



Guidance for Air Transport of Materials (Disinfectants) for Epidemic Prevention and Control

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Civil Aviation Administration of China

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This guidance is to be used only during the period of epidemic prevention and control, and will be updated in time to take into account the changes in regulations and standards. Therefore, attention shall be paid that the latest edition is applicable.

Foreword

I. Instructions

This guidance is to be used exclusively by relevant cargo departments and security screening departments of airlines and airports to quickly classify and identify disinfectants to be used in epidemic prevention and control, and understand the requirements for their transport as cargo by air.

Due to the variety in disinfectants and complexity of their compositions, this guidance lists only the commonly used articles or substances.

It shall be noted in particular that this guidance is to be used only for the rapid identification of disinfectants during the period of epidemic prevention and control. Transport activities involved shall be carried out based on shippers' declaration documents and other associated documents and in accordance with relevant requirements included in the *Civil Aviation Regulations on the Transport of Dangerous Goods by Air* and the *Technical Instructions on the Safe Transport of Dangerous Goods by Air* (2019-2020 Edition).

II. Legal Basis

This guidance is developed based mainly on UN *Recommendations on the Transport of Dangerous Goods - Model Regulations* (21st Edition), UN *Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria* (7th Edition), the ICAO *Technical Instructions on the Safe Transport of Dangerous Goods by Air* (2019-2020 Edition) and other legal and regulatory requirements.

III. Acknowledgments

This guidance is developed by the Dangerous Goods Management Center of CAAC. We would like to express our gratitude to Dangerous Goods Management (China) Ltd., Shanghai Research Institute of Chemical Industry Testing Co., Ltd., and Air China Cargo Co., Ltd., for providing data during the drafting process and to the experts from the 3rd CAAC Panel on the Transport of Dangerous Goods by Air for reviewing the draft guidance.

Guidance for Air Transport of Materials (Disinfectants) for Epidemic Prevention and Control

The health departments in China have put in place strict regulations and standards with respect to disinfectants¹. There exist a wide variety of disinfectants (Figure 1), most of which are flammable, corrosive or toxic if the concentration reaches a certain level, and therefore shall be classified as dangerous goods if offered for transport by air. In order to provide better support for safe transport of disinfectants by air, a brief description of the requirements for the air transport of disinfectants as cargo should be referenced.

It shall be noted in particular that the products may vary with brands and compositions, and therefore should be objectively classified and identified based on the compositions and the test results.

