

NISSAN CHLORINATED ISOCYANURATES

NISSAN T.C.C.A-90

NISSAN D.C.C.Na-60

NISSAN I.C.A-100

NISSAN HI-LITE TAB



NISSAN CHEMICAL INDUSTRIES, LTD.

INDEX

■ Introduction	2
■ Grade	3
■ Chemical structure	3
■ Chemical and physical properties	3
■ Application of NISSAN Chlorinated Isocyanurates (NISSAN C.I.)	4
1. Disinfectant for swimming pools	4
2. Non-shrinking treatment of wool	7
3. Use for various types of water disinfection	7
4. NISSAN C.I. as blends with various household chemicals	9
■ Stability of NISSAN C.I.	10
1. Stability in the form of powder	10
2. Stability of NISSAN C.I. mixtures	10
3. Stability against ultraviolet ray (sunlight)	10
■ Directions for storage and handling	11
■ Toxicity test results	11
■ Packaging	12

■ Introduction

“NISSAN Chlorinated Isocyanurates”

In the past, inorganic chlorine compounds including sodium hypochlorite, calcium hypochlorite, etc. have been widely used as non-shrinking agent for wool and sanitary disinfectants for swimming pool and septic tanks. In the U.S.A. and European countries, chlorinated isocyanurates have been used for a long time because inorganic compounds have a low stability and form water insoluble substances resulting in water contamination problems.

Nissan Chemical entered into domestic production of chlorinated isocyanurates in 1963 and since then have been working on market development and promotion of the product.

NISSAN Chlorinated isocyanurates have excellent characteristics and advantages compared with conventional inorganic chlorine compounds as indicated below.

(1) High available chlorine content

NISSAN TCCA-90: 90%

NISSAN DCCNa-60: 62%

(2) Low -hygroscopicity and extremely high chemical stability.

(3) Contains no insoluble substances and so dissolves completely

(4) Very economical disinfectant because they dissolve at appropriate speed

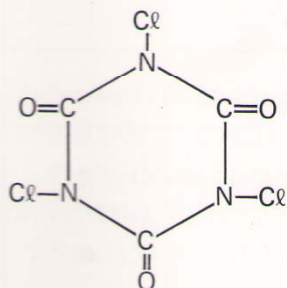
The effects of these compounds vary greatly depending on the application method. Please read this manual carefully when you use Nissan chlorinated isocyanurates.

■ Grade

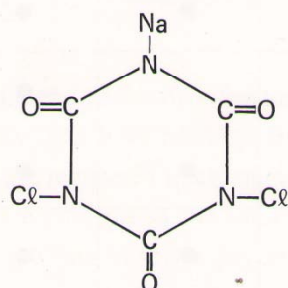
NISSAN TCCA-90 (Trichloroisocyanuric acid)
 NISSAN DCCNa-60 (Sodium dichloroisocyanurate)
 NISSAN ICA-100 (Isocyanuric acid)
 NISSAN HI-LITE TAB

■ Chemical structure

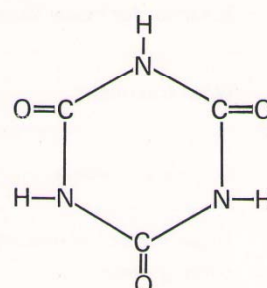
TCCA-90



DCCNa-60



ICA-100



■ Chemical and physical properties

Grade	NISSAN TCCA-90	NISSAN DCCNa-60	NISSAN ICA-100
Appearance	White powder & granules	White powder & granules	White powder & granules
Formula	$(\text{ClNCO})_3$	$\text{Cl}_2\text{Na}(\text{NCO})_3$	$(\text{HNCO})_3$
Molecular weight	232, 44	219, 98	129, 08
Available chlorine content %			
Theoretical value	91.5	64.5	
Typical value	90.0	62.0	
pH (1% solution)	2.7 ~ 3.3	6.2 ~ 6.8	3.3 ~ 3.7
Solubility (g/100g)			
Water at 25°C	1.0	30	0.28
Acetone at 30°C	35	0.5	insoluble

■ Application of NISSAN Chlorinated Isocyanurates(NISSAN C.I.)

NISSAN C.I. has a wide variety of applications — as disinfectants approved by the Ministry of Health & Welfare and non-shrinking agents for wool, and as sanitary disinfectants of swimming pools, etc.

