

Store at  
-20°C

#12520

## Vorinostat (SAHA)

5 mg

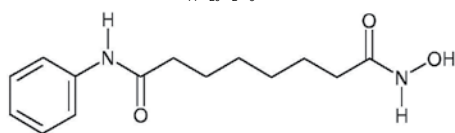
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rev. 07/11/14

For Research Use Only. Not For Use In Diagnostic Procedures.

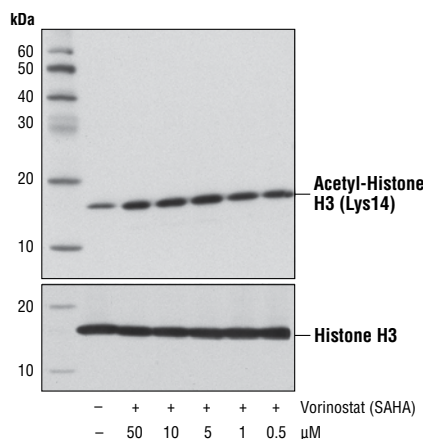
**Background:** Vorinostat (SAHA) is a histone deacetylase (HDAC) inhibitor that acts by binding to and blocking the active site of the enzyme (1). Both class I and class II HDACs are inhibited by vorinostat at nanomolar concentrations (1-3). Research studies have shown that vorinostat causes the accumulation of acetylated histones, certain transcription factors, and other nonhistone proteins, which regulate gene expression and protein function. This leads to cell cycle arrest, differentiation, and/or apoptosis in many transformed cell types treated with micromolar concentrations of vorinostat (1,4-7).

**Molecular Formula:** C<sub>14</sub>H<sub>20</sub>N<sub>2</sub>O<sub>3</sub>**Molecular Weight:** 264.32 g/mol

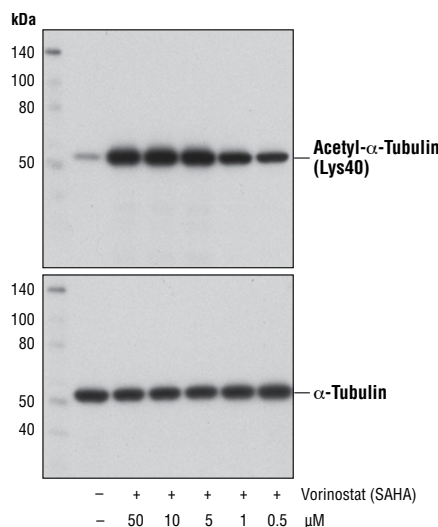
**Solubility:** Soluble in DMSO at 66 mg/ml; soluble in ethanol at 2 mg/ml with slight warming; very poorly soluble in water with maximum solubility ~20-50 µM.

**Purity:** >99%

**Directions for Use:** Vorinostat is supplied as a lyophilized powder. For a 20 mM stock, reconstitute the 5 mg in 945.8 µl DMSO. Working concentrations and length of treatment can vary depending on the desired effect, but it is typically used at 1-10 µM for 2-24 hr.



Western blot analysis of extracts from HeLa cells, untreated (-) or treated with Vorinostat (SAHA) (18 hr; +) at the indicated concentrations, using Acetyl-Histone H3 (Lys14) Antibody #4318 (upper) or Histone H3 (D1H2) XP® Rabbit mAb #4499 (lower).



Western blot analysis of extracts from HeLa cells, untreated (-) or treated with Vorinostat (SAHA) (18 hr; +) at the indicated concentrations, using Acetyl-α-Tubulin (Lys40) (D20G3) XP® Rabbit mAb #5335 (upper) or α-Tubulin (11H10) Rabbit mAb #2125 (lower).

**Storage:** Store lyophilized or in solution at -20°C, desiccated. In lyophilized form, the chemical is stable for 24 months. Once in solution, use within 3 months to prevent loss of potency. Aliquot to avoid multiple freeze/thaw cycles.

