

Table 2.2: Literature overview of intracellular particulate microbial products.

type of inclusion body	size (μm)	characteristics *	organism	function	references
proteins	0.05-2.25	-, variable shape	many (mainly recombinant) microorganisms	aggregation, incorrect folding, lacking the ability to excrete	(Bowden, et al., 1991; Fischer, et al., 1992; Fischer, et al., 1995; Gram, et al., 1994; Hellebust, et al., 1989; Hoess, et al., 1988; Honda, et al., 2000; Koller, et al., 1995; LaValle, et al., 1993; Mitrali and King, 1989; Rinas, et al., 1992; Valax and Georgiou, 1993; Wangsa-Wirawan, et al., 2001b; Wetzel, et al., 1991; Wong, et al., 1997a)
polyphosphate granules	0.048 - 1	-, amorphous, spherical	many m.o.'s	phosphate storage and regulation, energy storage, accumulation of unwanted (toxic) metals or metals used in the metabolism	(Bode, et al., 1993; Lins and Farina, 1999; Shively, 2003)
starch granules	1 - 100	-, variable shape	plant cells	energy storage	(Jane, et al., 1994)
cyanophycin	? - > 0.5	-, variable shape	cyanobacteria, recombinant <i>E. coli</i>	nitrogen storage	(Oppermann-Sanio and Steinbüchel, 2002; Shively, 2003)
glycogen granules	0.02 - 0.3	+/-, variable shape	many prokaryotes	hypothesis: energy/carbon storage	(Shively, 2003)
polyhydroxyalkanoate granules	0.1 - 0.8	+, spherical	bacteria, algae, etc.	energy/carbon reserve	(Shively, 2003)
sulphur globules	0.1 - 1	+	<i>Thiorhodaceae</i> and other apochlorotic sulphur bacteria	hypothesis: sulphur storage	(Lins and Farina, 1999; Shively, 2003)
magnetosomes	0.04-0.1	+, contains Fe_3O_4 or iron sulphides	magnetotactic bacteria	helps in search for nutrients due to magnetism	(Dunin-Borkowski, et al., 1998; Lins and Farina, 1999; Proksch, et al., 1995)
carboxysomes	0.09 - 0.5	+	blue-green algae, many nitrifying bacteria and thiobacilli	hypothesis: storage of ribulose-1,5-diphosphate carboxylase	(Shively, 2003)
other crystals	1-15	-, variable shape	various m.o.'s	due to increased production	(CN1294191; Eonseon, et al., 2003; Jealong, et al., 1999)

* + indicates that the inclusion body is surrounded by a membrane and - indicates that there is no membrane.