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# A Review: Disinfectant, Antiseptic, and Its Use for Infection

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Abstract

Control of microorganisms is vital to prevent infection. Prevention can be done in various ways, one of which is the use of disinfectants and antiseptics. The widespread use of disinfectants and antiseptics due to the outbreak of COVID-19 has led to the use of antiseptics that are not appropriate for society. The use of biocide agents that are not used correctly can endanger the health of its users. It is recommended that pharmacists, related health workers, and the public should learn more comprehensively about the use of disinfectants and antiseptics when a pandemic occurs. This review is done by searching Google Scholar as a database. This article discusses biocide agents, especially disinfectants and antiseptics, including definitions, ingredients and concentrations, antimicrobial effectiveness, factors affecting disinfection, hazards, techniques, and accuracy of the dosage of their use, the use and advantages and disadvantages of several classes of disinfectants and antiseptics that must be understood to be useful in their use, in this review also describe some formulations of disinfectant and antiseptic products circulating in the community that can be obtained and used from the commercial market.

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## INTRODUCTION

Control of microorganisms is vital to prevent infection. Prevention of infection is done in various ways, one of which is the use of disinfectants and antiseptics. The existence of Covid-19 makes the use of antiseptics and disinfectants in the community high. Now many found to do disinfectant spraying to the human body, both in the disinfectant booth or direct spraying. WHO (World Health Organization) does not justify this activity given the occurrence of disinfectant exposure to living things at risk of irritating the skin, eyes, as well as respiratory problems ("Disinfectant Ineffective to Prevent Covid-19 Transmission," n.d.). A data search in this literature study was based on primary data from compendial (USP, CPOB), scientific journals, as well as articles from the Centers for Disease Control and Prevention with the theme focusing on disinfectants and antiseptics.

COVID-19 can spread through particles from sneezing or cough sufferers that stick to other objects such as clothing or electronic devices from people around (Wang *et al.*, 2020) Therefore; it is necessary to take precautions on the transmission of COVID-19. This pandemic is one, that is feared by the community but can be prevented by various means. Many ways to avoid transmission of COVID-19, is by using antiseptics and disinfectants. The author tries this to impress the use of antiseptics and disinfec-

tants while choosing COVID-19 transmission in the community.

## MATERIALS AND METHODS

### Disinfectants, antiseptics, and antibiotics

A disinfectant is a chemical agent used on surfaces and inanimate objects to destroy fungi, bacteria, and viruses that can infect but not destroy spores (Pharmacopeia, 2013). Antiseptics are chemical agents that inhibit or destroy microorganisms in living tissue, including the skin, oral cavity, and open wounds (Pharmacopeia, 2013). From the statement that distinguishes disinfectants used to clean the surface of inanimate objects (tables, floors, walls, surgical instruments, etc.), while antiseptics are made for living tissue (as hand sanitizers, surgical scrubs, handwashes, etc.). Both disinfectants and antiseptics are chemical agents that can inactivate bacteria by inhibiting the growth of microorganisms (-static) or killing microorganisms (-sidal).

Another substance known as a bacterial killing agent is antibiotics. Antibiotics are drugs that are used to kill bacteria in infected living things (Pelczar and Chan, 2008). The way antibiotics work is more specific compared to disinfectants that have a broad spectrum. Antibiotics work on prokaryotic cells only, while disinfectants work on prokaryotic cells also work on eukaryotic (human) cells that cause dangerous disinfectants if used on living tissue (McDonnell and Russell, 1999). Besides, antibiotic use must be prescribed by a doctor, while disinfectants are not.

It is not justified if disinfectants are used as an antiseptic on the skin. In terms of material, the general concentration of materials and biocide capability of the disinfectant is higher and toxic compared to antiseptic. Disinfectant is harmful if used in the tissues of life, can disrupt the ecosystem of healthy body flora, causing asthma, irritating the skin, eyes, as well as respiratory problems such as asthma (Rosenman, 2006). Thus, disinfectant, antiseptic, and antibiotic are different in their use. Disinfectant can not be used as an antibiotic and antiseptic because it can harm the tissues of life. Antiseptic is not potential as a disinfectant and antibiotic, as well as antibiotics instead of provisions as a disinfectant and antiseptic agent because it triggers resistance.