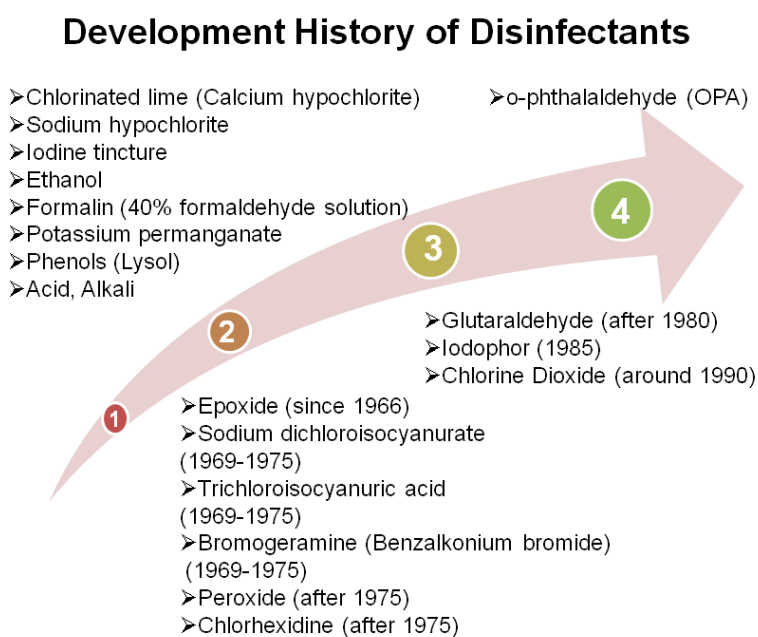


Fig. 1 Development History of Disinfectants

¹ Article 45 of the *Regulations on Disinfection Management* states that “Disinfection products: include disinfectants, disinfecting apparatuses (including bioindicators, chemical indicators and packages of sterilized articles), sanitary products and disposable medical products.” Disinfectants include disinfectants for disinfection of: medical and health supplies; skin and mucosa (mucosal disinfectants are only available for use in medical and health institutions for diagnosis and treatment); catering utensils; melons, fruits and vegetables; water; the surrounding environment; object surface areas; air; and excreta, secretions and other contaminants.

I. Hypochlorite and Its Solution

1. 84 Disinfectant Solution

It's a highly efficient disinfectant containing mainly aqueous solutions of sodium hypochlorite. The available chlorine content of the commercially available products is between 4.0% and 6.5%. It's highly corrosive and must not be mixed with acid. Therefore, it must be stored separately to avoid chlorine poisoning.

It is recommended that the disinfectant be classified as UN 1791, assigned a proper shipping name "**Hypochlorite solution**", classified in Class 8 - Corrosive substances, and assigned to Packing Group III. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 852, with the maximum net quantity per package not exceeding 5 L.



I. Hypochlorite and Its Solution

2. Bleaching Powder

Bleaching powder, also known as chlorinated lime, is a mixture of calcium hydroxide, calcium chloride and calcium hypochlorite. It's mainly composed of calcium hypochlorite and contains 25%-38% available chlorine. Bleaching powder is a fire accelerant which may cause burning and even explosion if under high temperature or mixed with water, acid or grease. In addition, bleaching powder can release chlorine under certain conditions (e.g. if in contact with acid), which can be toxic to the human body if inhaled through the upper respiratory tract or absorbed through skin mucosa.

It is recommended that the disinfectant be classified as UN 3487, assigned a proper shipping name “**Calcium hypochlorite, hydrated mixture, corrosive** with not less than 5.5% but not more than 16% water”, classified in Division 5.1 - Oxidizing substances, with a subsidiary hazard of Class 8 - Corrosive, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 558, with the maximum net quantity per package not exceeding 5 kg.

Note — It may also be classified as UN 1748, UN 2208, UN 2880, UN 3485 and UN 3486, based on the different content of calcium hypochlorite contained.



I. Hypochlorite and Its Solution

3. Bleaching Powder Concentrated

It's a white powder, which is high in the content of calcium hypochlorite and contains 80% - 85% available chlorine.

It is recommended that the disinfectant be classified as UN 1748, assigned a proper shipping name “**Calcium hypochlorite mixture, dry** with more than 39% available chlorine (8.8% available oxygen)”, classified in Division 5.1 - Oxidizing substances, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 558, with the maximum net quantity per package not exceeding 5 kg.

Note — It may also be classified as UN 3485, based on the different content and form of calcium hypochlorite contained.



II. Effervescent Disinfectant Tablet

1. Chloroisocyanuric Acid and Its Salt

Also known as chlorine-based disinfectant tablets, it's mainly composed of trichloroisocyanuric acid and its sodium salt or dichloroisocyanuric acid and its sodium salt. The products commercially available often contain 35% - 55% available chlorine.

- When trichloroisocyanuric acid is the only active ingredient, it is recommended that the disinfectant be classified as UN 2468, assigned a proper shipping name “**Trichloroisocyanuric acid, dry**”, classified in Division 5.1 - Oxidizing substances and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 558, with the maximum net quantity per package not exceeding 5 kg.
- When dichloroisocyanuric acid is the only active ingredient, it is recommended that the disinfectant be classified as UN 2465, assigned a proper shipping name “**Dichloroisocyanuric acid, dry**”, classified in Division 5.1 - Oxidizing substances and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 558, with the maximum net quantity per package not exceeding 5 kg.



