Phenylhydrazine and its monohydrochloride: Human health tier II assessment

27 November 2014

Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
Hydrazine, phenyl-, monohydrochloride	59-88-1
Hydrazine, phenyl-	100-63-0

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:**www.nicnas.gov.au**

Disclaimer

ACRONYMS & ABBREVIATIONS

Grouping Rationale

Phenylhydrazine hydrochloride is a salt resulting from phenylhydrazine reacting with one molecule of hydrochloride acid. As these two chemicals have similar systemic toxicity, they are considered together in this assessment report.

The two chemicals have similar uses and hazard properties (classified as hazardous with the same risk phrases in the Hazardous Substances Information System —HSIS) (Safe Work Australia).

Import, Manufacture and Use

Australian

No specific Australian use, import, or manufacturing information has been identified.

International

The following international uses have been identified through European Union Registration, Evaluation, Authorisation and Restriction of Chemicals (EU REACH) dossiers; Galleria Chemica; and the US National Library of Medicine's Hazardous Substances Data Bank (HSDB).

The chemicals have reported site-limited use including:

- as intermediates for organic synthesis (including dyes); and
- in photography.

The non-industrial use identified for the chemicals is in pharmaceutical products such as haemolytic agents.

Restrictions

Australian

No known restrictions have been identified.

International

Both chemicals are included in the group entry 'Hydrazine (302-01-2), its derivatives and their salts' in the EU Cosmetics Regulation 1223/2009 Annex II—List of substances prohibited in cosmetic products (Galleria Chemica).

Existing Worker Health and Safety Controls

Hazard Classification

Both chemicals are classified as hazardous, with the following risk phrases for human health in the HSIS (Safe Work Australia):

- T; R23/24/25 (acute toxicity)
- Xi; R36/38 (irritation)
- Xi; R43 (sensitisation)
- T; R48/23/24/25 (repeated dose toxicity)
- Carc. Cat. 2; R45 (carcinogenicity)
- Muta. Cat. 3; R68 (mutagenicity)

Exposure Standards

Australian

Phenylhydrazine has an exposure standard of 0.44 mg/m^3 (0.1 ppm) time weighted average (TWA) (Safe Work Australia).

International

Phenylhydrazine has the following exposure standards (Galleria Chemica):

- 0.4–0.6 mg/m^3 (0.1 ppm) TWA in Canada, Denmark, Iceland, Ireland, Indonesia, Norway, Singapore, South Africa and Spain; and
- 20–22 mg/m^3 (5 ppm) in Egypt, Estonia, Greece, Mexico, Philippines, Switzerland, Taiwan and the United States of America (USA).

Health Hazard Information

Both chemicals have been used to treat blood disorders (in the last century) and to induce haemolytic anaemia in animal models to study pathogenisis (Berger, 2007). The chemicals are known to cause oxidative stress in red blood cells (MAK, 2012).

Toxicokinetics

Phenylhydrazine has been reported to be absorbed rapidly, regardless of the route of administration; benzene, nitrogen and hydrogen peroxide were reported as the major metabolites (MAK, 2012).

In a rabbit study, phenylhydrazine was reported to be not readily removed from the body. Only 60 % of the administered oral dose (50 mg/kg bw) was eliminated after ten days, with one third of the urinary excretion taking place in the first 24 hours, and 10 % found in erythrocytes (possibly present as phenylhydrazone). Three main metabolites were identified in this study: p-hydroxyphenylhydrazine and two phenylhydrazones (?-oxoglutaric acid and pyruvic acid), representing most of the excreted dose (90 % within two days) (McIsaac et al., 1958).

Acute Toxicity

Oral

Both chemicals (phenylhydrazine and phenylhydrazine hydrochloride) are classified as hazardous with the risk phrase ‘Toxic if swallowed’ (T; R25) in HSIS (Safe Work Australia). The available data support this classification.

Acute toxicity values for phenylhydrazine include median lethal doses (LD50) of 188 mg/kg bw in the rat, 175 mg/kg bw in the mouse and 80 mg/kg bw in the guinea pig (ChemIDPlus; RTECS). Sublethal signs observed were formation of large amounts of methaemoglobin, haemolysis, formation of Heinz bodies, reticulocytosis, bone marrow hyperplasia, enlargement of the spleen and liver damage (MAK, 2012).