**Background References:**

- (1) Marks, P.A. and Breslow, R. (2007) *Nat Biotechnol* 25, 84-90.
- (2) Richon, V.M. et al. (1998) *Proc Natl Acad Sci USA* 95, 3003-7.
- (3) Moradei, O. et al. (2005) *Curr Med Chem Anticancer Agents* 5, 529-60.
- (4) Kim, M.J. et al. (2012) *Anticancer Res* 32, 3161-8.
- (5) Richon, V.M. et al. (2000) *Proc Natl Acad Sci USA* 97, 10014-9.
- (6) Butler, L.M. et al. (2000) *Cancer Res* 60, 5165-70.
- (7) Lee, J.H. et al. (2010) *Proc Natl Acad Sci USA* 107, 14639-44.

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SAFETY DATA SHEET (SDS): According to the OSHA Hazard Communication Standard 29 CFR 1910.1200  
Issuing Date: 2014-03-14 Revision Date: 2014-03-14 Version: 1

## SECTION 1. Identification

### Product identifier

Product No. 12520  
Product name Vorinostat (SAHA)  
UN number UN3077  
Other means of identification 125205

### Recommended use of the chemical and restrictions on use

Identified uses This product is intended for research purposes only.  
Uses advised against This product is not intended for use in diagnostic procedures or therapeutics.  
This product is not intended for use in humans or animals.

### Manufacturer, importer, supplier

Manufacturer address Cell Signaling Technology, Inc.  
3 Trask Lane  
Danvers, MA 01923  
TEL: +1 978 867 2300  
FAX: +1 978 867 2400  
www.cellsignal.com

Website support@cellsignal.com  
Email address 978-867-2300  
Company phone number  
Emergency telephone number In case of emergency call CHEMTREC 1-800-424-9300

## SECTION 2. Hazard(s) identification

### Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Germ cell mutagenicity	Category 2
Reproductive toxicity	Category 1B

### GHS Label elements, including precautionary statements



Signal Word  
Danger

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**Suitable Extinguishing Media** Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Unsuitable Extinguishing Media** CAUTION: Use of water spray when fighting fire may be inefficient.

### Specific hazards arising from the chemical

No information available.

### Explosion Data

Sensitivity to Mechanical Impact None.  
Sensitivity to Static Discharge None.

### Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

## SECTION 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Ensure adequate ventilation.  
Other information No information available.

### Environmental precautions

Do not flush into surface water or sanitary sewer system.

### Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.  
Methods for cleaning up Use personal protective equipment. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. Take up mechanically and collect in suitable container for disposal. Avoid dust formation. Clean contaminated surface thoroughly.

## SECTION 7. Handling and storage

### Precautions for safe handling

Handle in accordance with good industrial hygiene and safety practice.

### Conditions for safe storage, including any incompatibilities

Technical measures/Storage Keep containers tightly closed in a dry, cool and well-ventilated place.  
conditions  
Packaging material No information available.  
Incompatible products None known based on information supplied.

## SECTION 8. Exposure controls/personal protection

### Control parameters

This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

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### Hazard statement(s)

Suspected of causing genetic defects  
May damage fertility or the unborn child

### Precautionary Statement(s)

Obtain special instructions before use  
Use personal protective equipment as required  
IF exposed or concerned: Get medical advice/attention.  
Dispose of contents/container to an approved waste disposal plant

### Supplementary Hazard Information

Hazards not otherwise classified (HNOC) Very toxic to aquatic life.  
Unknown Acute Toxicity 100% of the mixture consists of ingredient(s) of unknown acute toxicity.

## SECTION 3. Composition/information on ingredients

Formula  $C_{11}H_{15}N_3O_5$   
Molecular Weight 264.32  
Chemical nature Monoconstituent substance  
Synonyms Vorinostat; N-Hydroxy-N'-phenyloctanediamide; Suberanilohydroxamic acid; Octanediamide, N-hydroxy-N'-phenyl-; Zolinza

Chemical Name	CAS No.	Weight %
N-hydroxy-N'-phenyloctanediamide	149647-78-9	60-100

## SECTION 4. First-aid measures

**Eye contact** Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.  
**Skin contact** Wash skin with soap and water.  
**Inhalation** Move to fresh air.  
**Ingestion** Clean mouth with water and afterwards drink plenty of water.

