

*Hawley's*  
**Condensed Chemical  
Dictionary**  
*Fifteenth Edition*

**Richard J. Lewis, Sr.**

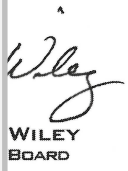


NS

ey first  
eration  
ping to  
midst  
ing the  
al, and  
e 20th  
d their  
there,  
ideas,

ourney,  
r needs  
he way  
wledge

you the



Copyright © 2007 by John Wiley & Sons, Inc., New York. All rights reserved.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.  
Published simultaneously in Canada.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4470, or on the web at [www.copyright.com](http://www.copyright.com).

Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 222 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at <http://www.wiley.com/go/permission>.

Limit of Liability/Disclaimer of Warranty. While the publisher and author have used their best efforts in preparing this book, they make no representations or warranties with respect to the accuracy or completeness of the contents of this book and specifically disclaim any implied warranties of merchantability of fitness for a particular purpose. No warranty may be created or extended by sales representatives or written sales materials. The advice and strategies contained herein may not be suitable for your situation. You should consult with a professional where appropriate. Neither the publisher nor author shall be liable for any loss or profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages.

For general information on our other products and services or for technical support, please contact our Customer Care Department within the United States at (800) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley also publishes its books in a variety of electronic formats. Some contents that appears in print may not be available in electronic formats. For more information about Wiley products, visit our web site at [www.wiley.com](http://www.wiley.com).

*Library of Congress Cataloging-in-Publication Data is available.*

Lewis, Richard J., Sr.  
Hawley's Condensed Chemical Dictionary, Fifteenth Edition  
ISBN 13: 978-0-471-76865-4  
ISBN 10: 0-471-76865-0

ore processing; analytical reagent; calorimetry; germicidal soaps.

**sodium persulfate.** (sodium peroxydisulfate).  
CAS: 7775-27-1.  $\text{Na}_2\text{S}_2\text{O}_8$ .

**Properties:** White, crystalline powder. Soluble in water; decomposed by alcohol; decomposes in moist air.

**Hazard:** By ingestion, strong irritant to tissue. TLV: 0.1 mg/m<sup>3</sup>.

**Use:** Bleaching agent (fats, oils, fabrics, soap), battery depolarizers, emulsion polymerization.

**sodium phenate.** (sodium phenolate; sodium carbolate).

CAS: 139-02-6.  $\text{C}_6\text{H}_5\text{ONa}$ .

**Properties:** White, deliquescent crystals. Soluble in water and alcohol; decomposed by carbon dioxide in the air.

**Derivation:** Phenol is dissolved in caustic soda solution, concentrated, and crystallized.

**Hazard:** Strong irritant to skin and tissue.

**Use:** Antiseptic, salicylic acid, organic synthesis.

**sodium phenobarbital.** (phenobarbital, solution).

See barbiturate.

**sodium phenolate.** Legal label name for sodium phenate.

**sodium phenolsulfonate.** (sodium sulfocarbolate).  $\text{HO}_2\text{C}_6\text{H}_4\text{SO}_3\text{Na}\cdot 2\text{H}_2\text{O}$ .

**Properties:** Colorless crystals or granules. Slightly efflorescent; chars at high temperature, evolving phenol. Soluble in water, hot alcohol, and glycerol.

**Use:** Medicine (intestinal antiseptic).

**sodium phenylacetate.** (sodium  $\alpha$ -toluate).  
 $\text{C}_6\text{H}_5\text{CH}_2\cdot\text{COONa}$ .

**Properties:** Soluble in water; insoluble in alcohol, ether, and ketones; 50% aqueous solution has pH 7.0–8.5 and is pale yellow. Solution tends to crystallize at 15C.

**Grade:** 50% solution, dry salt.

**Use:** Precursor in production of penicillin G, intermediate for producing heavy metal salts that act as fungicides.

**sodium-N-phenylglycinamide-p-arsenate.**

See tryparsamide.

**sodium-o-phenylphenate.** (sodium-o-phenylphenolate).  $\text{C}_6\text{H}_4(\text{C}_6\text{H}_5)\text{ONa}\cdot 4\text{H}_2\text{O}$ .

**Properties:** Practically white flakes. Bulk d 38–43 lb/cu ft. pH of saturated solution in water 12.0–13.5.

**sodium phenylphosphinate.**

$\text{C}_6\text{H}_5\text{PH}(\text{O})(\text{ONa})$ .

**Properties:** Crystals. Mp 355C (decomposes to give phenylphosphine), stable at room temperature. Soluble in water.

**Use:** Antioxidant, heat and light stabilizer.

**sodium phenyl sulfinate dihydrate.**

CAS: 25932-11-0. mf:  $\text{C}_6\text{H}_5\text{O}_2\text{S}\cdot\text{Na}\cdot 2\text{H}_2\text{O}$ .

