SUMMARY OF T1 MEASUREMENTS FOR PRE-AGED JMU3

For the DF middle and bottom targets which could be used for Spring 2011 runs, JMU3 HD gas had been aged in the pre-ager for about 2 months. T1s were measured after this aging. After injecting two targets into DF via PD, the gas was de-aged for 12 days followed by the second T1 measurement. During the aging period, HD gas manifold was leaking and the gas was contaminated with the air; the gas was cleaned by passing through the gas cleaner (whose temperature was controlled to be around 20 K so that HD could pass and the air was trapped). During the cleaning, some portion of the HD gas was de-aged (in total, about one day). During the injections, a portion of the HD gas was de-aged in the 1-mol tank (at most a half day).

1. History of aging/de-aging and others

The history of aging/de-aging and others are shown in Table 1.

Table 1. Aging/de-aging history

Age/de-age and others	Period	Days	Notes
Age	12/22/10 - 2/26/11	56 days	In pre-ager
De-age	2/21 - 2/24/11	$\sim$ 1 day total	Air cleaning
T1 measure	2/26 - 2/27/11	-	Q in PD
Age	2/26 - 3/1/11	3 days	In pre-ager
De-age	3/1/11	6 hours	$\sim$ 300 mbar at room temp for injection
Age	3/1 - 3/4/11	2.5 days	In pre-ager
De-age	3/4 - 3/16/11	12 days	Out of pre-ager
T1 measure	3/16 - 3/17/11	-	Q in PD
De-age	3/16 -		

2. T1 measurements

2.1. *Feb. 2011 data*

T1 measurements on Feb. and Mar. 2011 are shown in Figure 1. On Feb. 26 and 27th after aging of about 2 months and de-aging of about one day, T1H are shown to be rather small inspite of the long aging. Date taken in 2009 after de-aging of two and a half years are also shown in the figure (since the last time we used the gas for the targets at LEGS). If the gas as of Feb. 2011 has the same contents of H2 and D2 as in 2009, more than 10^4 seconds of T1H are expected after 2 months' of aging; one day's of de-aging is expected to lower the T1H. T1D were rather long and not mesured due to the time constraints.

2.2. *Mar. 2011 data*

After the T1 measurements on Feb., the gas was aged for 5 days and de-aged for 12 days, the second measurements were done; the results are also shown in Figure 1. T1H's were supposed to be longer after the 5 days' aging and come down with another 12 days. The T1H's at 4 and 2 K seem to consistent each other for the data in February and March. This suggests that more time is needed to de-age than to age this gas after about 2 months of aging. T1H at 2K are by about one order larger than those at 4K, which was observed after aging of about two weeks in 2009. T1H at 2K with the decay method (blue blank triangles) are consistent with those of the grow method (blue filled triangles).

T1D were measured at 2 and 4 K on March, which are about 10^4 seconds which are larger than those measured after an aging of 20 days in 2009. For the 4K measurement on March 2011, the data points are jumping up and down; the error could be larger than shown in the figure. The ratio of T1D at 2K to T1H at 2K is larger than one order of the magnitide; the ratio was observed to be about 10 after an aging of 20 days in 2009. This is consistent with the observation in which T1D's decrease is slower than T1H's after a long aging (order of 1 or 2 months) and a de-aging.

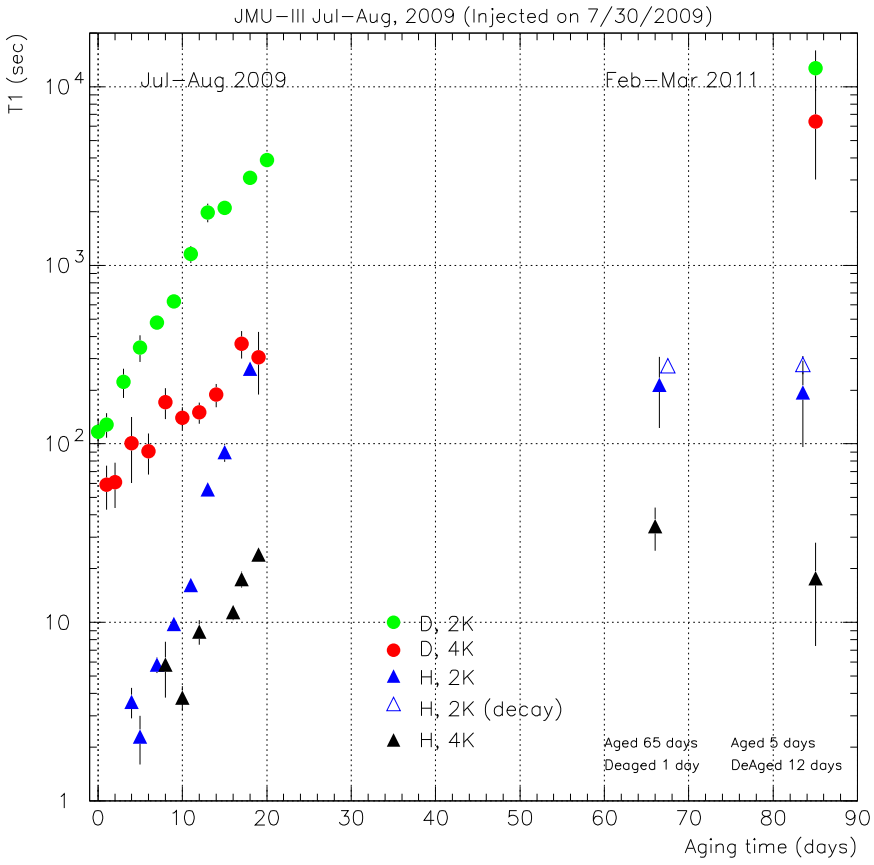

Figure 1. Summary of T1 measurements on Feb. and Mar. in 2011. T1's are plotted for H at 2K (blue) and 4K (black) where blank blue shows T1 from the decay method. Orange (D at 4K) and green (D at 2K) are also shown. The dates are measurement days after the start of pre-aging in Dec. 2010. For a reference, data taken in 2009 (after de-aging of 2 and a half years) are also shown.