No LD50 values were available for phenylhydrazine hydrochloride. However, it has been reported to have an acute toxicity that 'did not differ greatly from that of phenylhydrazine' (MAK, 2012).

Dermal

Both chemicals are classified as hazardous with the risk phrase ‘Toxic in contact with skin’ (T; R24) in HSIS (Safe Work Australia). No dermal LD50 values are available for the chemicals. However, the limited information available (i.e. mortalities observed at doses within the classification range) supports this classification.

Phenylhydrazine applied undiluted to the skin of male albino rabbits at 60, 90, 130, 200, 450 or 1000 mg/kg bw for up to 25 minutes was lethal from 90 mg/kg bw. Clinical signs included cyanosis, rapid breathing, haematuria (blood in the urine), brown urine and weight loss. Below 90 mg/kg bw, the chemical induced weight loss, haematuria, pallor, brown urine, local irritation and sloughing of the skin (HSDB). An approximate lethal dose (ALD) of 90 mg/kg bw was deduced from these results (HSDB).

A dose of 500 mg/kg of phenylhydrazine hydrochloride (aproximately 374 mg/kg phenylhydrazine) applied to the skin of rabbits (under a plastic cover or gauze) for 24 hours induced 20–30 % mortality. Reported effects were methaemoglobin formation, anaemia and reticulocytosis. In a similar study, the chemical was found less toxic in rats, in which no mortalities were observed at 500 mg/kg bw (Derelanko et al., 1987, cited in NIOSH, 2014).

Inhalation

Both chemicals are classified as hazardous with the risk phrase ‘Toxic by inhalation’ (T; R23) in HSIS (Safe Work Australia). While the available data on phenylhydrazine suggests a lower classification, in the absence of study details, it is not recommended that the existing classifications be amended.

The median lethal concentration (LC50) values of 2610 mg/m^3 (2.61 mg/L) in the rat and 2120 mg/m^3 (2.12 mg/L) in the mouse were reported (details not available) for phenylhydrazine (WHO, 2000).

Inhaled vapours (concentration not stated) of phenylhydrazine induced hypotension, respiratory arrest and a change in the blood pigments in rabbits (HSDB).

Corrosion / Irritation

Skin Irritation

Both chemicals are classified as hazardous with the risk phrase 'Irritating to skin' (Xi; R38) in HSIS (Safe Work Australia). The available data support this classification.

In primary skin irritation tests on rabbits and guinea pigs, a dose of 50 mg of undiluted phenylhydrazine induced skin irritation in both species (NIOSH, 2014)

In a single dose dermal toxicity study on rats and rabbits, phenylhydrazine was applied to the skin of animals (occlusive or semi-occlusive patches) for 24 hours. All rabbits exhibited skin irritation, with some necrosis and sloughing of the skin at the treated site for some animals (number not stated). In rats, skin irritation appeared

in most of the animals within 24 hours and persisted for up to seven days post-exposure, with necrosis in a few animals (Derelanko et al., 1987, cited in WHO, 2000 and NIOSH, 2014).

Phenylhydrazine and its hydrochloride salt have been reported to induce moderate skin irritation when applied to the skin of rabbits (NIOSH, 2014).

Eye Irritation

Both chemicals are classified as hazardous with the risk phrase 'Irritating to eyes' (Xi; R36) in HSIS (Safe Work Australia). The limited data available support this classification.

In a poorly-described study, phenylhydrazine was reported to cause severe suppurative conjunctivis when applied as a 50 % solution to the eyes of rabbits (WHO, 2000).

Both phenylhydrazine and its hydrochloride salt were reported to have 'irritative effect' on the eyes (MAK, 2012).

Observation in humans

After accidental exposure to phenylhydrazine hydrochloride powder, two workers showed signs of serious skin irritation. One exhibited local irritation, superficial erythema and partly bullous-papular changes; the other had multiple burn marks and small blisters at the site of contact (WHO, 2000).

In a patch test on one subject, a phenylhydrazine crystal placed on the forearm (duration not stated) induced marked erythema and oedema 18 hours after exposure, with the formation of vesicles and crusting (WHO, 2000).