**Hazard:** A mild eye irritant.

**sodium phosphate.** See "Nutrifos" [Solutia];

sodium metaphosphate; sodium phosphate, dibasic; sodium phosphate, monobasic; sodium phosphate (P-32); sodium phosphate, tribasic; sodium polyphosphate; sodium pyrophosphate; sodium pyrophosphate, acid; sodium tripolyphosphate.

**sodium phosphate, dibasic.** (DSP; disodium phosphate; sodium orthophosphate, secondary; disodium orthophosphate; disodium hydrogen phosphate).

CAS: 7558-79-4. (1)  $\text{Na}_2\text{HPO}_4$ . (2)  $\text{Na}_2\text{HPO}_4\cdot 2\text{H}_2\text{O}$ . (3)  $\text{Na}_2\text{HPO}_4\cdot 7\text{H}_2\text{O}$ . (4)  $\text{Na}_2\text{HPO}_4\cdot 12\text{H}_2\text{O}$ . The dihydrate (2) is also marketed as the duohydrate.

**Properties:** Colorless, translucent crystals or white powder; saline taste. (1) Hygroscopic; converted to sodium pyrophosphate at 240C; (2) mp loses water at 92.5C, d 2.066 (15C); (3) d 1.679, loses 5H<sub>2</sub>O at 48C; (4) mp 35C, d 1.5235, readily loses 5H<sub>2</sub>O on exposure to air at room temperature, loses 12H<sub>2</sub>O at 100C. Soluble in water; very soluble in alcohol; pH of 1% solution 8.0–8.8. Nonflammable.

**Derivation:** (1) By treating phosphoric acid with a slight excess of soda ash, boiling the solution to drive off carbon dioxide, and cooling to permit the dodecahydrate to crystallize; (2) by precipitating calcium carbonate from a solution of dicalcium phosphate with soda ash.

**Grade:** Commercial, NF (1) and (3), FCC (1) or (2).

**Use:** Chemicals, fertilizers, pharmaceuticals, textiles (weighting silk, dyeing and printing), fireproofing wood and paper; ceramic glazes, tanning, galvanoplastics, soldering enamels, analytical reagent, cheese, detergents, boiler-water treatment, dietary supplement, buffer, sequestrant in foods.

**sodium phosphate, monobasic.** (sodium acid phosphate; sodium biphosphate; sodium orthophosphate, primary; MSP; sodium dihydrogen phosphate).

CAS: 7558-80-7. (1)  $\text{NaH}_2\text{PO}_4$ . (2)  $\text{NaH}_2\text{PO}_4\cdot \text{H}_2\text{O}$ .

**Properties:** (1) White, crystalline powder. Slightly hygroscopic. Very soluble in water. Has acid reaction; forms sodium acid pyrophosphate at 225–250C and sodium metaphosphate at

an H<sub>2</sub>O.  
fp 482C,  
r and al-

um chlo-  
The un-  
l solution  
tion con-  
n contact  
ent.

odate).

16C), (2)  
(2) 175C

materials.

gent, oxi-

s or pow-  
soluble in

d in water  
olution is

solution.  
h organic

ide; man-  
oning by

ning yel-  
n dioxide  
20% by  
, bp 657  
evolution

300C in  
y air from  
oved.

in contact  
etals, and  
Keep dry.

ellaneous



## SODIUM PHOSPHATE (P-32)

1154

**Derivation:** By treating disodium phosphate with proper proportion of phosphoric acid.

**Grade:** Commercial, food, (2) NF, (1) FCC.

**Use:** Boiler-water treatment, electroplating, dyeing, acid cleansers, baking powders, cattle feed supplement, buffer, emulsifier, nutrient supplement in food, lab reagent, acidulant.

**sodium phosphate (P-32).** (sodium radio-phosphate). A radioactive form of sodium phosphate (which phosphate is not specified) containing phosphorus-32 which can be used as a tracer. See phosphorus-32.

**Grade:** USP, as solution.

**Use:** Biochemical research, medicine (diagnostic aid, antineoplastic).

**sodium phosphate, tribasic.** (TSP; trisodium orthophosphate; trisodium phosphate; tertiary sodium phosphate; sodium orthophosphate, tertiary).

CAS: 7601-54-9.  $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ .

**Properties:** Colorless crystals. D 1.62 (20C), mp 75C (decomposes), loses  $12\text{H}_2\text{O}$  at 100C, pH of 1% solution is 11.8–12.0. Soluble in water. Nonflammable.