### Kinds of Disinfectants

### Alcohol

Alcohol is a broad-spectrum biocide used as a disinfectant and antiseptic. The bactericidal nature of alcohol is more reliable than bacteriostatic against vegetative bacteria. Alcohol is tuberculosis, fungicide, and virus. But alcohol is not sporicidal. Therefore alcohol is not suitable for use as a sterilizing agent and cleaning surgical tools (Rutala, 1990), The mechanism of alcohol as a biocide is by denaturing proteins so that microorganisms undergo lysis and die. Types of alcohol that are widely used as germicides are ethyl alcohol (ethanol) and isopropyl alcohol (isopropanol) (Yasuda-Yasuki *et al.*, 1978). Ethanol is said to be more potent to eradicate the virus, while isopropanol is more potent as a bactericide. This relates to the lipophilicity of substances, where isopropanol is more lipophilic compared to ethanol so that the efficacy of isopropanol is less potent against hydrophilic viruses (e.g. poliovirus). But it all depends again on the concentration of substances used.

### Ethyl Alcohol

Ethanol at concentrations of 60%-80% potent as virucidal and inactivation of lipophilic viruses (herpes, influenza virus) is also a hydrophilic virus (adenovirus, Enterovirus, Rhinovirus, rotavirus, but not in the virus of hepatitis A (HAV), and poliovirus) (Tyler *et al.*, 1990). Isopropyl alcohol is potential against the lipid virus, but not active against a non-lipid enteroviru (Baertschi *et al.*, 2015). The methyl alcohol (methanol) is a type of alcohol that is rarely used as a disinfectant or antiseptic because of its low bacterial activity (Tilley and Schaffer, 1926).

The optimum concentration of alcohol as a bactericide is 60-90%. But the activity of destroying microorganisms from alcohol decreases when it is diluted below 50%. Alcohol is volatile and flammable Table 1. Alcohol must be stored in a cool place with controlled ventilation (Rutala and Weber, 2008).

### Aldehyde

Aldehydes can be used as disinfectant, preservative, and sterilant because the aldehydes are sporoside. The aldehydes are not used as an antiseptic because it is toxic, irritating the skin, irritating the eyes, causing upper respiratory disorders, and may trigger cancer (carcinogenic) Table 2 (McDonnell and Russell, 1999). Formaldehyde ($CH_2O$) is a water-soluble monoaldehyde. A formaldehyde solution contains 34-38% (WT/WT) CH2O in methanol. Formaldehyde is widely used in communities as disinfectants and sterility, bactericide, Sporosida, and Virucidal. However, formaldehyde works slower than Glutaraldehyde (McDonnell and Russell, 1999). Glutaraldehyde has high antimicrobial activity. Glutaraldehyde activity has a broad spectrum of bacteria and its spores, fungi, and viruses. This sub-

 

**Table 1: Advantage and weakness of the alcohol group**

| Advantage | Weakness |
|---|---|
| Broad-spectrum (including killing Spore), rapid action, not corrosive, volatile so less residue, making the skin dry (McDonnell and Russell, 1999). | No sporiside, flammable, not coock for large surfaces, not surfactant (Rutala and Weber, 2008). |

stance is a virucide agent that can decrease the activity of hepatitis B and hepatitis A. The concentration of < 0.1% of alkaline glutaraldehyde is effective for poliovirus. At 2% concentration can eradicate spores (sporicide) (Groote *et al.*, 2014; McDonnell and Russell, 1999).

**Biguanide**

**Chlorhexidine**

Chlorhexidine is a biguanide antimicrobial that is widely used as an antiseptic, handwash, and oral product, as well as a disinfectant and preservative (Hennessey, 1973). This is because chlorhexidine is a broad spectrum. Chlorhexidine has varied antiviral activity but is not effective against rotavirus, HAV, or polio (Tyler *et al.*, 1990). Low ability to irritate the skin Table 3. However, the activity of chlorhexidine is limited by pH 12 better at alkaline pH than at acidic pH, and its activity is reduced due to the presence of organic substances and is not fungicidal.

