

Appendix

Table 32 Number of Dioxins Congeners According to Degree of Chlorination

Congener group	Formula
Monochlorodibenzo <i>-p-</i> dioxin	$C_{12}H_7O_2Cl_1$
Dichlorodibenzo <i>-p-</i> dioxin	$C_{12}H_6O_2Cl_2$
Trichlorodibenzo <i>-p-</i> dioxin	$C_{12}H_5O_2Cl_3$
Tetrachlorodibenzo <i>-p-</i> dioxin	$C_{12}H_4O_2Cl_4$
Pentachlorodibenzo <i>-p-</i> dioxin	$C_{12}H_3O_2Cl_5$
Hexachlorodibenzo <i>-p-</i> dioxin	$C_{12}H_2O_2Cl_6$
Heptachlorodibenzo <i>-p-</i> dioxin	$C_{12}H_1O_2Cl_7$
Octachlorodibenzo <i>-p-</i> dioxin	$C_{12}H_0O_2Cl_8$
Total congeners	75

Table 33 Physical – Chemical Properties of Dioxins

Property	Congener	Values
Log K_{ow}	2,3,7,8- 4CDD	6.15
	1,3,6,8-4CDD	7.20
	8CDD	11.76
Water solubility (20 ° C) (ng/L)	2,3,7,8-4CDD	7.91 ± 2.7
	1,3,6,8-4CDD	320
	8CDD	0.4
Vapor Pressure (atm.)	1,3,6,8-4CDD (20° C)	5.3×10^{-9}
	1,3,6,8-4CDD (100° C)	1.1×10^{-8}
	8CDD (20° C)	8.6×10^{-11}
	8CDD (100° C)	1.7×10^{-10}

Physical properties of Amberlite XAD-2

Amberlite XAD-2 polymeric adsorbent is a hydrophobic crosslinked polystyrene copolymer resin, supplied as 20-60 mesh size white insoluble beads. The resin is widely used to adsorb soluble organic compounds from aqueous streams and organic solvents, generally in cyclic columnar operations. Their physical properties are as follow:

Appearance :	hard, spherical opaque beads
Solids :	55%
Porosity:	0.41 mL pore / mL bead
Surface Area (Min):	300m ² / g
Ture Wet Density :	1.02 g / mL
Skeletal Density :	1.08 g / mL
Bulk Density :	40 lb / ft ³ (640 g / L)

A single bead of Amberlite XAD-2 resin is shown schematically in Figure 32.

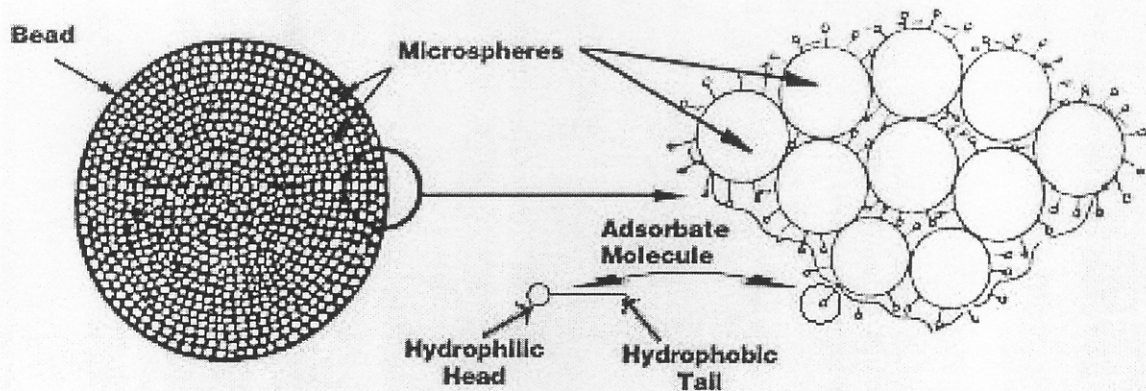


Figure 33 Amberlite XAD-2 polymeric adsorbent

Each bead consists of an agglomeration of many very small microspheres, giving a continuous gel phase and a continuous pore phase. The open-cell porous structure allows water to penetrate the pores easily. In the adsorption process, the hydrophobic portion of the adsorbate molecule is adsorbed on the hydrophobic polystyrene surface of resin, while the hydrophilic section of the adsorbate remains oriented in the aqueous phase. Dioxin being adsorbed ordinarily do not penetrate substantially into the microsphere phase, but remain adsorbed at

the surface. Therefore, with proper elution, the adsorbed dioxin can be rapidly eluted, because of the high rate of diffusion of the elution mobile phase through the porous structure of each bead.