

technical bulletin

Boron Trichloride Shelf Life

Boron Trichloride shelf life data is a combination of various studies undertaken at various times. The data is not confined to cylinders of a particular type or from a particular company.

The data is for both gaseous impurities as measured by analysis of the vapour above liquefied BCl₃ in cylinders (its normal state) and metallic impurities measured from liquid samples that are then decomposed and measured by ICPOES/MS.

This data was obtained by analysing BCl₃ from good, well prepared cylinders. The absolute analytical values were deemed to be irrelevant. There seemed to be little or no difference between the results obtained for cylinders of different types, even for metals.

Gaseous impurities.

Over long periods of time the values of the common (semi) permanent gaseous impurities (O₂, CO₂, N₂, CH₄ and CO) remain static or decline - see figure 1. The reason for declining values is that we are taking BCl₃ vapour from the head space above the liquid BCl₃ in cylinders to perform the GC analyses. For cylinders where the liquid and head space impurity concentrations are in equilibrium (normally the case for undisturbed cylinders over long periods) then the analysis itself will tend to reduce the impurity level, provide this level is essentially fixed. This is likely to be the case for good quality cylinders that are not leaking. This also applies for HCl (analysed by FTIR) as this partitions strongly into the head-space - see figure 2. For other reactive impurities (SiCl₄, COCl₂ and CCl₄) -see figure 3- where the gas/liquid partition is roughly 1:1 the results show little overall trends with time, but certainly over ~ 2 years show no increase with time.

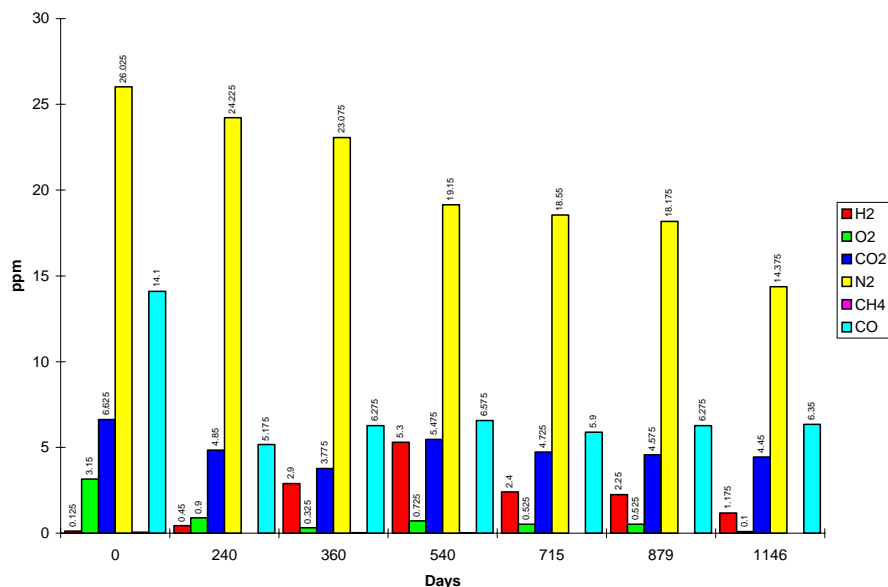
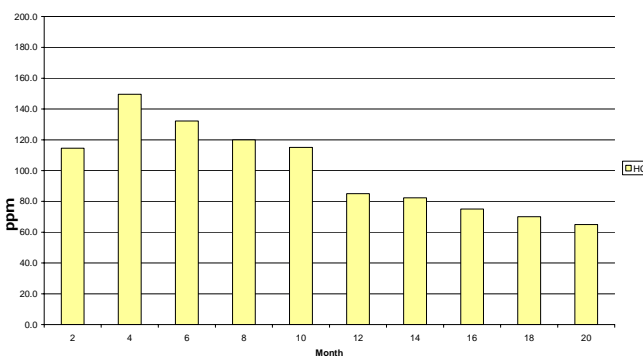


Figure 1 – BCl₃ Storage tests (Average)