**Chlorine Compound**

Chlorine solution is a broad-spectrum biocide that can be used as a disinfectant and sterilant because it is sporicidal. Chlorine is inexpensive, widely available on the market, and is relatively fast-acting Table 4. However, the chlorine solution is corrosive, unstable, and biocide activity quickly disappears due to the presence of heavy metals. Chlorine has high toxicity, and this substance must be used in areas with proper ventilation (McDonnell and Russell, 1999; Shirai *et al.*, 2000).

Sodium hypochlorite (NaOCl) is an example of chlorine that is widely used with concentrations of 1-35%—mostly used in concentrations of 1-5%. In 1% sodium hypochlorite solution contains 10,000 ppm free chlorine. The concentration of 5 ppm will kill vegetative bacteria. To kill spores, 10-1000 times greater concentration is required (Williams, 2004). Potential hypochlorite solutions as spores are reached when there is alcohol and buffer pH at 7.6 - 8.1 of alcohol-hypochlorite resulting in good sporicidal activity and optimum stability.

**Iodine compound**

Iodine compound is a broad-spectrum disinfectant that is effective against various bacteria, mycobacteria, fungi, and viruses Table 5. The tincture of iodine can be used as an antiseptic for injured skin. Iodine agents are inactivated by the presence of QAC and organic matter. Iodophor is widely used in povidone-iodine and poloxamer-iodine as an antiseptic and disinfectant. Iodophor is an iodine carrier/iodine-releasing agent, a sophisticated form of iodine as a solvent agent that can release small amounts of iodine in solution to kill microbes (McDonnell and Russell, 1999; Shirai *et al.*, 2000).

**Phenolic**

Phenol is a biocidal agent used as a disinfectant, but not for antiseptics. The derivatives of phenol are Bis-Phenol and Halophenols. Lack of phenol as a disinfectant is to leave residue on the surface Table 6. Phenol is very toxic, corrosive, and easily absorbed by the skin. Need to use protective equipment (such as latex gloves) if you want to use phenol as a disinfectant (Belofsky *et al.*, 2014; Hegna, 1977).

**Quaternary ammonium compounds (QAC)**

QAC, also called Quat, is a cationic surface-active agent that can be used as an antiseptic and disinfectant. The mechanism of action of QAC is that cationic agents in QAC react with phospholipids in the cytoplasmic membrane of bacteria that cause lysis. The effective concentration of QAC as a disinfectant is 0.1-2% for cleaning floors and walls. The corrosive and irritative nature of QAC is low, but QAC is not sufficient for removing biofilms. Usually, the time needed for QAC to kill microorganisms in 10 minutes and leaves a residue that must be cleaned after disinfection (Gerba, 2015; McDonnell and Burke, 2011).

**Benzalkonium chloride ( BAC)**

BAC is widely used as a clothing cleaner, disinfectant, preservative in hair conditioner, as well as antimicrobial soap. Some mentioned BAC is toxic, irritating to the skin Table 7. EPA classifies BAC as a category I toxicity that irritates the eyes and skin. However, most studies and government institutions agree that BAC is not a hazardous substance when used in small concentrations (Marple *et al.*, 2004; Pereira and Tagkopoulos, 2019).

**Oxidizing agents**

Oxidizing agents that are often used are hydro-

**Table 2: Advantage and weakness of Aldehyde group**

| Advantage | Weakness |
|---|---|
| The broad-spectrum activity includes killing spores, non-corrosive to stainless steel | Toxic and irritant, unstable, pungent odour, the presence of organic matter (blood, sputum, soil) decreases the sporicidal activity of aldehydes. |

**Table 3: Advantage and weakness Biguanide**

| Advantage | Weakness |
|---|---|
| Broad-spectrum activity, low toxicity, non-corrosive, easy to clean (Mitra *et al.*, 2005). | Does not kill spores, activity is limited by pH range, and activity is reduced due to the presence of organic matter 20 |

**Table 4: Advantage and weakness chlorine compound**

| Advantage | Weakness |
|---|---|
| Broad-spectrum activity (including sporicides), effective at small concentrations. McDonnell and Russell (1999). | Corrosive to metal, activity decreases when there is an organic material |

