

# CONTROL OF CONTAMINATION, PHYSICAL MEANS

TF&C, 2nd, p 182-, TFC 7th: 184-193, Black: p 150-155, 339-348, Bauman 2nd, pp262-276, 3rd: 257-271  
rvsd 23 July '97, 17 July 2000, 29 January 2002, 15 July 02, 21 July 03, 14Apr06, 18July07, 21July08, 19July10, 18July11, 15Oct12

Contrast: **sterilization:** all life forms destroyed  
(p 259) **disinfection:** all pathogens destroyed  
**sanitize:** microbe population reduced to safe level

**PATTERN OF DEATH:** (P 264) numbers decline logarithmically, effect of half life:  
the higher the starting number the longer to sterilize

**TARGETS: MECHANISMS BY WHICH MOST CONTROL AGENTS WORK (P 260)**

**Alter membrane** quaternary ammonium salts, EtOH, etc.  
**Damage protein** Heat, cold, heavy metals, halogens, etc. Anything altering 3D form (p)  
**Damage DNA** UV, radioactivity  
**Cell Wall** lysozyme, penicillin  
**Metabolism** sulfa drugs, organic acids

Relative antimicrobial **susceptibilities:**

(p 261) Most sensitive: Enveloped viruses  
Gram positive bacteria  
Non enveloped viruses  
Fungi  
Gram negative bacteria (Pseudomonads highly resistant)  
Active protozoa  
Protozoan cysts  
Mycobacteria  
Most resistant: Bacterial endospores

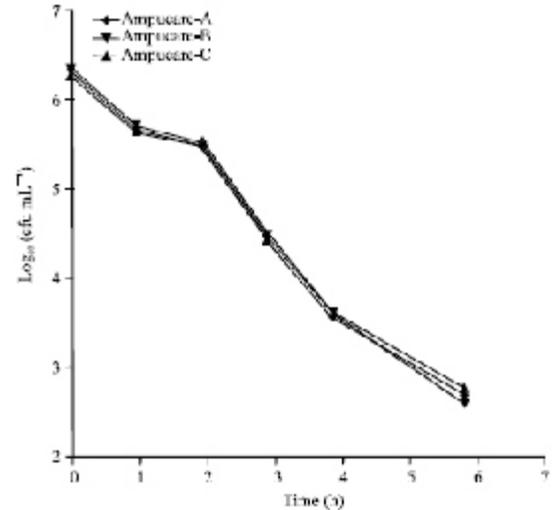
**CONDITIONS INFLUENCING MICROBIAL CONTROL:**

Temperature: disinfectants work better in warmth  
Physiological state: log phase most sensitive  
Environment: inhibits: low pH, large amt organic material (feces)

**EVALUATION:** Semilog plot of population vs time of exposure

**PHENOL COEFFICIENT**

(p. 266) first used by Lister, still standard: ratio of antibacterial activ.  
test against *S. aureus*, *S typhimurium*, and *P. aeruginosa*,



**PHYSICAL TECHNIQUES**

**TEMPERATURE**

**HEAT DRY** high heat kills by oxidation  
**incineration** flaming, burns up  
**hot air sterilization** used for glass ware: 170 C/2 hr poor heat conductance  
**HEAT, MOIST** heat disrupts H bonds. Moist heat (10 min 100 C) kills vegetative bacteria, many viruses, fungi in .not spores or some viruses)  
**Autoclave** water boils at 121 C 1 ATM (15lbs) usually for 15 minutes (p 265)  
**Pasteurization** Classic was 63 C/30 min (Does not kill thermoduric organisms ) (p 270)  
High-temp, Short (HTST) now used: 72 C, 15 sec  
**LOW TEMP:** bacteriostatic (except for psychrophiles)  
Slow freezing more effective: xyls formed

**FILTRATION** heat sens materials: filter thru unglazed porcelain. Now membrane filters: 0.45 um. (P 267)

**WATER CONDITIONS:**

**DESICCATION** also generally **bacteriostatic**: Neisseria dies in 2 hrs, Mycobacterium viable for mo.  
**OSMOTIC PRESSURE** plasmolysis is bacteriostatic to bacteriocidal. Yeast and mold resistant  
**ACID pH** Alters folding of protein. Vaginal health, pickles, various foods.

**RADIATION:** Ionizing:

UV, Sunlight: thymine dimers, 260 nm most effective germicidal lamps, penetrate poorly short UV filtered out, but singlet O<sub>2</sub> kills  
Ionizing radiation radioactivity creates ion pairs, hydroxyl radicals. destroys DNA. Used on disposable supplies & pharmac.

**PHYSICAL MEANS TO PREVENT "STINKY WASH CLOTH SYNDROME" (NON-CHEMICAL MEANS)**

- 1) Rinse out well after use removes nutrients
- 2) Wring out and hand to dry removes water, dessication
- 3) Boil heat denaturation of enzymes
- 4) Hang in sun UV damages DNA