Sensitisation

Skin Sensitisation

Both chemicals are classified as hazardous with the risk phrase ‘May cause sensitisation by skin contact’ (R43) in HSIS (Safe Work Australia). Animal and human data available for phenylhydrazine support this classification for both chemicals.

In a guinea pig study, a 10 % solution of phenylhydrazine was applied to the skin of guinea pigs which had previously been induced with undiluted phenylhydrazine (2–3 weeks before). Challenge results showed very intense erythema and swelling, followed by scaling and encrustation, compared with the non-pretreated animals (WHO, 2000; MAK, 2012).

Phenylhydrazine was shown to induce an allergic reaction after epicutaneous contact in albino guinea pigs. Applied daily at 10 % in dinonyl phthalate on the ear of animals for three days, then on the flank on the seventh day, phenylhydrazine induced slight to marked erythema in 7/8 animals (Stevens, 1967).

Observation in humans

Phenylhydrazine was first associated with skin allergic reactions (eczema) in the 19th century. Contact eczema was observed during epicutaneous tests, mainly in chemical industry workers, laboratory technicians and chemists. Dermatitis was also observed following oral administration of phenylhydrazine in the treatment of polycythaemia (MAK, 2012).

Skin hypersensitivity was reported with exposure to phenylhydrazine and its salts, in either solid form or in aqueous solutions (WHO, 2000).

Repeated Dose Toxicity

Oral

Both chemicals are classified as hazardous with the risk phrase 'Toxic: danger of serious damage to health by prolonged exposure if swallowed' (T; R48/25) in HSIS (Safe Work Australia). The available information indicates severe health effects in animals at the doses tested (i.e. 22 mg/kg bw/d), including mortalities. No test results are available with lower doses of the chemicals (falling within the 'Toxic' classification range). Based on the limited information available, and in light of the severe effects seen at lower doses in dermal studies, the existing classification is supported.

Test results show that phenylhydrazine and its hydrochloride salt were harmful to animals at the doses tested. Phenylhydrazine administered by gavage to 25 Swiss female mice for 40 weeks at 17–33 mg/kg bw/d induced marked anaemia that forced reduction of the dose during the sixth week of treatment. There were no other effects reported (WHO, 2000).

Phenylhydrazine hydrochloride administered once a week to mice (n = 21) at 85 mg/kg bw for eight weeks induced mortality in 30 % of the treated mice compared with zero in control group (n = 10 given saline) (WHO, 2000).

In a lifetime study of 100 Swiss mice, phenylhydrazine hydrochloride administered in the drinking water at an estimated dose of 22 mg/kg bw/d induced mortality in treated animals, many of them showing splenomegaly (WHO, 2000).

Dermal

Both chemicals are classified as hazardous with the risk phrase 'Toxic: danger of serious damage to health by prolonged exposure in contact with skin' (T; R48/24) in HSIS (Safe Work Australia). The available data support this classification.

In a 29-day study, phenylhydrazine hydrochloride applied 20 times at 0, 1, 10 or 100 mg/kg bw/d to the skin of rabbits induced liver damage from 1 mg/kg bw/d, spleen and kidney damage from 10 mg/kg bw/d and marked anaemia and leukocytosis at 100 mg/kg bw/d. This study showed the potential of the chemical to 'elicit systemic effects at doses as low as 1 mg/kg per day' (NIOSH, 2014).

The application of 0.1 % of phenylhydrazine in vaseline to the skin of rats every other day for four weeks resulted in a significantly reduced body weight and local effects: keratinisation, proliferation of squamous epithelium and infiltration of leukocytes at the application site (HSDB).

Inhalation

Both chemicals are classified as hazardous with the risk phrase 'Toxic: danger of serious damage to health by prolonged exposure through inhalation' (T; R48/23) in HSIS (Safe Work Australia). The available data on phenylhydrazine support this classification.

Haematological parameters were affected in rats inhaling phenylhydrazine at 1.5 mg/m^3, for 3–4 months, but the effects were reversible within six months (MAK, 2012). In another study, rats exposed to phenylhydrazine at 0.12 mg/m^3 for six months did not exhibit any signs of toxicity (no observed effect level—NOEL), but haematotoxic effects were observed at 21 mg/m^3 (MAK, 2012).

