

Evolution of oxygen content in Ti-6Al-4V grade 23 powder samples

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A controlled study was carried out to determine the effect of storage conditions and time on the oxygen content of titanium alloy powder (Ti6Al4V). Two size fractions of powder were investigated; 0-20µm and 0-40µm to observe the effect of surface area.

Results

Figure 1 presents the oxygen content measured on the powders at different intervals over an eight year period. The results show little change in oxidation of the titanium powder when stored and manipulated in a laboratory environment, i.e. without the use of a glove box. During that period, the powders were stored in HDPE containers under high purity argon gas.

Both the 0-20µm and 0-40µm powder samples show good stability with time as oxygen content does not increase with time. Fluctuations were observed in line with experimental variance and the finer 0-20µm powder has higher oxygen content than the 0-40µm due to a greater surface area to volume ratio. Both the 0-20µm and 0-40µm powder samples show good stability with time as oxygen content does not appear to increase. Fluctuations were observed in line with experimental variance and the finer 0-20µm powder has higher oxygen content than the 0-40µm due to a greater surface area to volume ratio.

Instrument & Method used

Instrument used to evaluate oxygen content is an Inert Gas Fusion Oxygen Analyser (LECO OHN-836).

After staff training and the development of testing procedures, the oxygen content measurement meets the certified value of Ti-6Al-4V ASTM B348-11 Grade 23. The standard deviation of the analyses was 0.01wt%, which corresponds to variability below 4.4%.

Figure 1