II. Effervescent Disinfectant Tablet

- When the active ingredient is a mixture of the above two, it is recommended that the disinfectant be classified as UN 1479, assigned a proper shipping name “**Oxidizing solid, n.o.s.***”, classified in Division 5.1 - Oxidizing substances, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 558, with the maximum net quantity per package not exceeding 5 kg.

Note 1. — This kind of products are relatively complex in their composition, and therefore shall be classified based on the actual identification.

Note 2. — The dihydrated sodium salt of dichloroisocyanuric acid does not meet the criteria for inclusion in Division 5.1.



II. Effervescent Disinfectant Tablet

2. Chlorine Dioxide Effervescent Tablet

The commercially available chlorine dioxide effervescent tablets, which are generally in the form of tablets, contain 1 g/tablet, with ClO_2 content $\geq 10\%$.

It is recommended that the disinfectant be classified as UN 3085, assigned a proper shipping name “**Oxidizing solid, corrosive, n.o.s.***”, classified in Division 5.1 - Oxidizing substances, with a subsidiary hazard of Class 8 - Corrosive, and assigned to Packing Group I. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 557, with the maximum net quantity per package not exceeding 1 kg.



III. Potassium Permanganate

Potassium permanganate is a strong oxidizing agent and a fire accelerant. It is corrosive and irritant, and can cause burns to human. Also, it can react violently with glycerol, sucrose, camphor, turpentine, ethylene glycol, ether, hydroxylamine and other organic compounds, and causes combustion or explosion.

As far as solid potassium permanganate is concerned, it is recommended that it be classified as UN 1490, assigned a proper shipping name "**Potassium permanganate**", classified in Division 5.1 - Oxidizing substances, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 558, with the maximum net quantity per package not exceeding 5 kg.



III. Potassium Permanganate

Potassium permanganate solution, which is commonly known as gentian violet liquid, is purple red in color and of an unstable nature.

As a result of identification, potassium permanganate solution may possibly be classified as UN 3139, with a proper shipping name “**Oxidizing liquid, n.o.s***”.

Generally, aqueous solution of potassium permanganate with a concentration of 0.02% - 0.125% and for personal medical use, has been identified as non-restricted goods.



IV. Peroxyacetic Acid Solution

The concentration of commercially available peroxyacetic acid (peracetic acid) is 15% - 21%. It is flammable, explosive, and highly corrosive and irritant, and can cause burns to human. In the disinfectant solution of peroxyacetic acid, the concentration of peroxyacetic acid is relatively low.

- Where the concentration of peroxyacetic acid is more than 43% and the concentration of hydrogen peroxide exceeds 6%, the product is forbidden for transport by air.
- Where the concentration of peroxyacetic acid is not more than 43%, it is recommended that the disinfectant be classified as UN 3105 or UN 3107 or UN 3109 provided that testing as prescribed in the *UN Manual of Tests and Criteria* was satisfactorily made.
- For **Hydrogen peroxide and peroxyacetic acid mixture** with acid(s), water and not more than 5% peroxyacetic acid, **stabilized** that meets the laboratory testing requirement in Special Provision A96, it is recommended that the disinfectant be assigned to UN 3149, classified in Division 5.1 - Oxidizing substances, with a subsidiary hazard of Class 8 - Corrosive, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 550, with the maximum net quantity per package not exceeding 1 L.



V. Oxydol Disinfectant Solution

It's also called hydrogen peroxide disinfectant solution. The concentration of its commercially available products often stays between 3% - 25%. The difference in the concentration of hydrogen peroxide in the products results in different requirements to be met when offered for transport by air.

