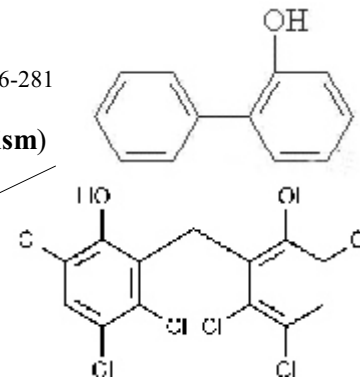


# CHEMICAL METHODS OF BACTERIAL CONTROL, ANTISEPTICS

rvsd 7/25/97, 17 July 2000, 17 July 02, 21 July 03, 14Apr06, 20July07, 23July08, 10Oct12, 21Feb13  
 TFC, 2ND, P. 194-, Alcamo 4th, pp 669-689, TFC 7<sup>th</sup>, 193-205, 8<sup>th</sup>: 192-204, Black 6<sup>th</sup>: pp328-338, Bauman 2<sup>nd</sup>: 276-281  
 Bauman 3rd:271-281

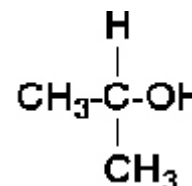
**SEE SUMMARY TABLE: p 277 (Targets: membrane, enzymes, cell wall, DNA, metabolism)**

**Phenolics** injure plasma membrane, inactivate enz. halogenation: O-phenylphenol in Lysol (p 272) increases effectiveness  
 pHisoHex has hexachlorophene (276) (led to neurological damage in infants):



**ALCOHOLS** disrupts membranes and denatures enzymes.  
 not effective against non-enveloped viruses or endospores.

P 273 Especially good for surfaces, tho may primarily wipe off bacteria...  
 EtOH: 70% aqueous more effective, (water needed to denature protein) generally recommended  
 Isopropanol seems more effective, less expensive.  
 graph to compare effectiveness of 95% vs 70%  
**tinctures:** alcoholic solutions of antimicrobials



**HALOGENS** may add to tyrosine, denaturing enzymes also strong oxidants,  
 usually used in **tincture** (EtOH soln) does not kill all viruses.

P 277 **Iodophors** bind the iodine to organic molecules, release slowly, non-irritating, do not stain so badly:  
 Betadine, Escodyne

**Chlorine** used on water esp. Ca hypochlorite (Ca(OCl)<sub>2</sub>) used on dairy and swimming pools. Can produce carcinogenic chlorinated compounds.  
 Clorox is 5% NaOCl (1/2 tsp/2 gal clear water, 30 min, to disinfect.)

**Chloramines** Chlorine and ammonia, used to treat water in emerg., may not be carcinogenic

**Bromine** used in hot tubs, evaporates more slowly at elevated temperatures

## OXIDIZING AGENTS

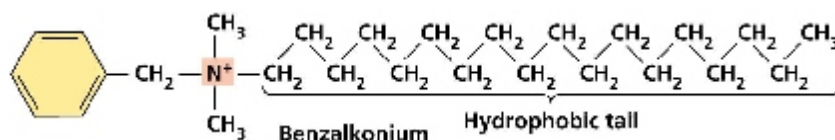
H<sub>2</sub>O<sub>2</sub> better on inanimate surface (wound enzyme *catalase* inactivates)  
 ozone (O<sub>3</sub>) "Fresh smell" after electrical storm, can be used to sanitize water  
 Zn peroxide: used to irrigate deep wounds,  
 benzoyl peroxide acne medicine (2 benzoates joined by oxygens)  
 peracetic acid sporidice, used in food processing. Leaves no toxic residue.

**SURFACTANTS** *amphipatic*: emulsify oil on skin, allow removal of bacteria

p 279 **Quats:** quaternary ammonium salts: bacteriocidal against Gm<sup>+</sup>, mess up membranes, incr permeability  
 Cepacol (cetylpyridinium),

Zephiran (benzalkonium), Phemerol.

*Pseudomonas* can live on these...

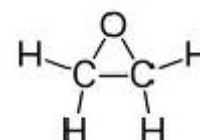


**HEAVY METALS** break -S-S- disulfide bonds, halt enzyme action (p 275)

Ag 1% AgNO<sub>3</sub> commonly used, formerly for eye protection against gonorrhea  
 Hg in Mercurchrome and Merthiolate, will wash off, thimerosal formerly in vaccines  
 Cu used against algae in reservoirs  
 Zn as anti bact & antifungal in mouthwash, paint, treatment for athletes foot

**ALDEHYDES** cross link proteins: (p 276)

**formaldehyde** as formalin (37% aqueous soln), caution, carcinogenic  
**glutaraldehyde** (Cidex: 2% even kills spores in 3-10 hrs)



**GASES** Ethylene oxide (EtO): alkylates proteins denaturing them. Toxic and explosive...

p 276 highly penetrating, used to sterilize bedding etc. in hospitals

**ORGANIC ACIDS** inhibits mold by interfering with metabolism  
 benzoic acid, sorbic acid, propanoic acid (and salts of these: -ate) activity not due to their acidity, rather to enzyme inhibition.