Applications	NISSAN TCCA-90	NISSAN DCCNa-60	NISSAN ICA-100	NISSAN HI-LITE TAB
Swimming pool treatment	●	●	●	●
Bleaches for home laundry	●	●		
Wool treatment		●		
Scouring powders	●	●		
Algae control in industrial cooling water	●	●		●
Effluent treatment		●		●
Disinfectant for septic tanks				●
Sanitation Compounds	●	●		●
Stabilizer for chlorine			●	

● mark is applicable

1. Disinfectant for swimming pools

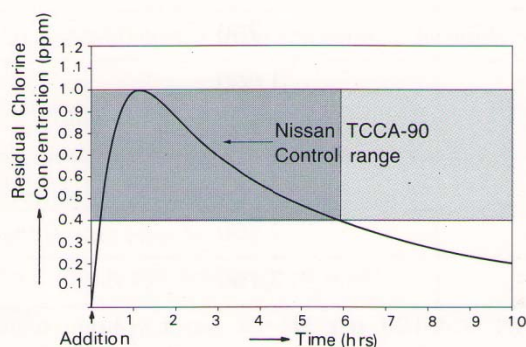
To sterilize and disinfect swimming pools, calcium hypochlorites, in the form of granules or tablets, have been used, but they present the following problems:

- (1) Poor durability of available chlorine in the water of swimming pools
- (2) Therefore, make-up chemicals must be added once every 2 to 3 hours in order to keep swimming pool water at an available chlorine concentration of 0.4 ~ 1.0 ppm.
- (3) Calcium compounds formed after disinfecting action are water insoluble and contaminate swimming pool water. Therefore, it is necessary to replace water at short intervals. For the above reasons, high initial concentrations of available chlorine are often employed in order to save labor for disinfection, and this high concentration frequently causes injury to the eyes of swimmers.

NISSAN C.I. compounds show the excellent features as mentioned below:

- (1) Water solutions of NISSAN C.I. have high stability.

To maintain the required concentration of 0.4 ~ 1.0 ppm of available chlorine, it is sufficient to add NISSAN C.I. once or twice a day, depending on the number of swimmers. Therefore, labor required for disinfection work can be minimized.



- (2) No water insoluble substances remain after disinfection.
- (3) NISSAN C.I. have no toxicity, and have been approved by the National Institute of Public Health of Japan. They are registered pharmaceutical products.
- (4) Effective stabilization of active chlorine in the swimming pools is achieved when the NISSAN ICA-100 is applied at a rate of about 3kg/100m³.
- (5) HI-LITE TABs are tablet form TCCA for disinfection of swimming pool and sewage controll.

For use in swimming pool, NISSAN C.I. Granules, Powder and Tablets are available as you choose.

Average dosage of NISSAN T.C.C.A-90 and Hi-lite TAB

Water volume in pool (M ³)	NISSAN T.C.C.A-90 (grams/day)	Hi-lite-TAB (gram/dose)
100	300	3,000
200	600	6,000
300	900	9,000
400	1,200	—
500	1,500	—
700	2,100	—
1,000	3,000	—

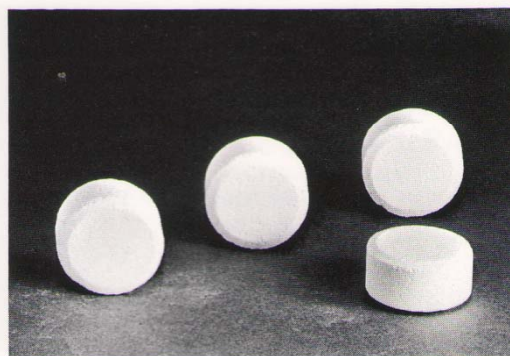
Average dosage of NISSAN DCCNa-60 and NISSAN ICA-100

Water volume in pool (M ³)	NISSAN DCCNa-60 (grams/dose)	NISSAN ICA-100 (Kg)
100	250	3
200	500	6
300	750	9
400	1,000	12
500	1,250	15
700	1,750	21
1,000	2,500	30
1,500	3,750	45

* 30 grams of NISSAN ICA-100 per M³ of water volume scattered when renew of swimming pool water.



NISSAN C.I. granules



Hi-lite TAB

- Remarks: 1. The material must be applied into the pool 5 ~ 16 minutes before swimming.
(When the number of swimmers is not certain, the above-mentioned quantity must be applied in two parts.)
2. When an additional quantity is necessary due to quality of water, weather and number of swimmers, 10 grams of NISSAN TCCA-90 or 15 grams of NISSAN DCCNa-60 must be applied in order to increase free chlorine by 0.1 ppm per water volume in a pool of 100M³.
3. The above quantities are based on the standard which requires 0.4 ppm of free chlorine or 1.0 ppm min. of total chlorine in the swimming pool.

2. Non-shrinking treatment of wool

There have been many methods for non-shrinking treatment of wool. Conventional chlorine-type non-shrinking agents were difficult to put into practice generally owing to problems of color tone, rough feel and uneven dyeing. However, the use of NISSAN DCCNa-60 together with acetic acid has solved these problems since the available chlorine gradually and uniformly works on wool.

In addition, NISSAN DCCNa-60 has proven economical because of no waste of available chlorine.

This method has been recommended by the International Wool Secretariat (I.W.S.).

