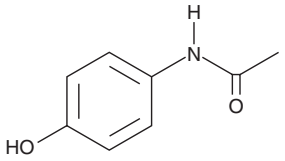
PRODUCT INFORMATION

Acetaminophen

Item No. 10024

CAS Registry No.: 103-90-2
Formal Name: N-(4-hydroxyphenyl)-acetamide
Synonyms: 4-Acetamidophenol, APAP, 4'-Hydroxyacetanilide, NSC 3991, NSC 109028, Paracetamol
MF: $C_8H_9NO_2$
FW: 151.2
Purity: ≥98%
UV/Vis.: λ_{max}: 249 nm
Supplied as: A crystalline solid
Storage: -20°C
Stability: ≥4 years



Information represents the product specifications. Batch specific analytical results are provided on each certificate of analysis.

Laboratory Procedures

Acetaminophen is supplied as a crystalline solid. A stock solution may be made by dissolving the acetaminophen in the solvent of choice, which should be purged with an inert gas. Acetaminophen is soluble in organic solvents such as ethanol, DMSO, and dimethyl formamide (DMF). The solubility of acetaminophen in ethanol and DMF is approximately 25 mg/ml and approximately 20 mg/ml in DMSO.

Further dilutions of the stock solution into aqueous buffers or isotonic saline should be made prior to performing biological experiments. Ensure that the residual amount of organic solvent is insignificant, since organic solvents may have physiological effects at low concentrations. Organic solvent-free aqueous solutions of acetaminophen can be prepared by directly dissolving the crystalline solid in aqueous buffers. The solubility of acetaminophen in PBS (pH 7.2) is approximately 2 mg/ml. We do not recommend storing the aqueous solution for more than one day.

Description

Acetaminophen is an analgesic and antipyretic compound.[1,2] Unlike many NSAIDs, which inhibit both COX-1 and COX-2, early studies suggested that acetaminophen is a poor inhibitor of both isoforms.[3,4] However, it does inhibit COX-2 by 83% and COX-1 by 56% in human blood *ex vivo*, albeit at a high 1,000 mg dose, with IC_{50} values of 25.8 and 113.7 µM, respectively.[5] Acetaminophen is enzymatically and non-enzymatically converted to several reactive metabolites that contribute to adverse or indirect effects, including liver injury.[6-8] At toxic doses, the acetaminophen metabolite N-acetyl-4-benzoquinone imine (NAPQI; Item No. 16115) depletes glutathione reserves in the liver, leading to an accumulation of NAPQI and subsequent hepatocyte necrosis.[9] Acetaminophen decreases glutathione levels and reduces glutathione peroxidase activity in mice when administered at a dose of 250 mg/kg and induces ferroptotic cell death in primary mouse hepatocytes, an effect that can be blocked by the ferroptosis inhibitor ferrostatin-1 (Item No. 17729).[10,11] Acetaminophen has analgesic and antipyretic properties in animal models.[1,2]

References

1. Vinegar, R., Truax, J.F., and Selph, J.L. Quantitative comparison of the analgesic and anti-inflammatory activities of aspirin, phenacetin and acetaminophen in rodents. *Eur. J. Pharmacol.* **37(1)**, 23-30 (1976).
2. Kobayashi, S. and Takagi, H. Fever responses to bacterial pyrogens in guinea pigs and application for screening of antipyretic agents. *Jpn. J. Pharmacol.* **18(1)**, 80-85 (1968).

CAYMAN CHEMICAL
1180 EAST ELLSWORTH RD
ANN ARBOR, MI 48108 · USA
PHONE: [800] 364-9897
[734] 971-3335
FAX: [734] 971-3640
CUSTSERV@CAYMANCHEM.COM
WWW.CAYMANCHEM.COM

PRODUCT INFORMATION

3. Mitchell, J.A., Akarasereenont, P., Thiemermann, C., *et al.* Selectivity of nonsteroidal antiinflammatory drugs as inhibitors of constitutive and inducible cyclooxygenase. *Proc. Natl. Acad. Sci. USA* **90(24)**, 11693-11697 (1993).
4. Warner, T.D., Giuliano, F., Vojnovic, I., *et al*. Nonsteroid drug selectivities for cyclo-oxygenase-1 rather than cyclo-oxygenase-2 are associated with human gastrointestinal toxicity: A full *in vitro* analysis. *Proc. Natl. Acad. Sci. USA* **96(13)**, 7563-7568 (1999).
5. Hinz, B., Cheremina, O., and Brune, K. Acetaminophen (paracetamol) is a selective cyclooxygenase-2-inhibitor in man. *FASEB J.* **22(2)**, 383-390 (2007).
6. Hinson, J.A. Reactive metabolites of phenacetin and acetaminophen: A review. *Environ. Health Perspect.* **49**, 71-79 (1983).
7. Högestätt, E.D., Jönsson, B.A.G., Ermund, A., *et al.* Conversion of acetaminophen to the biactive N-acylphenolamine AM404 *via* fatty acid amide hydrolase-dependent arachidonic acid conjugation in the nervous system. *J. Biol. Chem.* **280(36)**, 31405-31412 (2005).
8. Han, D., Dara, L., Win, S., *et al.* Regulation of drug-induced liver injury by signal transduction pathways: Critical role of mitochondria. *Trends Pharamacol. Sci.* **34(4)**, 243-253 (2013).
9. Qiu, Y., Benet, L.Z., and Burlingame, A.L. Identification of the hepatic protein targets of reactive metabolites of acetaminophen *in vivo* in mice using two-dimensional gel electrophoresis and mass spectrometry. *J. Biol. Chem.* **273(28)**, 17940-17953 (1998).
10. Tirmenstein, M.A. and Nelson, S.D. Acetaminophen-induced oxidation of protein thiols. Contribution of impaired thiol-metabolizing enzymes and the breakdown of adenine nucleotides. *J. Biol. Chem.* **265(6)**, 3059-3065 (1990).
11. Lőrincz, T., Jemnitz, K., Kardon, T., *et al.* Ferroptosis is involved in acetaminophen induced cell death. *Pathol. Oncol. Res.* **21(4)**, 1115-1121 (2015).

CAYMAN CHEMICAL
1180 EAST ELLSWORTH RD
ANN ARBOR, MI 48108 · USA
PHONE: [800] 364-9897
[734] 971-3335
FAX: [734] 971-3640
CUSTSERV@CAYMANCHEM.COM
WWW.CAYMANCHEM.COM