**Derivation:** By mixing soda ash and phosphoric acid in proper proportions to form disodium phosphate and then adding caustic soda.

**Grade:** Commercial, high purity, CP, FCC (anhydrous), anhydrous salt also available.

**Hazard:** Toxic by ingestion, irritant to tissue.

**Use:** Water softeners, boiler-water compounds, detergent, metal cleaner, textiles, manufacture of paper, laundering, tanning, sugar purification, photographic developers, paint removers, industrial cleaners, dietary supplement, buffer, emulsifier, food additive.

**sodium phosphate tribasic dodecahydrate.**

CAS: 10101-89-0. mf:  $\text{O}_4\text{P} \cdot 3\text{Na} \cdot 12\text{H}_2\text{O}$ .

**Hazard:** Low toxicity by ingestion.

**sodium phosphide.**

CAS: 12058-85-4.  $\text{Na}_3\text{P}$ .

**Properties:** Red solid. Decomposes on heating and in water, forming phosphine.

**Hazard:** Dangerous fire risk, reacts with water and acids to form phosphine.

**sodium phosphite.**  $\text{Na}_2\text{HPO}_3 \cdot 5\text{H}_2\text{O}$ .

**Properties:** White, crystalline powder. Hygroscopic. Mp 53C, bp 200–250C Soluble in water; insoluble in alcohol. (decomposes).

**Use:** Antidote in mercuric chloride poisoning.

retention of filler and fiber and in pH control, boiler-feed-water treatment, and as a food additive.

**sodium phospho-12-molybdate.** See sodium-12-molybdophosphate.

**sodium phospho-12-tungstate.** See sodium-12-tungstophosphate.

**sodium phytate.** (USAN; inositol hexaphosphoric ester, sodium salt).  $\text{C}_6\text{H}_9\text{O}_{24}\text{P}_6\text{Na}_9$ .

**Properties:** Hygroscopic powder. Water-soluble.

**Use:** Chelating agent for trace heavy metals, color improvement, medicine.

**sodium picramate.**

CAS: 831-52-7.  $\text{NaOC}_6\text{H}_4(\text{NO}_2)_2\text{NH}_2$ .

**Derivation:** Yellow, water-soluble salt resulting from neutralization of picramic acid with caustic soda.

**Hazard:** Dangerous fire and explosion hazard when dry. Toxic by ingestion and skin absorption.

**Use:** Manufacture of dye intermediates, organic synthesis.

**sodium platinichloride.** See sodium chloroplatinate.

**sodium plumbate.**  $\text{Na}_2\text{PbO}_3 \cdot 3\text{H}_2\text{O}$ .

**Properties:** Fused, light-yellow lumps. Hygroscopic, decomposed by water and acids. Soluble in alkalies.

**Hazard:** As for lead.

**sodium plumbite.**  $\text{Na}_2\text{PbO}_2$ .

**Derivation:** Solution of  $\text{PbO}$  (litharge) in sodium hydroxide.

**Hazard:** Highly toxic, corrosive.

See lead.

**Use:** Doctor solution for improving the odor of gasoline and other petroleum distillates.

**sodium polyphosphate.**  $\text{Na}_{n+2}\text{P}_n\text{O}_{3n+1}$ . The two most important crystalline sodium polyphosphates are the pyrophosphate ( $n = 2$ ) and the triphosphate ( $n = 3$ ). The term *sodium polyphosphate* also includes the system of vitreous sodium phosphates for which the mole ratio of  $\text{Na}_2\text{O}/\text{P}_2\text{O}_5$  is between 1 and 2.

**Hazard:** As for sodium phosphate.

**Use:** Sequestering and deflocculating agents, primarily in water treatment, food processing, and cleaning compounds; heavy-set detergent builders.

See sodium metaphosphate; sodium pyrophosphate; sodium triphosphate.

**sodium-pota**  
NaK.

**sodium-pota:**

sodium carb

**Properties:** C

The double s

salts. (decon

**Derivation:** N

bonates.

**Use:** Analysis

**sodium-potas**

sodium phosj

**Properties:** W

water.

**sodium-potas**

sodium tartra

**sodium propi**

CAS: 137-40

$\text{Na} \cdot x\text{H}_2\text{O}$ .

**Properties:** Tr

odorless. Delic

and alcohol. (

**Grade:** NF, F

**Use:** Fungicide

(bread and otl

**sodium prussi**

nide.

**sodium prussi**

rocyanide.

**sodium pyroal**

monate.

**sodium pyrobo**

**sodium pyropl**

phosphate; sodi

TSPP).

CAS: 7722-88-

(one of the soc

**Properties:** Colc

powder. (1) Mj

decomposes in a

1.8. Soluble in v

monia.

**Derivation:** By t

Crystalline P