# CORNING® VIRIDIAN™ VIALS

## Viridian™ Vials are Type I Borosilicate glass vials with a low coefficient of friction external coating.

West®

Exclusive Distributor of Corning® Viridian® Glass Vials

### Table 1: Bulk Glass Composition and Characteristic Temperatures

| Oxide Component | Oxide Weight[1] [%] or ppm |
|---|---|
| Silicon Dioxide ($SiO_2$) | 72.0 |
| Boron Oxide ($B_2O_3$) | 11.5 |
| Aluminium Oxide ($Al_2O_3$) | 6.8 |
| Calcium and Magnesium Oxide (CaO + MgO) | 0.7 |
| Sodium Oxide ($Na_2O$) | 6.5 |
| Potassium Oxide ($K_2O$) | 2.4 |
| Iron Oxide (*) ($Fe_2O_3$) | < 600 ppm |
| Barium Oxide (*) (BaO) | < 400 ppm |
| Titanium Dioxide (*) ($TiO_2$) | < 400 ppm |

| Viscosity (Poise) | Approx. °C |
|---|---|
| Working Point | 1130 $^0$C |
| Softening Point | 785 $^0$C |
| Annealing Point | 570 $^0$C |
| Strain Point | 525 $^0$C |

(*) Not introduced in the batch composition

[1] Glass is a substance of variable composition which, by convention, is expressed in terms of oxides.

Note: ICH Q3D Elemental Impurities and extractables profile available upon request.

### Table 2: Glass Chemical Characteristics and Physical Properties

| | |
|---|---|
| Hydrolytic Resistance (ISO 720) | HGA 1 |
| Hydrolytic Resistance (Ph. Eur. 3.2.1., USP <660>) | Type I |
| Soluble Alkali Test (JP 7.01) | Complies |
| Acid Resistance Class (DIN 12116) | Class S1 |
| Alkali Resistance Class (ISO 695) | Class A2 |
| ASTM Laboratory Glass Class (ASTM E 438) | Class B |
| Average Linear C.T.E. ($10^{-7}$ $K^{-1}$) | 54 |
| Density (g $cm^{-3}$) | 2.33 |
| Refractive Index (at λ 587.6 nm) | 1.49 |

### Table 3: Coating Chemical Characteristics and Physical Properties

| | |
|---|---|
| Biological Reactivity / Toxicity (USP <87> & <88>) | Meets Class V for Plastics |
| Solubility – Aqueous or Organic Solvents | Below MDQ (<0.8 µg/g) |
| Volatile Organic Compounds | Below LOQ (0.5 µg/g) |
| Appearance | Visibly Transparent, Colorless |
| Thickness | < 100 nm as single layer |
| Coefficient of Friction under 10N load | <0.5 |

### Table 4: Heavy Metals / Arsenic / Antimony

**Heavy Metals**

Contents of Pb, Cd, Hg, Cr(VI) are below the 100 ppm limit value stated by the CONEG US Toxics in Packaging Clearinghouse (TPCH and European Parliament and Council Directive Article 11 of 94/62/EC of 10.Dec.1994 on packaging and packaging waste with latest update (EU) 2015/720.

**Arsenic and Antimony**

Neither arsenic nor antimony is introduced in the batch composition of this Glass. Tests performed according to USP <660> and Ph. Eur. 3.2.1 give the following results:

As = Not Detectable; Sb = Not Detectable