In a short-term inhalation study in rats continuously exposed to phenylhydrazine at 210 mg/m^3 (exposure duration not available), animals showed increased mortality, haematotoxic effects and dystrophy in the liver, spleen and brain (Pham, 1979, cited in MAK, 2012).

Rats, mice, guinea pigs and rabbits exposed to phenylhydrazine vapour at 15.8 or 22.5 mg/m^3 for six months showed reduced erythrocyte counts and haemoglobin concentrations; and increased reticulocyte counts and methaemoglobinaemia (reversible at 15.8 mg/m^3). Haemolysis and dystrophic changes in the liver were also noted at 22.5 mg/m^3 (Pham, 1979, cited in WHO, 2000).

Observation in humans

The therapeutic use of phenylhydrazine or its hydrochloride form has been associated with some severe and even fatal side effects. A fatal intoxication was reported in 1927 when a 65-year-old woman with advanced arteriosclerosis was administered 2.9 g of phenylhydrazine. The patient showed a rapid decrease in the number of erythrocytes and died 16 days after the beginning of the treatment (Giffin & Conner, 1929).

When used at 100 mg/kg for the treatment of polycythaemia (a disease characterised by too many red blood cells), phenylhydrazine induced some serious side effects including jaundice, anaemia and oedema, along with darkened urine due to its content of haemoglobin, bile acid derivatives and bilirubin derivatives (MAK, 2012).

Genotoxicity

Both chemicals are classified as hazardous (Category 3 mutagenic substance) with the risk phrase ‘Possible risk of irreversible effects’ (Xn; R68) in HSIS (Safe Work Australia). The available data support this classification.

Phenylhydrazine and its hydrochloride salt have been found to be mutagenic in several bacterial gene mutation tests, with and without metabolic activation. Positive results were reported in many in vitro tests including micronucleus tests, intrachromosomal recombination and unscheduled DNA synthesis (UDS) assays showing a potential to cause damage to DNA (MAK, 2012). Two mechanisms were suggested to explain the genotoxicity of phenylhydrazine: formation of organic radicals following reaction with oxyhaemoglobin; and possible reaction with endogenous formaldehyde leading to DNA methylation (MAK, 2012).

A single intraperitoneal (i.p.) injection of phenylhydrazine induced positive results in a micronucleus test (study details not available) in BALB/c mice (Suzuki, 1985, cited in WHO, 2000). In another micronucleus test in female BALB/c mice, a single i.p. injection of 50 mg/kg bw of phenylhydrazine induced a significant increase in polychromatic erythrocytes (PCE), 24 hours post injection and in normochromatic erythrocytes (NCE), 48 hours post injection. However these results were possibly related to phenylhydrazine-induced haemolysis rather than a direct genotoxic action alone (Steinheider et al., 1985, cited in WHO, 2000).

Significant DNA damage was measured (by the elution rate of single strand of DNA from lung and liver extracts) in male Swiss albino mice that received a single i.p. injection of phenylhydrazine at 85 or 170 mg/kg bw (Parodi et al., 1981).

Methylation of liver DNA guanine occurred in male Sprague Dawley rats administered a single oral dose of phenylhydrazine at 65 mg/kg bw (Mathison et al., 1994, cited in WHO, 2000).

Carcinogenicity

Both chemicals are currently classified as Category 2 carcinogens with the risk phrase ‘May cause cancer’ (T; R45) in HSIS (Safe Work Australia). The available data support this classification.

The American Conference of Governmental Industrial Hygienists (ACGIH) has classified phenylhydrazine as a 'Confirmed animal carcinogen (A3)' with unknown relevance to humans (NIOSH, 2014; HSDB).

When administered by gavage to 30 BALB/c mice at 25 mg/kg bw/day for 42 weeks, phenylhydrazine hydrochloride induced a significant increase in lung tumours in the treated group (53 %) compared with controls (13 %). Most of the treated animals had multiple pulmonary tumours, 83 % of which were adenomas and 17 % carcinomas. The percent of malignant tumours (58.3 %) was reported to be higher than with other hydrazines (Clayson et al., 1966, cited in: WHO, 2000; OEHHA, 2001; and MAK, 2012).

