

# 3 Main Glass Compositions Used for Pharmaceutical Use

	Chemical Composition (Wt %)	Type I Aluminosilicate Glass	Type I Borosilicate Glass	Type III Soda Lime-Silica Glass
<b>Glassformers or Network Formers</b> (Required, network structure, viscosity)	<b>Silicon Dioxide (SiO<sub>2</sub>)</b>	70 - 80 wt%	65 - 82 wt%	69 - 75 wt%
	<b>Aluminum Oxide (Al<sub>2</sub>O<sub>3</sub>)</b>	6 - 12 wt%	2 - 9 wt%	0.5 - 4 wt%
	<b>Boric Oxide (B<sub>2</sub>O<sub>3</sub>)</b>	not batched	5 - 13 wt%	0 - 1 wt %
<b>Alkali Oxides - Fluxes - Network modifiers</b> (Reduces viscosity, reduces durability, required for IOX)	<b>SUM Alkali Oxide (Na<sub>2</sub>O, K<sub>2</sub>O)</b>	8 - 13 wt%	3 - 12 wt%	12 - 16 wt%
<b>Alkali Earth Oxides - Property Modifiers</b> (Adjusts viscosity, adjusts durability)	<b>SUM alkali Earth (MgO, CaO, ZnO, BaO)</b>	3 - 7 wt%	0 - 9 wt %	10-15 wt%
<b>Fining Agents</b> (Required, chemical reaction to remove bubbles)	<b>As<sub>2</sub>O<sub>5</sub></b>	not batched	0 - 0.2 wt%	0 - 0.2 wt%
	<b>SnO<sub>2</sub></b>	0 - 1 wt%	0 - 0.2 wt%	0 - 0.2 wt%
	<b>Cl + F</b>	not batched	0 - 0.2 wt%	0 - 0.2 wt%

Elements for Identity

## For Aluminosilicate Glass

- Aluminosilicate glass in this range meets Type I requirements
- Elimination of boron makes glass insensitive to surface chemistry changes from converting process
- Replaced arsenic (toxic) with tin for fining
- Type 1 Aluminosilicate is easily identified by XRF or ICP methods