

**SAFETY DATA SHEET (SDS):** According to the OSHA Hazard Communication Standard 29 CFR 1910.1200  
Issuing Date: 2014-05-20 Revision Date: 2015-01-22

Version: 2

## SECTION 1. Identification

### Product identifier

**Product number** 2204  
**Product name** Bortezomib  
**UN number** UN2811  
**Other means of identification** 2204S

### 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  
United States  
TEL: +1 978 867 2300  
FAX: +1 978 867 2400

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

## SECTION 2. Hazard(s) identification

### Classification

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

<b>Acute oral toxicity</b>	Category 1
<b>Skin corrosion/irritation</b>	Category 2
<b>Serious eye damage/eye irritation</b>	Category 1
<b>Reproductive toxicity</b>	Category 2
<b>Specific target organ toxicity - repeated exposure (STOT RE)</b>	Category 1

### GHS Label elements, including precautionary statements



**Signal Word**  
Danger

**Hazard statement(s)**

Fatal if swallowed  
 Causes skin irritation  
 Causes serious eye damage  
 Suspected of damaging fertility or the unborn child  
 Causes damage to organs through prolonged or repeated exposure

**Precautionary Statement(s)**

Obtain special instructions before use  
 Do not handle until all safety precautions have been read and understood  
 Use personal protective equipment as required  
 Wash face, hands and any exposed skin thoroughly after handling  
 Do not eat, drink or smoke when using this product  
 Do not breathe dust/fume/gas/mist/vapors/spray  
 IF exposed or concerned: Get medical advice/attention  
 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician  
 Rinse mouth  
 IF ON SKIN: Wash with plenty of soap and water  
 If skin irritation occurs: Get medical advice/attention  
 Take off contaminated clothing and wash before reuse  
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing  
 Immediately call a POISON CENTER or doctor/physician  
 Store locked up  
 Dispose of contents/container to an approved waste disposal plant

**Supplementary Hazard Information**

**Hazards not otherwise classified (HNOC)** None

### SECTION 3. Composition/information on ingredients

<b>Formula</b>	C <sub>19</sub> H <sub>25</sub> BN <sub>4</sub> O <sub>4</sub>
<b>Molecular Weight</b>	384.24 g/mol
<b>Chemical nature</b>	Monoconstituent substance
<b>Synonyms</b>	Bortezomib; Velcade®; PS-341; Boronic acid, (3-methyl-1-((1-oxo-3-phenyl-2-((pyrazinylcarbonyl)amino)propyl)amino)butyl)-, (S-(R*,S*))-

Chemical Name	CAS No	Weight %
[[[(1R)-3-methyl-1-[[[(2S)-3-phenyl-2-(pyrazine-2-carbonylamino)propanoyl]amino]butyl]boronic acid	179324-69-7	100

### SECTION 4. First-aid measures

<b>Eye contact</b>	Rinse thoroughly with plenty of water, also under the eyelids. Keep eye wide open while rinsing.
<b>Skin contact</b>	Immediate medical attention is required. Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Remove and wash contaminated clothing before re-use. Wash off immediately with plenty of water. Immediate medical attention is not required.
<b>Inhalation</b>	Immediate medical attention is required. Move to fresh air. If not breathing, give artificial respiration. Immediate medical attention is not required. IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
<b>Ingestion</b>	Do NOT induce vomiting. Immediate medical attention is required. Never give anything by mouth to an unconscious person. Drink plenty of water. Clean mouth with water. Do not induce vomiting without medical advice. Consult a physician.

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

Most commonly reported adverse reactions (incidence = 20%) in clinical studies include nausea, diarrhea, thrombocytopenia, neutropenia, peripheral neuropathy, fatigue, neuralgia, anemia, leukopenia, constipation, vomiting, lymphopenia, rash, pyrexia, and anorexia.

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

Treat symptomatically.

**Advice for emergency responders**

**General advice** Immediate medical attention is required. Show this safety data sheet to the doctor in attendance. If symptoms persist, call a physician.