**Table 5: Advantage and weakness iodine compound**

| Advantage | Weakness |
|---|---|
| Works quickly as a bactericide, fungicide, tuberculosis, virucide, and sporicide. Not too reactive compared to chlorine, fast-acting at small concentrations (McDonnell and Russell, 1999). | It is irritative at high concentrations and causes excessive staining, is not stable in solution (McDonnell and Russell, 1999). |

**Table 6: Advantage and weakness of phenolic**

| Advantages | Weakness |
|---|---|
| Broad-spectrum activity, fast action, tolerant of soil | Not sporicidal, (Russell, 1990) flammable, pungent, toxic (absorbed by the entire route), (Radulovic *et al.*, 2018) leaving residue on the surface, inactivated by hard water, reduced activity by nonionic detergents. |

**Table 7: Advantage and weakness quaternary ammonium compounds**

| Advantage | Weakness |
|---|---|
| Broad-spectrum activity, excellent stability, non-corrosive, non-toxic at low concentrations | Not sporicidal, leaving residue on the surface, less effective against gram-negative, fungistatic (not fungicidal) (Mcdonnell, 2007). |

gen peroxide, ozone, and potassium permanganate. Hydrogen Peroxide ($H_2O_2$) is used as an antiseptic, disinfectant, and sterile because it is sporicidal. In sporicidal solutions at high concentrations (10-30%) and require a longer contact time. In the form of $H_2O_2$ gas, the antimicrobial activity is significantly increased. Besides this substance is environmentally friendly, and it rapidly degrades Tables 8 and 9.

Peracetic acid (PAA) has a stronger activity compared to hydrogen peroxide as an agent of sporicides, bactericides, viruses, and fungicides at low concentrations (0.3%). PAA also breaks down into safe byproducts (acetic acid and oxygen). PAA is effective and is widely used for disinfection of food processing equipment and medical instruments because it does not leave toxic residues, as well as sterilizing liquids at low temperatures for medical devices including devices.

**Factors Affecting the Disinfection Process**

**Table 8: Advantage and weakness oxidizing agent**

| Advantages | Weakness |
|---|---|
| Broad-spectrum, sporoside at high temperatures, does not leave toxic residues, environmentally friendly. | Flammable in high Concentration |

**Table 9: Uses and inactivating agents in biocide types**

| Group | Usage | Dapat menginaktivasi[4] | | | | |
|---|---|---|---|---|---|---|
| | | Vegetative Bacteria | Lipovirus | Nonlipid Virus | Mycobac-tericidal | Sporiside |
| Ethanol | Antiseptic, disinfectant, preservative | ✓ | ✓ | * | | |
| Isopropanol | Antiseptic, disinfectant, preservative | ✓ | ✓ | * | | |
| Biguanide (Chlorhexidine) | Antiseptics, antiplaque agents, preservatives, antifungals | ✓ | ✓ | * | | |
| Chlorin and zat chlorin | Antiseptic, disinfectant | ✓ | ✓ | ✓ | ✓ | ✓ on 5000 ppm) |
| Formaldehyde | Disinfectant, sterilant, preservative | ✓ | ✓ | ✓ | ✓ | ✓ |
| Glutaraldehyde | Disinfectant, sterilant, preservative | ✓ | ✓ | ✓ | ✓ | ✓ |
| Phenolic | Disinfectant, preservative | ✓ | ✓ | * | | |
| Quaternary Ammonium Compounds | Disinfectant, cleaning agent, antiseptic | ✓ | ✓ | | | |

**Type and number of microorganisms**

Disinfectants are more effective against small numbers of microorganisms than many microorganisms. Some microorganisms are more resistant to disinfectants Table 10. Gram-positive bacteria are easier to eradicate than gram-negative bacteria. Vegetative bacteria are easier to eradicate compared to fungi, and the most difficult to eradicate is bacterial endospores. To kill endospores, it is necessary to disinfectant, which is sporicidal.

**Location of microorganisms**

The location of microorganisms on non-smooth surfaces is more challenging to clean than on smooth surfaces. The degree of a surface affects the disinfection process.

**Temperature**

Temperature can affect the reaction speed. In general, disinfectants do not work effectively at low temperatures. If you need disinfectants in cold areas, you need to evaluate their effectiveness.