### Most important symptoms and effects, both acute and delayed

Diarrhea, nausea, anorexia, weight decrease, vomiting, constipation, fatigue, chills, thrombocytopenia, anemia, dysgeusia and dry mouth.

### Indication of any immediate medical attention and special treatment needed

**Notes to physician** Treat symptomatically. Remove unabsorbed material from the gastrointestinal tract, employ clinical monitoring, and institute supportive therapy, if required. It is not known if vorinostat is dialyzable.

### Advice for emergency responders

**General advice** For further assistance, contact your local Poison Control Center.  
**Protection of First-aiders** Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

## SECTION 5. Fire-fighting measures

### Extinguishing media

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### Appropriate engineering controls

Showers, eyewash stations, and ventilation systems.

### Individual protection measures, such as personal protective equipment

Personal protective equipment (PPE) needs to be selected depending on the implemented engineering controls, frequency/duration of work activities and the concentrations of the hazardous substance.

**Eye/face protection** Safety glasses with side-shields.  
**Skin and body protection** Wear protective gloves/clothing.  
**Respiratory protection** If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.  
**Hygiene measures** Handle in accordance with good industrial hygiene and safety practice.

## SECTION 9. Physical and chemical properties

### Information on basic physical and chemical properties

**Physical state** Solid  
**Appearance** Crystalline powder  
**Odor** No information available  
**Color** White to off-white  
**Odor Threshold** No information available  
**pH** 6.6 saturated water solution ( 9.2 pKa)  
**Melting point/freezing point** 151-163 °C  
**Initial boiling point and boiling range** No information available  
**Flash point** No information available  
**Evaporation rate** No information available  
**Flammability (solid, gas)** No information available  
**Upper flammability limit** No information available  
**Lower flammability limit** No information available  
**Vapor pressure** No information available  
**Vapor density** No information available  
**Relative density** No information available  
**Solubility** Practically insoluble  
**Solubility in other solvents** 66 mg/mL in Dimethyl sulfoxide (DMSO); soluble in Ethanol (EtOH) @ 2 mg/mL with slight warming.  
**Partition coefficient: n-octanol/water** No information available  
**Autoignition temperature** No information available  
**Decomposition temperature** No information available  
**Explosive properties** No information available  
**Oxidizing properties** No information available  
**Molecular Weight** 264.32  
**VOC content** No information available  
**Viscosity** No information available  
**Density** No information available

## SECTION 10. Stability and reactivity

### Reactivity

No information available.

### Chemical stability

Stable under recommended storage conditions.

**Possibility of hazardous reactions**

<b>Hazardous reactions</b>	None under normal processing.
<b>Hazardous polymerization</b>	None under normal processing.

**Conditions to Avoid**

No information available.

**Incompatible Materials**

None known based on information supplied.

**Hazardous Decomposition Products**

None known based on information supplied.

**SECTION 11. Toxicological information****Information on likely routes of exposure**

<b>Inhalation</b>	There is no data available for this product.
<b>Eye contact</b>	There is no data available for this product.
<b>Skin contact</b>	There is no data available for this product.
<b>Ingestion</b>	There is no data available for this product.

**Information on toxicological effects**

This material should only be handled by, or under the close supervision of, those properly qualified in the handling and use of potentially hazardous chemicals. It should be borne in mind that the toxicological and physiological properties of this compound is not well defined.