The characteristics of this method are:

- (1) Practically odorless during the non-shrinking treatment.
- (2) Excellent shrinkage inhibiting effects.
- (3) Not affect the soft feel, touch and resilience of wool.
- (4) No change in color tone.
- (5) Faster dyeing speed and uniform dyeing.
- (6) Almost no decrease in textile strength.
- (7) Simple and easy non-shrinking treatment.

3. Use for various types of water disinfection

(1) Hi-Lite TAB

"Hi-Lite TAB" is a tablet for algae control, effluent treatment, and disinfection of septic tanks, formulated from chlorinated isocyanuric acid with good chemical stability. It has the following characteristics.

- a. "Hi-Lite TAB" because of its extremely low hygroscopicity and extremely high chemical stability, has little loss of active chlorine and shows a stable disinfectant effect over several months.
- b. "Hi-Lite TAB" contains no insoluble matter and so dissolves completely. Calcium hypochlorite type tablets react with carbonate and the formed insoluble calcium carbonate adheres to the tablet surface.
- c. "Hi-Lite TAB" is a very economical disinfectant because of its appropriate dissolving speed. Calcium hypochlorite type tablets dissolve somewhat too rapidly and have unstable effects in month-long use due to the loss of active chlorine.

(2) NISSAN C.I.

NISSAN C.I. is also excellent as a disinfectant for any type of water including public baths, industrial water.

Hi-Lite TAB

No.	Trade Name	Property		Applications
		Available chlorine	Shape and Weight	
1	Hi-Lite clean S	65%	Doughnut-shaped, 15 grams 30 mm ϕ x about 14 mm high Hole 9 mm ϕ	Effluent treatment Water treatment Disinfectant for septic tanks
2	Hi-Lite clean L-90	88% up	Doughnut-shaped, 200 grams 70 mm ϕ x about 35mm high Hole 9mm ϕ	Effluent treatment Large-sized septic tanks Treatment of large quantities of water
3	Hi-Lite TAB 20	88% up	Disk-shaped, 20 grams 30 mm ϕ x about 15 mm high no center hole	Swimming pool disinfection Algae control Effluent treatment Disinfectant for septic tanks
4	Hi-Lite TAB 200	88% up	Disk-shaped, 200 grams 78 mm ϕ x about 27 mm high no center hole	Swimming pool disinfection Algae control Effluent treatment Disinfectant for septic tanks

4. NISSAN C.I. as blends with various household chemicals

(a) NISSAN DCCNa-60 as blended with phosphate salts, sodium metasilicate surfactant agents, etc. has good bleaching and stain-removing effects when washing. It does not injure or damage fabrics. Satisfactory bleaching effects can be attained at either low or high temperature.

(b) The above blends are also highly recommended for dish-washing in hotels, hospitals, restaurants, and food factories. They can give not only excellent detergency but also high sterilizing effects.

No odor remains.

(c) NISSAN DCCNa-60, when added to ordinary cleanser, is effective in removing oil and protein stains and facilitates better polishing of stainless steel products.

It is also suitable for cleaning and sterilization of bathroom tiles, toilet sinks, etc.

Typical formulation

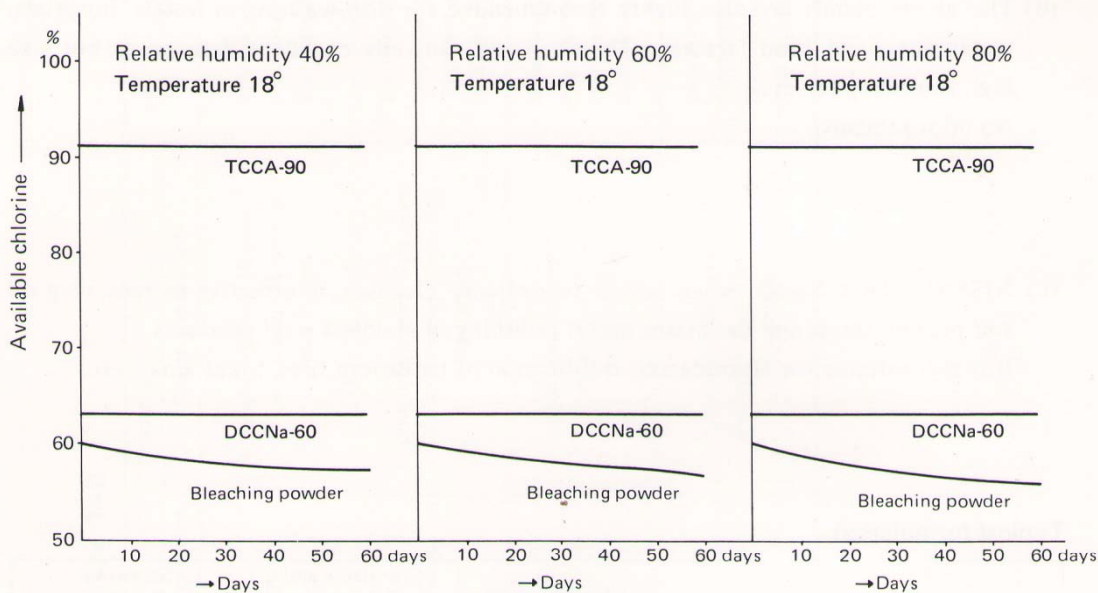
	Laundry Bleaches (% by weight)	Sterilizers and Sanitizers (% by weight)	Scouring Powder (% by weight)	
NISSAN DCCNa-60	1	10	20	20
Sodium tripolyphosphate	6	10	30	30
Sodium metasilicate, anhydrous		5		5
Surfactant	3	5	2	
Sodium sulphate		45	48	45
Sodium carbonate		25		
Feldspar powder	90			