**pH**

Such extreme pH temperatures can affect the effectiveness of disinfectants (Pharmacopeia, 2013).

**Disinfectant concentrations**

Disinfectant manufactured by the company is in the most effective concentration range. Excess dilution can eliminate the efficacy. Follow the usage according to manufacturing Table 11. Describes the often-used concentration of disinfectants (Pharmacopeia, 2013).

**Time Contact**

The time is taken for the disinfectant to remain wet on the surface. In practice keeping the surface wet is quite difficult for disinfectants that require a long

**Table 10: Resistance of several clinically important microorganism against disinfectant**

| Type of Microorganisms | Examples |
|---|---|
| Micro bacteria | Bacillus subtilis and Clostridium sporogenes |
| Non-lipid coated viruses | Mycobacterium Tuberculosis |
| Fungal spores and vegetative moulds and yeast | Poliovirus and rhinovirus, Trichophyton, cryptococcus, and candida spp |
| Vegetative bacteria | Pseudomonas aeruginosa, Staphylococus aereus, and Salmonella spp. |
| Lipid coated Viruses | Herpes Simplex virus, hepatitis B virus, and Human immunodeficiency virus |

**Table 11: Concentration of disinfectants commonly used**

| Disinfectant | Concentration Exponents |
|---|---|
| Hydrogen peroxide | 0.5 |
| Sodium hypochlorite | 0.5 |
| Mercuric chloride | 1 |
| Chlorhexidine | 2 |
| Formaldehyde | 1 |
| Alcohol | 9 |
| Phenol | 6 |
| Quaternary ammonium compounds | 0.8-2.5 |
| Aliphatic alcohol | 6.0-12.7 |
| Phenolic compounds | 4-9.9 |

contact time, such as 10 minutes. This is influenced by high temperatures and low humidity, which will be more challenging to keep the disinfectant wet. Especially in the type of alcohol disinfectant, which is volatile. The contact time range for disinfectants is 15 seconds to 10 minutes. If the disinfected surface is dry before the contact time is reached, there need to be instructions on the label to be re-applied to ensure the contact time remains appropriate. Contact time depends on the manufacturer and based on microbiological tests (Song *et al.*, 2016).

### Soil

The presence of soil that has not been wholly cleaned can affect the disinfectant for contact with the microbial cell. For that, cleaning before disinfection on the surface is important (Meyer *et al.*, 2010).

### Water

Water fast can be a problem. Water used to prepare disinfectants in the production facilities should be put into the study of the effectiveness of disinfectants.

## RESULTS AND DISCUSSION

### Disinfection technique

### Spraying or Wiping

praying and darkening are done for relatively small surfaces. Spraying or wiping alone does not optimally kill microbes (Figure 2), (Beaney, 2006). The best way on a small surface is by spraying then continuing with darkening to ensure that the particles are completely clean. For flat and soft surfaces such as (for example tables, benches), the disinfectant is sprayed on a dry cloth and then continued with darkening. This can reduce bioburden from disinfectants exposing the body. For uneven surfaces and small objects, spraying can be done directly onto the surface of the object to maximize biocide contact with the entire surface. But need to be careful because spraying directly on objects causes the airborne from disinfectants to be sucked or exposed to the body. When using a dry cloth for disinfection, make sure the cloth must look wet. If the lap is folded, the disinfectant must be sprayed on both sides Figure 1.

### Mop and Bucket System

Mop and Bucket System is used for large surface cleaning. There are three types of systems in this method, namely single, double, and triple bucket (Beaney, 2006). In a single bucket, the disinfectant solution will be easily contaminated. Either use a minimum of a double bucket (consisting of a dirty and clean solution), or more efficient

