

# Antiseptics, disinfectants and preservatives

Chapter 16

# Introduction:

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- ▶ Chemical biocides are used as antiseptics, preservatives or disinfectants

المبيد الحيوي او biocide

: مادة كيميائية أو كائن حي دقيق يهدف إلى تدمير أو إبطال مفعول أو قتل أي كائن حي دقيق ضار.

بختلف عن المضاد الحيوي:

- ▶ Differ from antibiotics:

- Chemically synthesized

مصنع كيميائي،  
وممكن يكون له اثر مدمر على الخلايا بشكل

- Cause more general damage to cell ( unlike antibiotics which have specific targets)

لا تستخدم علاجيا

ومقاومتها من قبل الكائنات الحية الدقيقة

- Are not used therapeutically

الاخري ضعيفة

- Resistance to biocides tends to occur less readily
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وفي عندي ثلاث انواع من ال biocides  
اما antiseptic وهي المعقمات  
او disinfectant مطهرات  
او preservatives وهي مواد حافظة

# Definitions

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## ▶ Antiseptics:

- Have broad spectrum of antimicrobial activity خصائص ال antiseptic
- Sufficiently non toxic بتقتل طيف واسع من ال MO، غير سام وغالبا ما بأثروا، يمكن استخدامه على الجلد
- Can be used on broken skin or mucosal surfaces

## ▶ Disinfectants:

- Have broad spectrum activity خصائص ال disinfectant
- Have toxicity issues بتقتل طيف واسع من الميكروبات، ممكن يسبب تسمم، يستخدم على الاسطح غير الحية (حنفية، مكتب، مجلى اي شي)
- Limit uses to inanimate surfaces (worktops, floors, sinks, and drains)



# Definitions

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## ▶ Preservatives:

- Broad spectrum antimicrobial agents
- Incorporated into pharmaceutical and other products to prevent the growth of contaminant M.O. which might arise during use
- Bactericidal, virucidal or fungicidal
- Bacteriostatic, virustatic and fungistatic  
(Note : time and concentration dependent)

خصائص المواد الحافظة ال  
:preservatives  
طيف واسع في قتل  
الميكروبات، موجودة في  
المنتجات الصيدلانية وغيرها  
لمنع نمو M.O الملوثات التي  
قد تنشأ أثناء الاستخدام،  
مبيد للجراثيم ، ومبيد  
للفيروسات أو فطريات.



# Examples of different chemical biocides and their uses

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- ▶ Refer to page 151-153



**Table 16.1** (Continued)

<b>Biocide group</b>	<b>Examples</b>	<b>Spectrum of activity</b>	<b>Mode of action</b>	<b>Formulation issues</b>	<b>Commercial uses</b>
Esters	Methyl, ethyl, butyl, propyl and benzyl parabens	Mainly G + ve bacteria and fungi Less active against G – ve cells	Not well understood Disrupt membrane transport processes; inhibit nucleic acid synthesis and inactivate key enzymes	Activity increases with alkyl chain length but solubility decreases Partition into oil phase of emulsions	Widely used as preservatives in pharmaceutical industry
Halogens	Chlorine Hypochlorites Iodine Iodophors	Broad antimicrobial spectrum Sporicidal	Cause enzyme and protein damage by interacting with amino and thiol groups	Can be irritant and staining	Used in skin disinfection and as general disinfectants
Isothiazolones	Range of commercial mixtures	Broad spectrum antibacterial, fungicidal	Inhibit active transport and glucose oxidation by binding to thiol groups on enzymes	Water soluble, pH stable and biodegradable	Mainly used as preservatives
Metals	Copper Mercury Silver Phenylmercuric nitrate (PMN) and Phenylmercuric acetate (PMA) Thiomersal	Phenylmercuric nitrate (PMN) active against G + ve and G – ve cells and fungi Not sporicidal	Silver binds with thiol groups on proteins and enzymes Interacts with bases on DNA	Toxicity problems with mercurials in particular. PMN incompatible with a number of common excipients Activity of silver depends on presence of Ag <sup>+</sup> ion	PMN and PMA limited use as preservatives Silver used as topical antiseptic and wound treatment
Organic acids	Benzoic acid Sorbic acid	Mainly active against fungi More limited activity against bacteria	Uncoupling agents Prevent uptake of substrates requiring proton motive force for transport	Activity highly pH dependent Only active at pH lower than 5	Used as preservatives particularly in the food industry
Peroxygens	Hydrogen peroxide Peracetic acid	Broad spectrum activity Sporicidal	Oxidation of functional groups on proteins	Hydrogen peroxide unstable	Used as antiseptics and disinfectants

(continued)