■ Stability of NISSAN C.I.

1. Stability in the form of powder

Both NISSAN TCCA-90 and NISSAN DCCNa-60 do not show any loss of available chlorine for more than one year when stored in sealed containers. This excellent stability is of great advantage to all of the above-mentioned applications.

The stability of NISSAN C.I. is shown below:



2. Stability of NISSAN C.I. mixtures

In case the content of the NISSAN C.I. in the mixture is low, the decomposition rate become higher and care should be taken when moisture containing materials are mixed with NISSAN C.I.

3. Stability against ultraviolet rays (sunlight)

Test method:

Ultraviolet rays were applied to NISSAN DCCNa-60 water solution (pH 7) with available chlorine concentration of 1 ppm, and NISSAN DCCNa-60 was added every 4 to 5 hours so that the available chlorine would not become less than 0.6 ppm. Then, the total consumption of available chlorine was calculated after 24 hours.

Results:

The consumption of NISSAN DCCNa-60 was only half of that of sodium hypochlorite, as shown below:

Sodium hypochlorite
6.8 ppm

NISSAN DCCNa-60
3.7 ppm

■ Directions for storage and handling

NISSAN C.I. compounds are strong oxidizing agents, which release chlorine on contact with water. Care should be exercised therefore in their storage, and all NISSAN C.I. compounds should be stored under cool dry conditions. NISSAN C.I. should be stored away from water, moisture, ammonium compounds, amines, oil and grease, any easily oxidizable matter, strong acids and alkalis, and sources of heat. Raised storage is advisable and when not in use all containers should be kept closed and covered.

Spillages should be flushed away with a copious amount of cold water only taking care to avoid cross-mixing in drains. Minor spillages can be swept up, but should be disposed of by flushing down a drain. No sweepings or waste should be put into bins, as accidental contamination with easily oxidizable matter could cause heating and fire. Damp or contaminated material should never be repacked in containers.

NISSAN C.I. compounds should never be mixed with any other chemicals, except when being formulated into products with known compatible materials.

■ Toxicity test results

NISSAN C.I. compounds are of low systemic toxicity by oral ingestion. Any toxic effects are due to the chlorine content, which may cause corrosive attack on the stomach lining, and are only likely if solid compound or fresh strong suspensions are swallowed undiluted. The residues after chlorine release are of low toxicity. Solutions of NISSAN C.I. compounds containing 100 ppm of available chlorine have been shown to be neither toxic, irritating nor sensitizing to human beings. The dry powders are, however, irritating to the eyes, moist skin, and upper respiratory tract.

SUMMARY OF ACUTE TOXICITY DATA FOR NISSAN CHLORINATED ISOCYANURATES

(Basis: Younger Lab Reports as dated July 3, 1974)

NISSAN C.I.	Chemical Nomenclature	Acute Rat Oral Toxicity (mg/kg) Classification	Acute Rabbit Dermal Toxicity (mg/kg) Classification	Rabbit Skin Irritation Classification (Dry Powder)	Rabbit Eye Irritation Classification (24 hr. Contact)
DCCNa-60	Sodium dichloro-isocyanurate	1,420 mildly toxic	2,000 slightly toxic	Non-Irritating	Slightly Irritating
TCCA-90	Trichloro-isocyanuric acid	1,300 mildly toxic	3,160 slightly toxic	Non-Irritating	Slightly Irritating
ICA-100	Isocyanuric acid	10,000 essentially non-toxic	7,940 essentially non-toxic	Essentially non-irritating	Essentially non-irritating

NISSAN CHEMICAL INDUSTRIES, LTD.



40/2 Soi.37/2, Kingkaew Road, Samutprakarn 10540, Thailand

Tel: 66 2 738 5088-99, 66 2 175 2561-65

Fax: 66 2 738 5299, 66 2 738 4209

Email: sales@poolspa.co.th Website: www.poolspa.co.th