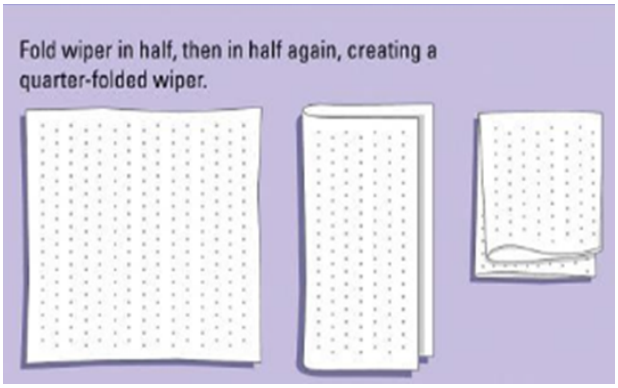


**Figure 1: Lap folding technique**

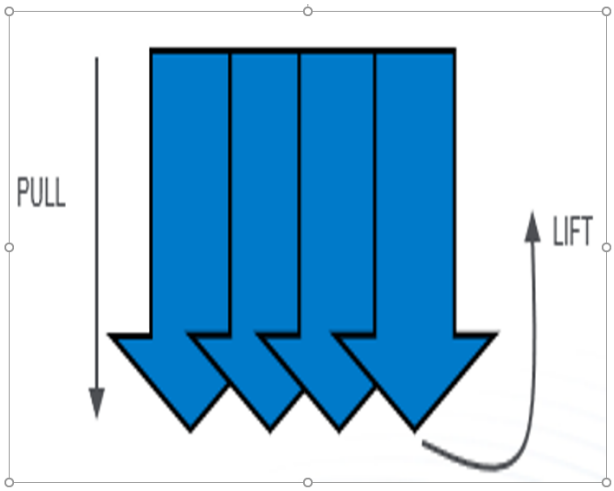


**Figure 2: Technic Pull and Lift[23]**

use of a triple bucket (consisting of a dirty, rinse, and clean solution). In the pharmaceutical industry, the method used is a double bucket and, in the C/D class area uses a triple jacket. The single bucket method is not used because it is not compatible with GMP. In the rinse solution (triple bucket method), it is best to use a disinfectant solution. But even using water is allowed to control costs. Disinfectants and mop wipes should be replaced when they look dirty (Gilbert, 1970).

**Clean-rinse-disinfect-rinse**

Clean-rinse-disinfect-rinse is the sequence used when mopping and wiping. The basis of the wiping and moping process is the process of cleaning - disinfection - residue removal-drying. The efficacy of disinfectants will change with the presence of organic substances, so cleaning the surface first becomes important before disinfection. The cleaning and rinsing process will remove all contamination, usually using a nonionic surfactant or enzymatic cleaner for wetting, cleaning and removing biofilms. After doing clean and rinse, then disinfect is done by paying attention to contact time. After that rinse is done again to remove residue, the pharmaceutical industry can use water for injection (WFI) (Williams, 2004).

**Pull and Lift Technic**

Full and lift is a technique used for mopping and wiping Figure 2. This technique can avoid the spread of contamination on the surface. Contaminated surfaces will be carried to the elevator (Gilbert, 1970).

**Fogging System**

Fogging is an ideal way for large rooms with complex surfaces and difficult to reach areas, such as the removal of the entire hall room, outdoor disinfection, etc.). The fogging officer must use the APD to protect himself from infectious exposure. They were previously done emptying the room first. In the pharmaceutical industry during fogging, HVAC systems must be turned off and validated to ensure biocides reach all parts of the room. The classification of fogging systems is based on large droplets. The compounds used for fogging are usually formaldehyde, phenol, and benzalkonium chloride, or fumigation using ozone mist, evaporated hydrogen peroxide (Forrester and Diebolt-Brown, 2000).

**Potential Hazard**

Some of the hazards that can be caused by several groups of disinfectants are presented in Table 12.

**Examples of Disinfectants that are Widely Used in Society**

**Brand A**

**Ingredients**

Ethanol, Alkyl Dimethyl Benzyl Ammonium Saccharinate, perfume, and Limonene. Disinfectant brand A-shaped spray disinfectant. These preparations can be used for rough surfaces (toilets, sinks, etc.) and soft (sofas, mattresses, etc.). The use of the disinfectant of alcohol (ethanol) is suitable for the preparation of spray because it is quickly evaporated. Storage of this disinfectant should not be stored at temperatures over 50$^{o}$C. How to use this disinfectant with sprayed at a distance of 15-20 cm from the surface, then let dry and no need to wipe again. This disinfectant can also appreciate the room because it contains perfume.