**Protection of first-aiders** Use personal protective equipment. Avoid contact with skin, eyes and clothing.

**SECTION 5. Fire-fighting measures****Extinguishing media**

**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**

Wear self-contained breathing apparatus and protective suit. Wear self contained breathing apparatus for fire fighting if necessary.

**SECTION 6. Accidental release measures****Personal precautions, protective equipment and emergency procedures**

**For non-emergency personnel** Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

**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. Cover powder spill with plastic sheet or tarp to minimize spreading. Dike far ahead of liquid spill for later disposal.

**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. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal. After cleaning, flush away traces with water. Take precautionary measures against static discharges.

**SECTION 7. Handling and storage**

**Precautions for safe handling**

Avoid contact with skin, eyes and clothing. Wear personal protective equipment. Prevent the formation of vapors, mists and aerosols. Do not eat, drink or smoke when using this product. Use only in area provided with appropriate exhaust ventilation.

**Conditions for safe storage, including any incompatibilities**

<b>Technical measures/Storage conditions</b>	Keep away from direct sunlight.
<b>Packaging material</b>	No information available.
<b>Incompatible products</b>	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.

**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.

<b>Eye/face protection</b>	Tightly fitting safety goggles.
<b>Skin and body protection</b>	Wear protective gloves/clothing.
<b>Respiratory protection</b>	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.
<b>Hygiene measures</b>	When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Keep away from food, drink and animal feeding stuffs.

**SECTION 9. Physical and chemical properties****Information on basic physical and chemical properties**

<b>Physical state</b>	Solid
<b>Appearance</b>	Powder
<b>Odor</b>	No information available
<b>Color</b>	White to off-white
<b>Odor Threshold</b>	No information available
<b>pH</b>	2-6.5 @ 0.0033 - 0.0038 g/L in water
<b>Melting point/freezing point</b>	124-140 °C
<b>Initial boiling point and boiling range</b>	No information available
<b>Flash point</b>	No information available.
<b>Evaporation rate</b>	No information available
<b>Flammability (solid, gas)</b>	No information available
<b>Upper flammability limit</b>	No information available.
<b>Lower flammability limit</b>	No information available.
<b>Vapor pressure</b>	No information available
<b>Vapor density</b>	No information available

<b>Relative density</b>	No information available
<b>Solubility</b>	Partly soluble
<b>Solubility in other solvents</b>	No information available
<b>Partition coefficient: n-octanol/water</b>	2.0 estimated
<b>Autoignition temperature</b>	No information available
<b>Decomposition temperature</b>	No information available.
<b>Explosive properties</b>	No information available
<b>Oxidizing properties</b>	No information available
<b>Molecular Weight</b>	384.24 g/mol
<b>VOC content</b>	No information available
<b>Viscosity</b>	No information available.
<b>Density</b>	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>	May cause additional affects as listed under "Ingestion".
<b>Eye contact</b>	May cause irreversible damage to eyes.
<b>Skin contact</b>	Irritating to skin. May be harmful in contact with skin.
<b>Ingestion</b>	Very toxic if swallowed. Target Organ Effects. Reproductive Toxicity.