Concentration of hydrogen peroxide	UN No.	Proper shipping name	Hazard	Packing group and packing instruction
< 8%	-	-	-	Not Restricted
≥8% - <20%	UN 2984	Hydrogen peroxide, aqueous solution with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)	5.1	III, PI551, PI555
≥20% - ≤40%	UN 2014	Hydrogen peroxide, aqueous solution with not less than 20% but not more than 40% hydrogen peroxide (stabilized as necessary)	5.1(8)	II, PI550, PI554
>40% - ≤60%	UN 2014	Hydrogen peroxide, aqueous solution with more than 40% but not more than 60% hydrogen peroxide (stabilized as necessary)	5.1(8)	FORBIDDEN ¹
>60%	UN 2015	Hydrogen peroxide, aqueous solution , stabilized with more than 60% hydrogen peroxide	5.1(8)	FORBIDDEN
	UN 2015	Hydrogen peroxide, stabilized	5.1(8)	FORBIDDEN

Note 1.— As per Special Provision A75, articles such as sterilization devices including Hydrogen peroxide, aqueous solution (UN 2014), when containing less than 30 mL per inner packaging with not more than 150 mL per outer packaging, may be transported on passenger and cargo aircraft in accordance with relevant provisions, provided such packagings were first subjected to comparative fire testing.



VI. Alcohol Disinfectant

1. Alcohol Disinfectant

At present, most rinse-free hand sanitizers contain high-concentration alcohol (anhydrous ethanol).

It is recommended that alcohol disinfectant be classified as UN 1170, assigned a proper shipping name “**Ethyl alcohol solution** or **Ethanol solution**”, classified in Class 3 - Flammable liquids, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 353, with the maximum net quantity per package not exceeding 5 L.

Note — According to Special Provision A58, an alcoholic solution containing not more than 24 percent alcohol by volume is not subject to the Technical Instructions for the Safe Transport of Dangerous Goods by Air.



There are ethanol solutions with different active ingredients on the market, such as iodine (iodine tincture, see iodine-containing disinfectant), chlorhexidine and bromogeramine disinfectant solution, whose flammability also needs to be taken into account.

VI. Alcohol Disinfectant

2. Isopropanol Disinfectant

Some disinfectants and hand sanitizers contain isopropanol. It is recommended that the disinfectant be classified as UN 1219, assigned a proper shipping name “**Isopropanol**”, classified in Class 3 - Flammable liquids, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 353, with the maximum net quantity per package not exceeding 5 L.



VI. Alcohol Disinfectant

3. Alcohol Prep Pads or Swabs

According to Special Provision A46, alcohol prep pads or swabs sealed in small separate packaging are not subject to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* provided the alcohol liquid has been completely absorbed, the packaging is in good condition and has passed a leakproofness test.



VII. Iodine-containing Disinfectant

Iodine-containing disinfectants include iodophor, povidone iodine, iodine tincture, among others.

Iodophor, a preparation containing iodine complexed with certain surfactants, is a disinfectant with medium to low efficacy, with an available iodine concentration of 50 mg/L. Iodophor for medical use is usually with low concentration (1% or less) and is identified as non-restricted goods.



In general, povidone iodine and its aqueous solutions have been identified as non-restricted goods.



VII. Iodine-containing Disinfectant

Iodine tincture is a mixture of iodine, potassium iodide and ethanol. It is recommended that the disinfectant be classified as UN 1170, assigned a proper shipping name “**Ethyl alcohol solution** or **Ethanol solution**”, classified in Class 3 - Flammable liquids, and assigned to Packing Group III. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 355, with the maximum net quantity per package not exceeding 60 L.



Compound iodine disinfectant solutions contain chlorhexidine acetate and ethanol (58 - 72%). It is recommended that the disinfectant be classified as UN 1170, assigned a proper shipping name “**Ethyl alcohol solution** or **Ethanol solution**”, classified in Class 3 - Flammable liquids, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 353, with the maximum net quantity per package not exceeding 5 L.



VIII. Phenols Disinfectant

There are many phenolic disinfectants, and the common ones are lysol (also known as saponated cresol solution), compound phenol, creolin, phenol (also known as carbolic acid), p-chlorometaxyleneol, etc.

Note — The components and concentrations of phenol disinfectants are correlated with the hazards they bring, and should be objectively classified based on the exact components of the products and the actual data from tests.

