# Hydrophobic Interaction and Ion Exchange Chromatography Detergent Properties[1]

## Physical Properties of Commonly Used Detergents

| Detergent | MPt °C | Mol.Wt. Monomer | Mol.Wt. Micelle | Critical Micellular Conc. %(w/v) | M |
|---|---|---|---|---|---|
| SDS | 206 | 288 | 18,000 | 0.23 | $8.0 \times 10^{-3}$ |
| Cholate | 201 | 430 | 4,300 | 0.60 | $1.4 \times 10^{-2}$ |
| Deoxycholate | 175 | 432 | 4,200 | 0.21 | $5.0 \times 10^{-3}$ |
| $C_{16}$TAB | 230 | 365 | 62,000 | 0.04 | $1.0 \times 10^{-3}$ |
| Lyso PC ($C_{16}$) | - | 495 | 92,000 | 0.0004 | $7.0 \times 10^{-6}$ |
| CHAPS | 157 | 615 | 6,150 | 0.49 | $1.4 \times 10^{-3}$ |
| Zwittergent 3-14 | - | 364 | 30,000 | 0.011 | $3.0 \times 10^{-4}$ |
| Octyl glucoside | 105 | 292 | 8,000 | 0.73 | $2.3 \times 10^{-2}$ |
| Digitonin | 235 | 1,229 | 70,000 | - | - |
| $C_{12}E_8$ | - | 542 | 65,000 | 0.005 | $8.7 \times 10^{-5}$ |
| Lubrol PX | - | 582 | 64,000 | 0.006 | $1.0 \times 10^{-4}$ |
| Triton-X-100 | - | 650 | 90,000 | 0.021 | $3.0 \times 10^{-4}$ |
| Tween 80 | - | 1,310 | 76,000 | 0.002 | $1.2 \times 10^{-5}$ |

## Chemical Properties of Commonly Used Detergents[a]

| | Ionic Detergents | | | | | | | Non-ionic Detergents | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Property | SDS | $C_{16}$ | CHO | DOC | LYS | CHA | ZWI | OGL | DIG | $C_{12}$ | T80 | LUB | TNX |
| Strongly denaturing[b] | + | + | - | - | +/- | - | +/- | - | - | - | - | - | - |
| Dialyzable | + | + | + | + | - | + | +/- | + | - | - | - | - | - |
| Ion exchangeable [c] | + | + | + | + | - | - | - | - | - | - | - | - | - |
| Complexes ions | + | - | + | + | - | - | - | - | - | +/- | +/- | +/- | +/- |
| Strong $A_{280}$ | - | - | - | - | - | - | - | - | - | - | - | - | + |
| Assay Interference | - | - | - | - | - | - | - | - | - | - | +/- | +/- | +/- |
| Cold Precipitates | + | + | - | + | - | - | - | - | - | - | - | - | - |
| High Cost | - | - | - | + | + | + | + | + | + | - | - | - | |
| Availability | + | + | + | + | + | + | +/- | + | + | +/- | + | + | + |
| Toxicity | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ease of purification | + | + | + | + | +/- | + | + | - | + | - | - | - | - |
| Radiolabelled | + | - | + | + | + | - | - | + | - | + | + | + | + |
| Defined composition | + | + | + | + | + | + | + | + | - | - | - | - | - |
| Auto-oxidation | - | - | - | - | - | - | - | - | - | + | + | + | + |

a Key: SDS, Sodium Dodecyl Sulfate; $C_{16}$, Hexadecyl trimethylammonium bromide; CHO, cholate; DOC, Deoxycholate; LYS, Lysophosphatidylcholine; CHA, CHAPS; ZWI, Zwittergent 3-14; OGL, Octyl glucoside; DIG, Digitonin; $C_{12}$, $C_{12}E_8$; T80, Tween 80; LUB, Lubrol PX; TNX, Triton X-100. See reference 1 for structures. b Denaturing refers to disruption of secondary and tertiary protein structure. c Ionic detergents are unsuitable for ion exchange chromatography.

1. Tables taken from O.T. Jones, J. P. Earnest, and M.G. McNamee, "Solubilization and Reconstitution of Membrane Proteins," in Biological Membranes: A Practical Approach (J. Findlay, ed.) IRL Press (1986).

# Hydrophobic Interaction and Ion Exchange Chromatography Biological Buffer Characteristic Chart

**pH Properties of Common Biological Buffers**

| pKa(20°C) | Buffer | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|
| 6.15 | MES | 5.5 | | 7.0 | | | | |
| 6.5 | Bis-Tris | 5.5 | | 7.3 | | | | |
| 6.62 | ADA | 5.8 | | 7.4 | | | | |
| 6.80 | PIPES | | 6.1 | 7.5 | | | | |
| 6.88 | ACES | | 6.0 | 7.5 | | | | |
| 6.95 | MOPSO | | 6.2 | 7.4 | | | | |
| 7.15 | BES | | 6.6 | | 8.0 | | | |
| 7.2 | MOPS | | 6.5 | | 7.9 | | | |
| 7.5 | TES | | | 6.8 | 8.2 | | | |
| 7.55 | HEPES | | | 6.8 | 8.2 | | | |
| 7.7 | TAPSO | | | 7.0 | 8.2 | | | |
| 8.0 | EPPS | | | | 7.5 | 8.5 | | |
| 8.15 | TRICINE | | | | 7.8 | 8.8 | | |
| 8.35 | BICINE | | | | 7.7 | 9.1 | | |
| 8.4 | TAPS | | | | 7.7 | 9.1 | | |
| 9.3 | CHES | | | | | 8.6 | 10.00 | |
| 10.40 | CAPS | | | | | | 9.7 | 11.1 |

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