB · dichlorprop · fenoprop · **MCPA** · MCPB · 2,4,5-T
Pyridines	dithiopyr · fluroxypyr · imazapyr · thiazopyr · triclopyr
Quaternary	diquat · MPP · paraquat
Triazines	ametryn · atrazine · cyanazine · hexazinone · prometon · prometryn · propazine · simazine · simetryn · terbuthylazine · terbutryn
Ureas	chlortoluron · DCMU · metsulfuron-methyl
Others	3-AT · bromoxynil · clomazone · DCBN · dinoseb · juglone · methazole · metham sodium · sulfentrazone

Categories: Organochlorides | Carboxylic acids | Aromatic compounds | Herbicides