from the core by the solubilizates. In addition, the formation of the polymeric micelles is directed by polymer-polymer and water-polymer interactions (Gadelle et al., 1995). In contrast, the hydrophobic core of a conventional surfactant micelle is essentially void of water, and the aggregation process is mostly dependent on interfacial tension.

To compare the solubilization capacity of the copolymers and the conventional surfactants, a different representation of the solubilization capability can be found (Gadelle et al., 1995). It was shown that the block copolymer (P103) yields a higher solubilization capacity than the conventional surfactants (CPC and RC630) for high toluene concentrations. On the other hand, the extent of solubilization in P103 is comparable to that in CPC for lower solute concentrations. The results indicate that some polymeric surfactants could advantageously replace conventional low molecular weight surfactants in processes where solubilization is involved (Gadelle et al., 1995).

In terms of biodistribution, Zhang et al. (1997) were not able to demonstrate any difference between the biodistribution of paclitaxel loaded into MePEO-*b*-PDLLA micelles versus paclitaxel solubilized in Cremophor EL (a conventional surfactant). These two formulations also showed similar *in vitro* distribution between the lipoprotein and lipoprotein-deficient fraction of plasma (Ramaswamy et al., 1997). As for other drug carriers, plasma half-life and uptake of polymeric micelles by the MPS depend on the molecular weight (Kwon et al., 1994a,b) and density of the hydrophilic shell (Hagan et al., 1996).

Weissig et al. (1998a,b) compared liposomes with similar surface characteristics to polymeric micelles. Liposomes seem to have a longer circulation time than polymeric micelles, possibly because extravasation of liposomes from the vasculature is more difficult due to their larger size. The capacity of polymeric micelles to reach regions of the body that are poorly accessible to liposomes has been exemplified by Trubetskoy and Torchilin (1996). They showed that after subcutaneous injection in the dorsum of rabbit hindpaw, polymeric micelles exhibited higher accumulation in the primary lymph node than liposomes and reached the systemic circulation after massage of the lymph node. A more detailed discussion of this work can be found in the case study of micelle-forming diacyllipid-polymer conjugates in the Pharmaceutical Application section of this chapter.

Aliabadi and Lavasanifar (2006) recently compiled a comprehensive review of the solubilities and loading levels of many hydrophobic drugs in block copolymer micelle systems. The diversity of drugs that may be incorporated in block copolymers testifies to the vesitility of these systems owing to the wide structural diversity possible in the core forming block (Table 13.7).

TABLE 13.7
Drug Loading in Block Copolymer Micelles

Drug	Solubility of Free Drug	Block Copolymer	Loading (% w/w)
Cisplatin	1.2 mg/mL	PEO-*b*-P(glutamic acid)	31–39
		PEO-*b*-P(aspartic acid)	49
		PEO-*b*-P(lysine)-succinate	5.5
Doxorubicin	≤50 μg/mL	PEO-*b*-P(benzyl-l-aspartate)	10–20
		PEO-*b*-P(aspartic acid)-DOX	18–53
		Pluronic P-85	13
Indomethacin	35 μg/mL	PEO-*b*-P(benzyl-l-aspartate)	20–22
		PEO-*b*-P(ε-caprolactone)	42
		PEO-*b*-P(dl-lactic acid)	22
Paclitaxel	1 μg/mL	PEO-*b*-P(dl-lactic acid)	25
		PEO-*b*-P(ε-caprolactone)	5–21
		PEO-*b*-P(*N*-[2-hydroxypropyl] methacrylamide lactate)	22

Source: Aliabadi, H.M. and Lavasanifar, A., *Expert Opin. Drug Deliv.*, 3, 139–162, 2006.