Lysol is a saponated cresol solution which contains cresol, vegetable oil, sodium hydroxide or potassium hydroxide. It is recommended that the disinfectant be classified as UN 3267, assigned a proper shipping name “**Corrosive liquid, basic, organic, n.o.s.***”, classified in Class 8 - Corrosive substances, and assigned to Packing Group III. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 852, with the maximum net quantity per package not exceeding 5 L.



Compound phenol is mainly composed of phenol, acetic acid and dodecylbenzene sulfonic acid. It's recommended that consideration be given to its corrosivity and flammability.

Creolin is made by adding rosin, soap and sodium hydroxide into cresol. It's recommended that consideration be given to its corrosivity.

VIII. Phenols Disinfectant

For the phenol solution which is high in the percentage of active ingredient, it is recommended that the disinfectant be classified as UN 2821, assigned a proper shipping name “**Phenol solution**”, and classified in Division 6.1 - Toxic substances. For the phenol solution that has a concentration of not less than 3%, presents no toxic effect, and has been identified as being corrosive, it’s recommended that it be classified as UN 1760, and assigned a proper shipping name “**Corrosive liquid, n.o.s.***”.



p-Chlorometaxylenol (PCMX) disinfectant solution, whose common concentration of p-Chlorometaxylenol stays at 4.3 - 5.3% (W/V), exhibits to some extent inhibitory and bactericidal effects. It is recommended that consideration be given to the flammability of the solution. If the solution is not flammable, it is recommended that transport of the solution by air be carried out pursuant to what’s specified in Special Provision A197.



IX. Aldehyde Disinfectant

1. Formalin

Formalin is an aqueous solution with 35 - 40% (wt%) formaldehyde. Formaldehyde solution should be assigned into different classes of dangerous goods based on the formaldehyde concentration and the solvent composition.

Formaldehyde solution	UN no.	Proper shipping name	Hazard	Packing group and packing instruction
	UN 1198	Formaldehyde solution, flammable	3(8)	III, PI354, PI365
≥25%	UN 2209	Formaldehyde solution with not less than 25% formaldehyde	8	III, PI 852, PI856
≥10% - < 25%	UN 3334	Aviation regulated liquid, n.o.s.*	9	III, PI964

Note — According to Special Provision A189, except where the defining criteria of another class or division are met, formaldehyde solutions with formaldehyde concentrations:

—less than 25% but not less than 10% must be classified as UN 3334; and

—less than 10% are not subject to the Technical Instructions for the Safe Transport of Dangerous Goods by Air.



IX. Aldehyde Disinfectant

2. Glutaraldehyde Disinfectant

Glutaraldehyde, an efficient disinfectant, can kill various kinds of microorganisms and is recommended by WHO as the disinfectant for hepatitis virus contaminants.

It's recommended that the 50% glutaraldehyde solution be classified as UN 2922, assigned a proper shipping name "**Corrosive liquid, toxic, n.o.s.***", classified in Class 8 - Corrosive substances, with a subsidiary hazard of Division 6.1 - Toxic, and assigned to Packing Group II. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 851, with the maximum net quantity per package not exceeding 1 L.

It's recommended that the 10% glutaraldehyde solution be classified as UN 1760, assigned a proper shipping name "**Corrosive liquid, n.o.s.***", classified as Class 8 - Corrosive substances, and assigned to Packing Group III. If offered for transport on a passenger aircraft, it shall be packed in accordance with the Packing Instruction 852, with the maximum net quantity per package not exceeding 5 L.

Low concentration glutaraldehyde (2% or 0.5% - 1%) for medical use has been identified as non-restricted goods.



IX. Aldehyde Disinfectant

3. o-Phthalaldehyde Disinfectant Solution

As a highly efficient new medical disinfectant, its main active ingredient is o-phthalaldehyde with a concentration of 0.5% - 0.6%. Due to the presence of ethanol in the solvent, the possible hazards include the flammability, corrosivity, or toxicity.

Note – There is currently no data on the hazard identification for this kind of products, so the specific classification is unknown.



产品规格
1L/瓶 2.5L/瓶 5L/瓶