<b>Unknown Acute Toxicity</b>	100% of the mixture consists of ingredient(s) of unknown acute toxicity.
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**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

<b>Symptoms</b>	Diarrhea, nausea, anorexia, weight decrease, vomiting, constipation, fatigue, chills, thrombocytopenia, anemia, dysgeusia and dry mouth.
<b>Corrosivity</b>	No information available.
<b>Sensitization</b>	No information available.
<b>Mutagenic effects</b>	Mutagenic in vitro in the bacterial reverse mutation assays (AMES test). Caused chromosomal aberrations in vitro in Chinese hamster ovary (CHO) cells. Increased the incidence of micro-nucleated erythrocytes when administered to mice (Mouse Micronucleus Assay).
<b>Carcinogenicity</b>	No component of this product present at levels greater than or equal to 0.1% is identifiable as probable, possible or confirmed carcinogen by IARC, ACGIH, NTP, or OSHA.
<b>Reproductive toxicity</b>	This material is classified as a Pregnancy Category D. Positive evidence of risk.
<b>STOT - single exposure</b>	No information available.
<b>STOT - repeated exposure</b>	No information available.
<b>Neurological effects</b>	No information available.
<b>Aspiration Hazard</b>	No information available.

**SECTION 12. Ecological information****Ecotoxicity****SECTION 15. Regulatory information****North American Inventory Listing**

Component	TSCA	DSL	NDSL
N-hydroxy-N'-phenyloctanediamide 149847-78-9 ( 60-100 )	Not Listed	Not Listed	Not Listed

**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

**SARA 311/312 Hazard Categories**

<b>Acute Health Hazard</b>	No
<b>Chronic Health Hazard</b>	Yes
<b>Fire Hazard</b>	No
<b>Sudden Release of Pressure Hazard</b>	No
<b>Reactive Hazard</b>	No

**Clean Water Act**

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

**CERCLA**

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

This product does not contain any substances regulated under applicable state right-to-know regulations

**U.S. EPA Label Information**

This product does not contain any substances regulated as pesticides.

**SECTION 16. Other information**

**Issuing Date:** 2014-03-14  
**Revision Date:** 2014-03-14  
**Disclaimer**

Chemical Name	Toxicity to algae	Toxicity to fish	Toxicity to daphnia and other aquatic invertebrates
N-hydroxy-N'-phenyloctanediamide	EC50 0.080 mg/l (Selenastrum capricornutum) 96 h	LC50 10 mg/l (Sheepshead minnow) 96 h	LC50 7.4 mg/l (Mysidopsis juniae) 96 h

<b>Persistence and degradability</b>	No information available.
<b>Bioaccumulation</b>	No information available.
<b>Mobility</b>	No information available.

**Other adverse effects**

No information available.

**SECTION 13. Disposal considerations****Waste Disposal Methods**

Dispose of in accordance with all applicable national environmental laws and regulations.

**Disposal considerations**

Do not empty into drains; dispose of this material and its container in a safe way.

**SECTION 14. Transport information****DOT**

<b>UN number</b>	UN3077
<b>UN proper shipping name</b>	Environmentally hazardous substance, solid, n.o.s. (N-hydroxy-N'-phenyloctanediamide)
<b>Transport hazard class(es)</b>	9
<b>Packing Group</b>	III
<b>Special precautions for user</b>	146, 335, A112, B54, B120, IB8, IP3, N20, T1, TP33
<b>Emergency Response Guide Number</b>	171

**IATA**

<b>UN number</b>	UN3077
<b>UN proper shipping name</b>	Environmentally hazardous substance, solid, n.o.s. (N-hydroxy-N'-phenyloctanediamide)
<b>Transport hazard class(es)</b>	9
<b>Packing Group</b>	III
<b>Special precautions for user</b>	A158, A179, A97

**IMDG/IMO**

<b>UN number</b>	UN3077
<b>UN proper shipping name</b>	Environmentally hazardous substance, solid, n.o.s. (N-hydroxy-N'-phenyloctanediamide)
<b>Transport hazard class(es)</b>	9
<b>Packing group</b>	III
<b>EmS No.</b>	F-A, S-F
<b>Special precautions for user</b>	274, 335, 966, 967

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet