Quinoline Yellow, spirit-soluble: Human health tier II assessment

08 March 2019

Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
1H-Indene-1,3(2H)-dione, 2-(6-methyl-2-quinolinyl)-	6493-58-9
C.I. Solvent Yellow 33	8003-22-3

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

Solvent Yellow 33 (CAS No 8003-22-3) is a mixture which consists of two parts non-methylated and one part methylated form from the reaction products of 1,3-isobenzofurandione with non-methylated and methylated quinoline (NTP, 1997). One of the resulting chemicals in this mixture is 1H-indene-1,3(2H)-dione, 2-(6-methyl-2-quinolinyl)- (CAS No 6493-58-9) (the Colour Index Database) which is a tautomer of the methylated component of Solvent Yellow 33. Given the absence of comprehensive information for 1H-indene-1,3(2H)-dione, 2-(6-methyl-2-quinolinyl)- (CAS No. 6493-58-9), the information on this report based on the toxicological effects of Solvent Yellow 33 can be considered applicable to the group.

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 the European Union (EU) Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) dossiers; Galleria Chemica; the European Commission Cosmetic Ingredients and Substances (CosIng) database; the United States (US) Personal Care Products Council International Nomenclature of Cosmetic Ingredients (INCI) Dictionary; the US National Library of Medicine's Hazardous Substances Data Bank (HSDB); the Colour Index database; and the Good Scents Company.

The following use information is specifically for Solvent Yellow 33 (CAS No. 8003-22-3).

The chemical has reported cosmetic uses as a colourant in a variety of toiletries and personal care products including:

- baby care products;
- oral care products;
- depilatory waxes;
- shaving products;
- make up products including lipsticks, powders and eye makeup;
- hair care products; and
- nail vanishes and polishes.

The chemical has reported domestic uses in soaps and detergents.

The chemical has reported commercial and site-limited uses as a component in spirit lacquers, polystyrenes, polycarbonates, polyamides, acrylic resins, coloured smokes, and hydrocarbon solvents.

The chemical has non-industrial use in pharmaceuticals.

No specific use, import or manufacturing information has been identified for 1H-indene-1,3(2H)-dione, 2-(6-methyl-2-quinolinyl)- (CAS No. 6493-58-9).

Restrictions

Australian

No known restrictions have been identified.

International

Solvent Yellow 33 is listed in the following:

- European Commission (EC) Cosmetics Regulation Annex II (List of substances prohibited in cosmetic products): when used as a substance in hair dye products (CosIng);
- EC Cosmetics Regulation Annex IV (List of colourants allows in cosmetic products): with a condition 'not to be used in products applied on mucous membranes' (CosIng);
- United States Food and Drug Administration (US FDA) List 3 (Colour additives subject to certification and permanently listed for use in externally applied drugs and cosmetic): not to be used in products that are used in the area of the eye (US FDA); and
- The Association of Southeast Asian Nations (ASEAN) and New Zealand Cosmetic Products Group Standard adopted the cosmetic regulations similar to the EU (ASEAN, 2015; New Zealand Group Standard, 2012).

Existing Worker Health and Safety Controls

Hazard Classification

The chemicals are not listed on the Hazardous Chemical Information System (HCIS) (Safe Work Australia).

Exposure Standards

Australian

No specific exposure standards are available.

International

No specific exposure standards are available.

Health Hazard Information

Toxicokinetics

In animals, Solvent Yellow 33 has reported absorption efficiency of 0.58 from the gastrointestinal tract (GIT) and 0.99 from respiratory tract. The chemical is distributed to almost all body tissues, primarily metabolised by the liver and excreted in faeces. Clearance from main organs such as lung, liver, kidney, stomach, spleen and blood is rapid with minimal accumulation (8–12 %) (ORNL, 1987).

Acute Toxicity

Oral

Based on the available data, the chemicals are expected to have low acute oral toxicity.

After a single gavage administration of Solvent Yellow 33 in Fischer 344 (F344) rats (5/sex), the median lethal dose (LD50) was determined to be >5000 mg/kg bw. Mortality occurred in three animals (two died due to experimental errors). At the end of the observation period (day 14), the fur and tails were either stained light green (dosed male groups) or yellow (dosed female groups) (ORNL, 1987; REACH).

In dogs, the oral LD50 was >1000 mg/kg bw (ORNL, 1987).

Dermal

Based on the available data, Solvent Yellow 33 has low acute dermal toxicity.

A single 24-hour application of Solvent Yellow 33 at 2000 mg/kg bw caused minimal to mild hyperkeratosis in rabbits (5/sex) with no mortality. Mild to moderate diarrhoea was reported in two female rabbits and mild gastrointestinal tract (GIT) effects, mottled kidneys and hepatic lesions were observed in three female rabbits (ORNL, 1987; HSDB; REACH).

Inhalation

A single inhalation exposure to Solvent Yellow 33 at approximately 1 mg/L is not toxic (ORNL, 1987). No further study details were available.

Corrosion / Irritation

Skin Irritation

Based on the available animal data, the chemicals are expected not to be irritating to the skin.

After 24-hour occlusive applications of Solvent Yellow 33 to abraded and intact skin of six rabbits, 'barely perceptible erythema' was reported on the test site and reversed within 72 hr (ORNL, 1987; HSDB; REACH).

Eye Irritation

Based on the available animal data, the chemicals are expected to be only slightly irritating to the eye.

No corneal opacity, iridial effects, chemosis or discharge were observed after application of the Solvent Yellow 33 to the right eye of New Zealand White rabbits (n=3). Hyperaemia was observed in two animals and resolved within 72 hr (ORNL, 1987; HSDB; REACH).

Sensitisation

Skin Sensitisation

Based on the available animal and human data, the chemicals are considered to be sensitising to skin, warranting hazard classification (see **Recommendation** section).

In a modified Buehler test, female Hartley guinea pigs (13/group) were given Solvent Yellow 33, weekly for three consecutive weeks, through a 24-hour occluded patch at an induction concentration of 50 % (in ethanol). After a two-week rest period, the animals were challenged with another 24-hour occluded patch at 1, 3, or 10 % (in ethanol). Minimal irritation was noted during the induction phase of the study. Statistically significant sensitisation reactions were observed in animals challenged with Solvent Yellow 33 at 10 % (11/13 animals gave a score of 1 as barely perceptible erythema). Solvent Yellow 33 was determined to be a weak sensitiser (ORNL, 1987).

In an adjuvant sensitisation test, Solvent Yellow 33 (5, 25, or 50 µg in 0.1 mL of Freund Complete Adjuvant) was injected intradermally during induction into the footpad of female Hartley guinea pigs (20/group). Positive control was a known sensitiser (2,4-dinitrochlorobenzene) and vehicle control was peanut oil. After a 2-week rest period, each group was challenged with intradermal injection in the shaved flanks of the same compounds, the known sensitiser or peanut oil. The results showed a dose-related increase in the frequency and intensity of positive responses. All animals administered 50 µg of the chemical gave positive responses at 24 and 48 hours. Fewer animals in the 5 and 25 µg groups gave positive responses. Histological examination of the skin specimens from the 72-hour exposed animals showed that the inflammatory responses were more severe, but qualitatively similar, to the vehicle control group. The inflammatory responses in the 5 and 25 µg groups were less severe compared to the 50 µg group. Necrotic lesions were observed in 40 % of the animals in the 50 µg group. It was determined that 25 and 50 µg should be considered as moderate and strong sensitising levels, respectively (ORNL, 1987).

In another adjuvant sensitisation test (10 guinea pigs/group; strain and sex not specified), Freund Complete Adjuvant was injected interdermally in a shaved area of the shoulder. Four different commercial grade samples and a purified dye preparation of Solvent Yellow 33 (at 1000 ppm in acetone) were applied to abraded skin through 24-hour patches. Abrasion and treatment was repeated for two consecutive days. On the 9th day, the treatment was repeated for 48 hours. On the 21st day, the animals were challenged with the same four samples and purified Solvent Yellow 33 through direct application to a shaved area of the flank at 0.1, 1, 10, 100, or 1000 ppm. The application sites were evaluated 24 and 48 hours after the challenge dose. Erythema and oedema were scored separately. The mean responses of the animals showed a dose-response relationship above 0.1 ppm (ORNL, 1987).

Observation in humans

Based on a number of case reports, Solvent Yellow 33 was highly sensitising in humans.

Positive reactions were reported after induction with the chemical at 0.5 % and challenge at 0.1% in 15/20 volunteers (REACH). No other study details were reported.

In a human maximisation test, positive reactions were observed in subjects induced with Solvent Yellow 33 at 0.5 % (in petrolatum) and challenged at concentrations of 1–1000 ppm. The mean frequency and intensity of the responses showed a dose-response relationship (Kita et al, 1984).

In beauticians with hand dermatitis, positive skin reactions (1 out of 7 individuals) were reported after application of the chemical at 0.5 % in petrolatum (Matsunaga et al, 1988).

In a patch test, a 42-year-old male patient was treated with the chemical at 1 % and 14 days later showed a positive reaction at the test site. After a second patch test using the chemical at 0.1 %, the patient showed a 'severe itchy reaction at the test site with infiltration, spreading vesicles, coalescing bullae and erosion'. Positive reactions were reported when the patient was rechallenged with the chemical at 0.00001 % (REACH).

A 43-year-old female developed soreness of the mouth; and swelling of the mouth, face and eyelids after using lipstick containing Solvent Yellow 33. A 24-year-old female developed dermatitis of the eyelids after using eye cream containing Solvent Yellow 33. In both cases, positive reactions were reported in patch tests using Solvent Yellow 33 at 0.004 % in petrolatum (ORNL, 1987).

Cases of contact dermatitis were reported after using a soap containing Solvent Yellow 33 (ORNL, 1987; NTP, 1997; HSDB).

Repeated Dose Toxicity

Oral

Based on the available data, Solvent Yellow 33 is expected to cause harm to the liver and kidneys at high doses after repeated oral exposure. However, these effects do not warrant hazard classification.

Solvent Yellow 33 was administered to F344/N rats and B6C3F1 mice (5–10/species/sex/dose) through their diet at 0, 500, 1700, 5000, 17000 or 50000 ppm (equivalent to approximately 0, 83, 283, 833, 2833 and 8333 mg/kg bw/day) for 14 days or 13 weeks. The repeat-dose toxicity findings were similar for both species and exposure durations, although the estimated intake of the chemical was twice higher in mice than in rats.

Reduced body weight gain was observed in both sexes of rats at ≥850 mg/kg bw/day groups.

Significant increases in absolute and relative liver weights were observed in all dosed groups compared with the controls. Minimal to mild degeneration of the periportal lobules of the liver were reported at ≥83 mg/kg bw/day in rats and ≥283 mg/kg bw/day in mice.

Yellow-brown pigment accumulation was dose-related in hepatocytes, Kupffer cells (specialised macrophages of the liver), and bile epithelium in both sexes of both species and in the renal tubule epithelium in both sexes of rats.

Dose-dependent hepatocellular degeneration was observed in rats in both studies, and was more severe in the 13 week study. A dose-dependent increase in the number and size of hyaline droplets in the tubular epithelium of the cortex and outer medulla of the kidney was observed in male rats (NTP, 1997). Reproductive effects were also seen at doses ≥833 mg/kg bw/day (see **Reproductive and developmental toxicity** section). The lowest observed effect level (LOEL) for female mice in the 13 week study was 8333 mg/kg bw/day and the no observed effect level (NOEL) for male mice in the 13 week study was 83 mg/kg bw/day. The LOEL in rats was 8333 mg/kg bw/day (NTP, 1991; REACH).

In two-year feeding study (see **Carcinogenicity** section), rats of both sexes at ≥85–100 mg/kg bw/day showed reduced body weights and yellow discolouration of the entire body from day 1, and increased liver weights at 12 months. Incidences of non-neoplastic liver lesions, cytologic alterations (basophilia and granularity of hepatocytes) and pigment deposition (in hepatocytes, Kupffer cells, bile duct epithelial cells and renal tubules) in all exposed groups were greater than those in the controls at both 12 months and two years. The severity of nephropathy was increased in exposed rats (NTP, 1997).

Dermal

Based on the available data, high doses of Solvent Yellow 33 are expected to cause toxic effects to the skin and gastrointestinal tract (GIT) upon repeat dermal exposure. However, these effects do not warrant a hazard classification.

Albino rabbits (5/sex/dose) were administered Solvent Yellow 33 under occlusion at 50, 200 or 1000 mg/kg bw/day for six hr/day, five days/week for two weeks. One male at 50 mg/kg bw/day died on day 10, showing GIT damage, decreased food consumption and weight loss. Another male died due to an accident. Locally, the incidence of skin lesions was increased with dose (ORNL, 1987; HSDB).

At ≥50 mg/kg bw/day (all doses), hyperkeratosis, acanthosis and adnexal hyperplasia were seen during histopathological examination. At ≥200 mg/kg bw/day, mild to marked fatty livers (4 males), mild to moderate diarrhoea (3 males, 1 female), and nasal discharge (1 male, 1 female) were reported (ORNL, 1987; REACH).

Inhalation

Based on the available data, high doses of Solvent Yellow 33 may cause harm to the lungs. The no observable adverse effect concentration (NOAEC) for a 90 day study was 0.001 mg/L.

In a 13-week whole body exposure study, F344/Crl rats (63/sex/dose) were administered the chemical at doses of 0, 1, 11 or 100 mg/m^3, 6 hr/day, 5 days/week for 13 weeks. No deaths occurred in the study. At the highest dose, minimal pigment accumulation of the nasal epithelium and liver; and minimal hypertrophy of type II pulmonary epithelial cells were observed. The NOAEC was determined to be 0.001 mg/L for 90-day inhalation exposure (ORNL, 1987; NTP, 1997; REACH).

Solvent Yellow 33 was administered to F344/N rats (22/sex/dose) as an aerosol via whole body exposure, 6 hr/day, 5 days/week for 4 weeks at concentrations of 0, 10, 51 or 230 mg/m^3 (0, 0.01, 0.051 or 0.23 mg/L respectively). At the highest dose, there was a significant decrease in body weight compared to controls, decreased lung elasticity and increased resting lung volume. The changes were consistent with breakdown of pulmonary connective tissue in the lungs. The lowest observable effect concentration (LOEC) was determined to be 0.23 mg/L and the no observed effect concentration (NOEC) 0.51 mg/L for a four-week inhalation exposure (ORNL, 1987; REACH).

Repeated exposures to 1.29 mg/L caused hypertrophy and hyperplasia of the epithelium of the nasal cavity and inflammation of the naso-lacrimal duct and naso-vomer organ (ORNL, 1987).

Genotoxicity

While there are indications that Solvent Yellow 33 may be genotoxic, there are insufficient in vivo data to classify the chemicals for mutagenicity.

In vitro

Solvent Yellow 33 was mutagenic in *Salmonella typhimurium* (TA1535, TA1537, TA1538, TA98, TA100, TA102 and TA104) (NTP, 1997; REACH).

Responses were equivocal in *S. typhimurium* strain TA100 and weakly positive in strains TA98 and TA100, all with metabolic activation (NTP, 1997; REACH).

Solvent Yellow 33 was clastogenic in mouse lymphoma cells and induced sister chromatid exchanges and chromosomal aberration in Chinese hamster ovary cells, with and without metabolic activation (ORNL, 1987; NTP, 1997; REACH).

Effects in Syrian hamster embryo (SHE) cells were observed after exposure to Solvent Yellow 33 at concentrations of 0.1, 1, 2.5, 5 or 7.5 µg/mL for 24 hr. A statistically significant increase in morphological transformation frequencies were observed (REACH).

In vivo

Negative results for gene mutations were reported in a sister chromatid exchange assay conducted in male C57B1/6J mice (4/dose) after a single intraperitoneal (i.p.) injection of Solvent Yellow 33 at 5, 15, 25 or 35 mg/kg (ORNL, 1987; NTP, 1997; REACH).

In an OECD TG 474 study, no increases in the frequency of micronucleated polychromatic erythrocytes were reported in mouse peripheral blood samples after administration of Solvent Yellow 33 to B6C3F1 albino mice (45/sex/dose) in diet at 222, 666 or 2000 mg/kg bw/day for 13 weeks (NTP, 1997; REACH).

Carcinogenicity

Based on the available data, Solvent Yellow 33 has some carcinogenic potential in mammals, based on an increased incidence of hepatocellular neoplasms in both sexes of a single species in a single experiment, warranting hazard classification (see **Recommendation** section).

In a carcinogenicity study using F1 generation rats (60/sex/dose; 28 days old at weaning) from the reproductive toxicity study (see **Reproductive and Developmental toxicity** section), Solvent Yellow 33 was administered in diet at 0, 25, 85 or 250 mg/kg bw/day (males for 105 weeks), and 0, 25, 100 or 280 mg/kg bw/day (females for 106 weeks). The incidences of hepatocellular adenoma in males and of hepatocellular adenoma or carcinoma (combined) in females were statistically greater in high dose animals versus controls. There were reports of renal tubule adenoma/carcinoma and squamous cell papilloma/carcinoma of the oral cavity in males and uncommon squamous cell carcinoma of the oral mucosa or tongue in female rats that could be chemical-related (NTP, 1997; REACH).

Solvent Yellow 33 was not carcinogenic in the mouse lung tumour bioassay (Davidson & Hovatter, 1987; ORNL, 1987).

Reproductive and Developmental Toxicity

Based on the available data, any observed reproductive and developmental effects were secondary to maternal toxicity.

In a 13-week study, sperm motility was significantly decreased in male mice receiving Solvent Yellow 33 at a dose of 833 mg/kg bw/day (NTP, 1991).

In a developmental toxicity study, female F344/N rats (12/dose) were administered the chemical in the diet at 0, 5000, 17000 or 50000 ppm (equivalent to approximately 250, 850 or 2500 mg/kg bw/day) from 4 weeks pre-mating, during mating, conception, lactation, and until weaning of offspring. There were no differences in fertility, gestation length, litter sizes, and pup birth weights. However, pup body weights at weaning were significantly decreased in a dose-dependent manner from dams dosed at 250 mg/kg bw/day and above, relative to control litters, on days 14 and 21. This effect was considered to be related to treatment. All dosed rats were yellow at study day 7. Hepatocyte degeneration (minimal cytoplasmic vacuolation) and accumulation of yellow/brown pigment in the liver and kidney were observed in all doses (NTP, 1997).

In a one-generation study, the parental generation (F0) F344 rats (60/sex/dose) were administered Solvent Yellow 33 in their diet at doses of 0, 500, 1,700, or 5,000 ppm (equivalent to approximately 35, 120, or 350 mg/kg bw and 35, 120, or 370 mg/kg bw in males and females, respectively) for up to 19 weeks and then mated. Exposure of second-generation (F1) males and females began in utero and continued for 2 years after weaning at 28 days of age. Prior to cohabitation, mean body weight gains of males at all doses and of females given 370 mg/kg bw were significantly lower than those of the controls. The mean body weight gains of exposed females during gestation and lactation were generally similar to those of the controls. With regards to the F1 generation, the average litter sizes and the number of live pups were similar to the control litters. However, the mean body weights of the exposed litters significantly lower compared to the control litters (NTP, 1997).

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include systemic long-term effects (such as carcinogenicity) and skin sensitisation.

Public Risk Characterisation

Considering the range of products that may contain the chemicals, the main route of public exposure is expected to be through the skin, and potential oral exposure from lip and oral hygiene products.

Solvent Yellow 33 has been banned for use in hair-dyes in Europe (ECHA). The chemical is listed in the EU as a colourant allowed in cosmetic products; however, is not to be used in products applied on mucous membranes (the oral cavity, on the rim of the eyes or genital region).

Currently, there are no restrictions in Australia on using these chemicals in cosmetics or domestic products. In the absence of any regulatory controls, the characterised systemic long-term effects and skin sensitisation have the potential to pose an unreasonable risk under the identified uses.

Occupational Risk Characterisation

Given the critical systemic long-term health effects and skin sensitisation, the chemicals could pose an unreasonable risk to workers unless adequate control measures to minimise exposure 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 the appropriate controls.

The data available support an amendment to the hazard classification in the HCIS (Safe Work Australia) (see **Recommendation** section).

NICNAS Recommendation

Further risk management is required. Sufficient information is available to recommend that risks to public health and safety from the potential use of the chemical in cosmetics and/or domestic products be managed through changes to poisons scheduling, and risks for workplace health and safety be managed through changes to classification and labelling.

Assessment of the chemical is considered to be sufficient provided that risk management recommendations are implemented and all requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Regulatory Control

Public Health

Appropriate scheduling and labelling should be undertaken to mitigate risk when the chemicals are used in domestic and cosmetic products. Due to the toxicity profile at the concentrations reported to be potentially in use, these chemicals should be considered for listing in the *Standard for the Uniform Scheduling of Medicines and Poisons* (SUSMP), consistent with the *Scheduling Policy Framework* guidelines. Exemptions to scheduling might be applicable at low concentrations. Matters to be taken into consideration include:

- the known uses of the chemicals. Although there is no information to confirm that the chemicals are currently used in cosmetic and domestic products in Australia, it is probable as the chemicals are reported to be used in cosmetic and domestic products overseas;
- the chemicals causes skin reactions in animals and humans at concentrations ≥0.5 %; and
- the chemicals cause adverse effects (carcinogenicity) from repeated oral exposure.

Work Health and Safety

The chemicals are recommended for classification and labelling aligned with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as below. This does not consider classification of physical hazards and environmental hazards.

From 1 January 2017, under the model Work Health and Safety Regulations, chemicals are no longer to be classified under the Approved Criteria for Classifying Hazardous Substances system.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Sensitisation	Not Applicable	May cause an allergic skin reaction - Cat. 1 (H317)
Carcinogenicity	Not Applicable	Suspected of causing cancer - Cat. 2 (H351)

[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 consumers

Products containing the chemicals should be used according to the instructions on the label.

Advice for industry

Control measures

Control measures to minimise the risk from dermal 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 chemicals are is used. Examples of control measures that could minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemicals from entering the breathing zone of any worker;
- health monitoring for any worker who is at risk of exposure to the chemicals, 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 chemicals.

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 help meet 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 safety data sheets (SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemicals 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 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 these chemicals has not been undertaken as part of this assessment.

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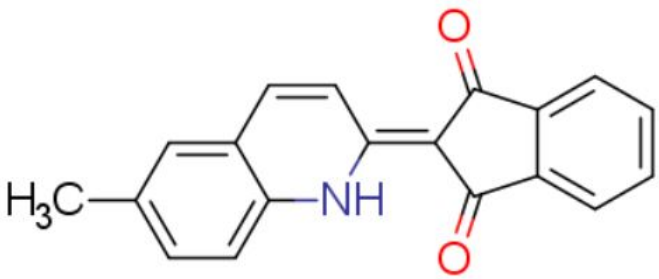
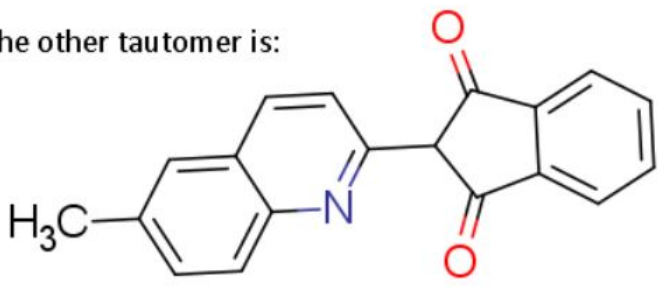
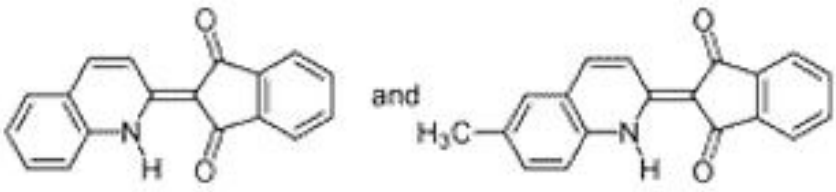
Last Update 08 March 2019

Chemical Identities

Chemical Name in the Inventory and Synonyms	**1H-Indene-1,3(2H)-dione, 2-(6-methyl-2-quinolinyl)-** 2-(6-methyl-2-quinolyl)-1H-indene-1,3(2H)-dione 1,3-indandione, 2-(6-methyl-2-quinolyl)-
CAS Number	6493-58-9
Structural Formula	 The other tautomer is: 

Molecular Formula	C19H13NO2
Molecular Weight	287.31

Chemical Name in the Inventory and Synonyms	**C.I. Solvent Yellow 33** C.I. 47000 Quinoline Yellow SS 1,3-isobenzofurandione, reaction products with methylquinoline and quinoline 2-(2-quinolyl)-1,3-Indandione D&C Yellow 11 or Ki2O4
CAS Number	8003-22-3
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	273.29

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