Swiss albino mice exposed to 0.01 % phenylhydrazine hydrochloride in drinking water for maximum of 110 weeks exhibited a significant increase in blood vessel tumours (increased from 5 % to 22 % in females and from 6 % to 20 % in males, when compared with controls), mostly as angiosarcomas and angiomas. Survival was significantly decreased (Toth & Shimizu, 1976, cited in: WHO, 2000; OEHHA, 2001; and MAK, 2012).

Cancer potencies were determined at 0.68 and 0.51 mg/kg bw/day for phenylhydrazine and its hydrochloride salt, respectively. The no significant risk levels (NSRLs) were estimated to be 1 and 1.4 µg/day for phenylhydrazine and phenylhydrazine hydrochloride, respectively (OEHHA, 2001).

Reproductive and Developmental Toxicity

Only limited data are available. Based on the available information, it is not possible to make a conclusion on reproductive and developmental toxicity of the chemicals.

Pregnant Wistar rats were injected (i.p.) with phenylhydrazine hydrochloride on gestation days (GD) 17–19 (phenylhydrazine 7.5 mg/kg bw/day) or on GD 18–19 (phenylhydrazine 15 mg/kg bw/day). Reported effects were jaundice and/or anaemia among the offspring and high mortality among the pups (WHO, 2000; MAK, 2012). These results have been reported as unreliable because of the study methodology (WHO, 2000).

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include:

- systemic long-term effects (carcinogenicity, mutagenicity);
- systemic acute effects (from oral, dermal and inhalation exposure); and
- local effects (skin sensitisation, skin and eye irritation).

The chemicals may also cause serious effects following repeated oral, dermal and inhalation exposure.

Public Risk Characterisation

Given the uses identified for the chemicals, it is unlikely that the public will be exposed. Hence, the public risk from these chemicals is not considered to be unreasonable.

Occupational Risk Characterisation

Given their critical health effects, the chemicals may pose an unreasonable risk to workers unless adequate control measures to minimise oral, dermal, ocular and inhalation exposure to the chemicals are implemented. The chemicals should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) at a workplace (such as an employer) has adequate information to determine appropriate controls.

NICNAS Recommendation

Current risk management measures are considered adequate to protect public and workers’ health and safety, provided that all requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory. No further assessment is required.

Regulatory Control

Work Health and Safety

Both chemicals are recommended for classification and labelling under the current approved criteria and adopted GHS as below. This assessment does not consider classification of physical hazards and environmental hazards.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Toxic if swallowed (T; R25)* Toxic in contact with skin (T; R24)* Toxic by inhalation (T; R23)*	Toxic if swallowed - Cat. 3 (H301) Toxic in contact with skin - Cat. 3 (H311) Toxic if inhaled - Cat. 3 (H331)
Irritation / Corrosivity	Irritating to eyes (Xi; R36)* Irritating to skin (Xi; R38)*	Causes serious eye irritation - Cat. 2A (H319) Causes skin irritation - Cat. 2 (H315)
Sensitisation	May cause sensitisation by skin contact (Xi; R43)*	May cause an allergic skin reaction - Cat. 1 (H317)
Repeat Dose Toxicity	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed (T; R48/23/24/25)*	Causes damage to organs through prolonged or repeated exposure - Cat. 1 (H372)
Genotoxicity	Muta. Cat 3 - Possible risk of irreversible effects (Xn; R68)*	Suspected of causing genetic defects - Cat. 2 (H341)
Carcinogenicity	Carc. Cat 2 - May cause cancer (T; R45)*	May cause cancer - Cat. 1B (H350)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for industry

Control measures

Control measures to minimise the risk from oral, dermal, ocular and inhalation exposure to the chemicals should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemical is used. Examples of control measures which may minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemical from entering the breathing zone of any worker;
- health monitoring for any worker who is at risk of exposure to the chemical if valid techniques are available to monitor the effect on the worker's health;
- air monitoring to ensure control measures in place are working effectively and continue to do so;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemical.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to assist with meeting obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;
- ensuring that (material) safety data sheets ((m)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemical are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (m)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals— Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of practice are available from the Safe Work Australia website.

A review of the physical hazards of the chemicals has not been undertaken as part of this assessment.