Figure 2 – BCl₃ Storage tests (Average)



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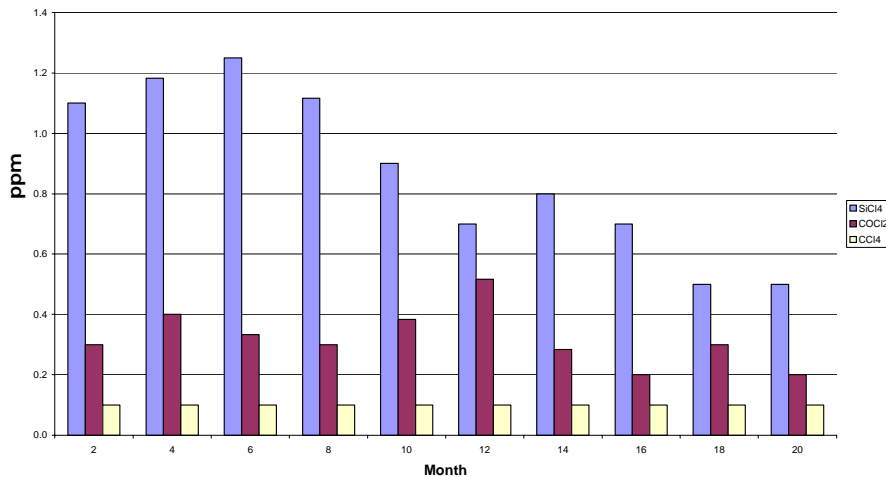


Figure 3– BCl₃ Storage tests (Average)

Metallic impurities.

We typically analyse for a large range of metals. For this shelf life data we have restricted information to the common metals and ones that may be influenced by vessel material (Fe, Cr Ni, P, Cu and Si). Figure 3 shows that the concentration of these metals remains constant or slightly declines with time. It would appear that good quality, dry BCl₃ in well prepared cylinders does not solubilise metals to any extent, if anything the metals reduce perhaps by “plating-out” on to the cylinder surface.

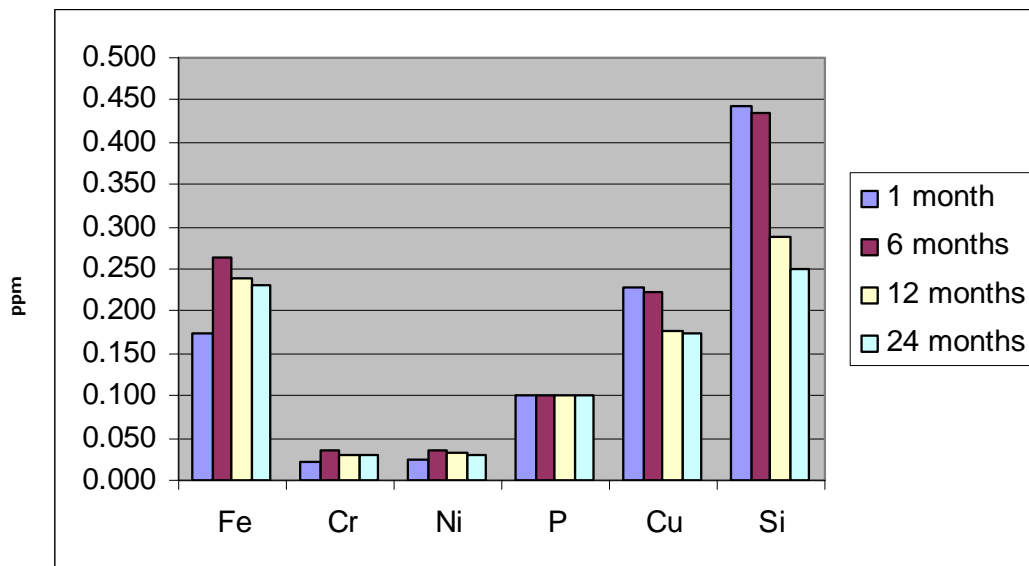


Figure 4