Detergents and Sanitizers

Detergents

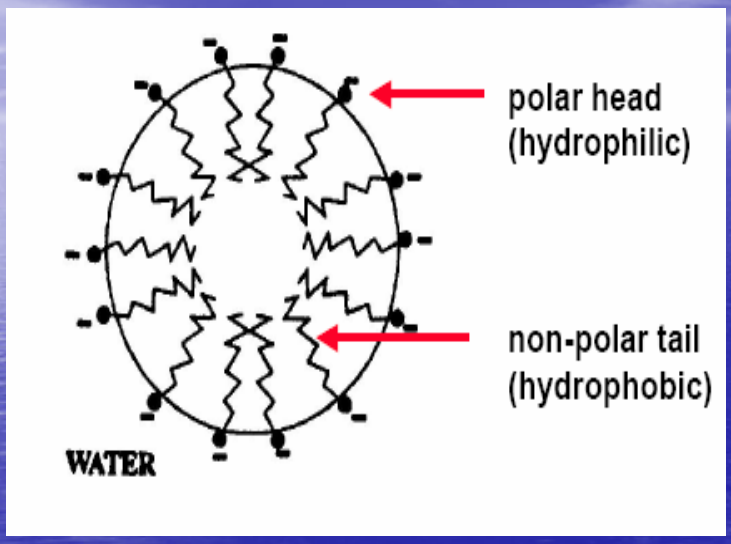
Classification of surface active agents:

1. Highly alkaline detergents:
2. Moderately alkaline detergents:
3. Inorganic acids:
4. Organic acids:
5. Surface active agents:
   - a- Anionic compounds
   - b- Cationic compounds
   - c- Non-ionic compounds

Detergents

Surface active compounds which have

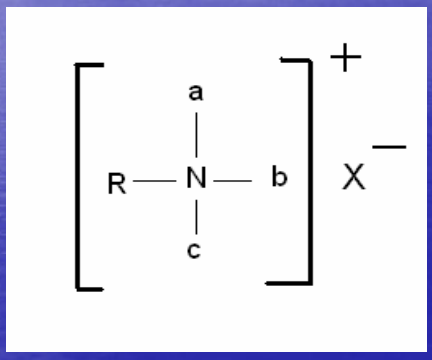
- a polar head (hydrophilic)
- a non-polar tail (hydrophobic)



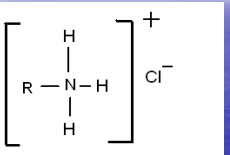
Anionic Surface-Active Compounds

- $R.OH + H_2SO4 \longrightarrow R.OSO_2OH + H2O$
  (sulfuric acid ester)
- $R.OSO_2OH + NaOH \longrightarrow R.OSO_2Na + H_2O$
- $R.OSO_2Na \rightleftharpoons R.OSO_2O^- + Na^+$

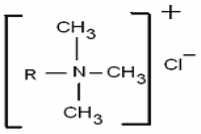
Cationic surface-active compounds



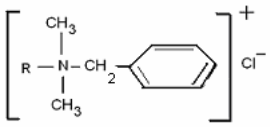
Cationic surface-active compounds



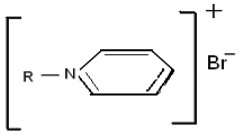
Alkyl ammonium hydrochloride



Alkyl trimethyl ammonium chloride



Alkyl dimethyl benzyl ammonium chloride



Alkyl Pyridinium halides

Non-ionic surface-active compounds

1- Polyethers
2- Ploygylcerol esters
3- polyoxyethelene glycol stearates

Functions of Detergents

- 1- Chelating
- 2- Saponifying
- 3- Wetting
- 4- Peptizing
- 5-Emulsifying
- 6- Dispersion
- 7- Rinsing
- 8- Corrosion

Relative effectiveness of some Detergents in meeting all of the various functions :

	Properties of Detergents			Degrees of Activity		
Extreme = 4	High = 3	Medium = 2	Low = 1	None = 0		
	STRONG ALKALIS	MILD ALKALIS	POLY-PHOSPHATE	MILD ACIDS	STRONG ACIDS	SURFAC-TANTS
Chelating	0	1	4	0	0	0
Saponifying	4	3	3	-	-	1
Wetting	1	2	1	1	0	4
Peptizing	4	3	1	2	3	0
Emulsifying	1	2	2	0	0	4
Dispersion	2	3	1	3	0	3
Rinsing	3	3	2	1	0	4
Corrosion	4	2	0	2	4	0

Choice of detergent

Soil	solubility	ease of removal	change on heating	best detergent
protein	water insoluble	difficult	denatures, more tenacious	chlorinated alkaline
fats / oils	water insoluble	difficult	polymerization more difficult to clean	alkaline
carbo-hydrates	water soluble	easy	caramelization, more difficult to clean	alkaline
mineral salts	variable water insolubility	variable	generally easy	acid

Sanitizers

Classification of sanitizers

- Sanitizers

Oxidizing

-Chlorine compounds
-Iodine Compounds
-Ozone
-Acids

Non-Oxidizing

-Quaternary ammonium compounds

The ideal chemical sanitizer should:

1. be approved for food contact surface application
2. have a wide range or scope of activity.
3. destroy microorganisms rapidly.
4. be stable under all types of conditions.
5. be tolerant of a broad range of environmental conditions.
6. be readily solubilized and possess some detergency.
7. be low in toxicity and corrosivity.
8. be inexpensive.

Factors affecting efficacy

Contact time

Temperature

Concentration

pH

Nature of "soil"

Compatibility with detergents

Specific sanitizer safety problems include:

1. Strong acids and alkalis are highly corrosive to skin, and should not be sprayed in plants.
2. Sodium hydroxide reacts with aluminum to form hydrogen gas. Hydrogen gas is explosive at a 4% concentration level.
3. Chlorine gas is a deadly poison. Gas cylinders must be handled carefully, stored securely, and kept away from heat.
4. Liquid chlorine solutions are highly corrosive.
5. Mixing a chlorine sanitizer with acid generates chlorine gas.
6. Mixing sodium hypochlorites with quaternary ammonium compounds generates heat and nitrogen chloride (explosive).

Sanitizer Selection

	Bact.phages	Small virus	Large virus	Gr. + bact.	Gr. - bact.	Spore f. bact.	Yeasts	Moulds
Hot water	+	+	+	+	+	+	+	+
Active chlorine	++	++	++	++	++	+	++	+
Iodophores	+	+	++	++	++	+	++	++
Hydrogen peroxide	+	+	+	++	++	+	+	+
Peracetic acid	++	++	++	++	++	++	++	+
Quartenary ammonium compounds	-	-	++	++	+	-	++	+
Aldehydes	+	+	+	+	+	+	+	+


Thank you