### 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.

### Delayed and immediate effects as well as chronic effects from short and long-term exposure

<b>Symptoms</b>	Most commonly reported adverse reactions (incidence = 20%) in clinical studies include nausea, diarrhea, thrombocytopenia, neutropenia, peripheral neuropathy, fatigue, neuralgia, anemia, leukopenia, constipation, vomiting, lymphopenia, rash, pyrexia, and anorexia.
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<b>Skin corrosion/irritation</b>	Causes skin irritation.
<b>Serious eye damage/eye irritation</b>	Risk of serious damage to eyes.
<b>Sensitization</b>	No information available.
<b>Mutagenic effects</b>	The weight of evidence demonstrates that this material is not genotoxic. Bortezomib showed clastogenic activity (structural chromosomal aberrations) in the in vitro chromosomal aberration assay using Chinese hamster ovary cells. Bortezomib was not genotoxic when tested in the in vitro mutagenicity assay (Ames test) and in vivo micronucleus assay in mice.
<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>	In a 6-month rat toxicity study, degenerative effects in the ovary were observed at doses = 0.3 mg/kg and degenerative changes in the testes occurred at 1.2 mg/kg. Pregnant rabbits given bortezomib during organogenesis at a dose of 0.05 mg/kg experienced significant post-implantation loss and decreased number of live fetuses. Live fetuses from these litters also showed significant decreases in fetal weight.
<b>STOT - single exposure</b>	No information available.
<b>STOT - repeated exposure</b>	In a repeat dose toxicity study in monkeys, myocardial hemorrhage, inflammation, and necrosis were observed. In animals, severe anemia and thrombocytopenia, and gastrointestinal, neurological and lymphoid system toxicities were observed during chronic dosing. Neurotoxic effects of bortezomib included axonal swelling and degeneration in peripheral nerves, dorsal spinal roots, and tracts of the spinal cord, multifocal hemorrhage and necrosis in the brain, eye, and heart.
<b>Chronic Toxicity</b>	Prolonged or repeated exposure increases the risk. Possible risks of irreversible effects. Avoid repeated exposure.
<b>Target Organ Effects</b>	Cardiovascular system, Gastrointestinal tract (GI), Hematopoietic System, Central nervous system (CNS), Peripheral Nervous System (PNS).
<b>Neurological effects</b>	No information available.
<b>Aspiration Hazard</b>	No information available.

## SECTION 12. Ecological information

### Ecotoxicity

Product does not present an aquatic toxicity hazard based on known or supplied information.

<b>Persistence and degradability</b>	No information available.
<b>Bioaccumulation</b>	Not likely to bioaccumulate.
<b>Mobility</b>	Is predicted to have low mobility in the environment

Chemical Name	Octanol-Water Partition Coefficient
[(1R)-3-methyl-1-[[[(2S)-3-phenyl-2-(pyrazine-2-carbonylamino)propanoyl]amino]butyl]boronic acid	2.0

### Other adverse effects

No information available.

## SECTION 13. Disposal considerations

### Waste Disposal Methods

Should not be released into the environment.

### 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>	UN2811
<b>UN proper shipping name</b>	Toxic solid, organic, n.o.s. (Bortezomib)
<b>Transport hazard class(es)</b>	6.1
<b>Packing group</b>	I
<b>Special provisions</b>	IB7, T6, TP33
<b>Emergency response guide number</b>	154


**IATA**

<b>UN number</b>	UN2811
<b>UN proper shipping name</b>	Toxic solid, organic, n.o.s. (Bortezomib)
<b>Transport hazard class(es)</b>	6.1
<b>Packing group</b>	I
<b>ERG code</b>	6L

**SECTION 15. Regulatory information****North American Inventory Listing**

Chemical Name	TSCA 8(b)	TSCA 12(b)	DSL	NDSL
[(1R)-3-methyl-1-[[[(2S)-3-phenyl-2-(pyrazine-2-carboxylamino)propanoyl]amino]butyl]boronic acid	Not Listed	Not Listed	Not Listed	Not Listed

**Canadian Workplace Hazardous Materials Information System (WHMIS) Classification**

	Class D1A - Very Toxic Materials at $\geq 1\%$ Class D2A - Very Toxic Material at $\geq 0.1\%$
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**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>	Yes
<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**

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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. FIFRA Label Information**

This product does not contain any substances regulated as pesticides.

**US Commerce Department - Export Administration Regulations Information**

This product does not contain any substances regulated under the Chemical Weapons Convention (CWC).

**U.S. Drug Enforcement Administration Information**

This product does not contain any substances regulated under the DEA.

<b>SECTION 16. Other information</b>
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**Issuing Date:** 2014-05-20

**Revision Date:** 2015-01-22

**Disclaimer**

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