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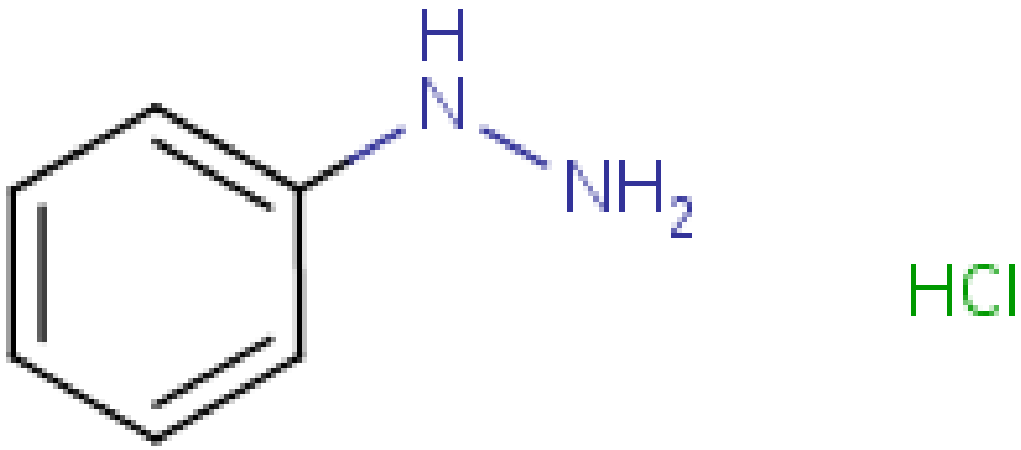
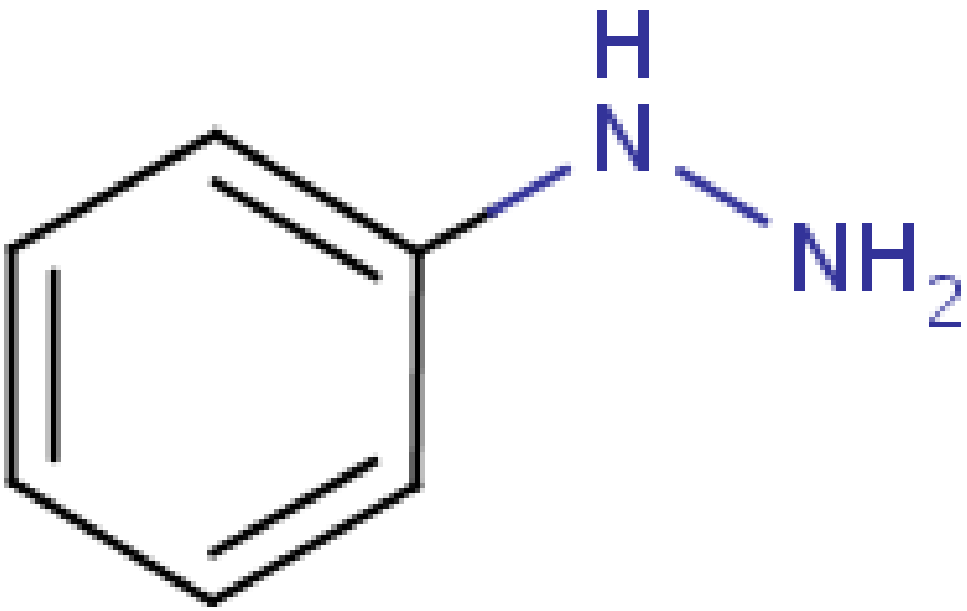
Chemical Identities

Chemical Name in the Inventory and Synonyms	**Hydrazine, phenyl-, monohydrochloride** phenylhydrazine hydrochloride phenylhydrazinium chloride hydrazine, phenyl-, hydrochloride (1:1)
CAS Number	59-88-1
Structural Formula	
Molecular Formula	C6H8N2.ClH
Molecular Weight	144.604

Chemical Name in the Inventory and Synonyms	**Hydrazine, phenyl-** phenylhydrazine hydrazinobenzene

	monophenylhydrazine hydrazine-benzene
CAS Number	100-63-0
Structural Formula	
Molecular Formula	C6H8N2
Molecular Weight	108.14

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