**Brand B**

**Ingredients**

Sodium Hypochlorite 5.25%. This product is commonly used as a bleach (bleaching) clothes but can also be used as a disinfectant agent. The effective concentration as a viral agent of sodium hypochlorite is 0.05 - 0.5% 18. The disinfection technique is usually done by mopping / wiping after 10 minutes wipe the surface again using a wet cloth because this

**Table 12: Hazards potential from disinfectant group**

| Group | Chemical Disinfectants | Hazard potential |
|---|---|---|
| Alcohol | Ethyl alcohol<br>Isopropyl alcohol | Flammable, making dry skin that causes dermatitis. If it is suction at a high concentration causes irritation of the respiratory tract and effects on the nervous system |
| Aldehyde | Formaldehyde<br>Glutaraldehyde<br>OPA(Ortho-phthalaldehye) | Formaldehyde on the form of gas is very flammable so that it should be used on areas with good ventilation known formaldehyde is carcinogenic. Immuting irritation, toxic to humans due to direct or suction contact at high concentrations. |
| Chlorine compounds | Sodium hypochlorite<br>Calcium hypochlorite | Mixing hypochlorite with strong acids causes harsh reactions that emit toxic gases. Can react explosively with ammonia, amine, or reducing agent. It causes skin irritation. High concentration hypochlorite solutions can cause a burning effect on the skin. |
| Phenolic | Cresol<br>Hexachlorophene | Irritating to skin and eyes Harmful to humans if inhaled or exposed to a high concentration of skin. |
| Oxidizing agents | Hydrogen peroxide | Flammable in high concentration. |

substance is corrosive to metals.

**Brand C**

**Ingredients**

Per 100 g liquid contains 2.4 g Benzalkonium Chloride (BAC), containing < 5% of EDTA salts, disinfectants, perfumes, limonene, citral, hexyl cinnamal. This product claims to be Fertilmicelli 99.9% bacteria on surfaces including E-coli, almonella, listeria, MRSA, and flu viruses. This product can be used on the surface of dead objects (disinfectants) and skin (antiseptic) with notes following the usage instructions. The maximum concentration of BAC as a disinfectant on the surface with food contact is 0.1% 19. The drawback of this ingredient is leaving scars on the surface and not killing mushrooms, only inhibiting growth. Besides, BAC can irritate the skin. So please note how to use this product. How to use; Without dilution: For the surface of the toilet seat, the solution can be directly applied without dilution. For dilution of dissolve 83 ml disinfectant with water for disinfection and on surfaces of contact with food, dissolve 160 ml into the washing for disinfection of the clothes/Landry. For antibacterial skin cleanser, dissolve 85 ml into 1 litre of warm water, use it on the desired area for 5 minutes, then rinse using water and soap.

**Brand D**

The material of disinfectant in Merk D is Alcohol Etoxilate 3% and Benzalkonium chloride 1.25%. This brand is commonly used as a floor cleaner. Alcohol Ethoxylate is a nonionic surfactant that is used as a cleanser by lifting dirt and deposits through a decrease in liquid surface tension with dirt particles attached up to the surface of the dirt so that impurities can be rinsed. This substance is also used as an emulsifier to help bind the active ingredient and keep the formula from unravelling over time. The use of this product is done by dilution of 40 ml in 1 L of water and can be used.

**Brand E**

**Material**

Pine Oil 2.5%. This disinfectant contains a pine oil 2.5% commonly used as a floor cleaner. Pine Oil has natural smell characteristic where this substance is originally a result of distillation from fir tree which is now synthetic and commercially synthetically as the agent Disinfectane effective Concentrations of pine Oil as a disinfectant is 0.23%. The usage is by dilute 1 part of the substance into nine parts of water.

Each product has its respective specifications according to the created formula. Therefore, the vital thing to consider is the use of disinfectant

 

products is to read the rules of Use and security information on the product. It is not justified if the mixing of various kinds of disinfectants without further knowledge.

## CONCLUSION

The use of a biocide solution as a microbial control substance both a disinfectant and antiseptic needs to be done with appropriate selection and treatment. The selection and understanding of the type of biocide and its concentration, cleaning techniques, how to use, as well as evaluation of the disinfection process should be considered well so that benefit is more significant than the risk gained.

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