Ref #1, Single-author paper- RW Smith- Feb.1998.

1) The "D" value with the "raw" g-jitter of MIR (corresponding to MIM Latched) is similar to that obtained in this alloy in 1992 on STS 57. **THUS AS FAR AS LIQUID DIFFUISON IS CONCERNED, BOTH SPACE VEHICLES PROVIDE SIMILAR REDUCED GRAVITY ENVIRONMENTS.**

2) The "D" value is reduced by approximately a factor of 2 by reducing the gravity field from 1 g to that of the STS or MIR.

3) The reduction of g-jitter afforded by MIM, reduces the measured value of 'D' substantially, perhaps by a further factor of 2.

4) The use of a MIM on manned space platforms operating in low earth orbit (LEO) is essential for obtaining accurate values of " Measured. These should permit a detailed examination of the current understanding of the structure(s) of liquid metals and semiconductors. Such an understanding should eventually permit the accurate prediction of "D" values for all alloy systems, a feat only possible as a result of the judicious use of LEO processing.

Ref#2, Single author paper, RW Smith 1998

5 Conclusions

Whilst fully definitive statements are not available at this juncture, it appears that the results obtained to date support the following conclusions, namely:

(1) The *D*-values with the 'raw' *g*-jitter of MIR (corresponding to MIM latched) are similar to those obtained in similar alloy diffusion couples in 1992 on STS-47 and 52. Thus as far as liquid diffusion in narrow capillaries is concerned, both space vehicles provide similar reduced gravity environments.
(2) The *D*-value may be reduced markedly by reducing the gravity field from 1 *g* to that of the STS or MIR in low earth orbit.
(3) The reduction of *g*-jitter afforded by MIM, reduces the measured value of *D* even further, perhaps by another factor of 2 for Pb-Au and somewhat less for Pb-Ag.
(4) The experimental data obtained thus-far in the present study suggest a linear relationship between *D* and *T*.
(5) The use of a MIM on any manned space platform operating in low earth orbit (LEO) is essential when attempting to obtain accurate experimental values for liquid diffusion coefficients, even taking note that MIM is ineffective in isolating the experimental facility from disturbances induced by 'jitter' of less than 0.01 Hz. These more accurate *D*-values should permit a detailed examination of our current understanding of the structure(s) of liquid metals and semiconductors. Such an understanding should eventually permit the accurate prediction of *D*-values for all alloy systems, a feat only possible as a result of the judicious use of LEO processing.
6) Low frequency (0.1 Hz), small amplitude (less than 4 mg) single axis forced *g*-jitter does not appear to induce appreciably increased liquid transport in narrow long capillary liquid diffusion specimens.

Josee Robert- MSc thesis- 1999

5 Conclusions

While fully definitive statements are not available at this juncture, it appears that the results obtained to date support the following conclusions, namely:

1) The diffusion coefficient values with the "raw" g-jitter of MIR (corresponding to MIM latched) were similar to those obtained in similar alloy diffusion couples in 1992 on STS 47 and 52. Thus as far as liquid diffusion in narrow capillaries is concerned, both space vehicles provided similar reduced gravity environments.
2) The diffusion coefficient value may be reduced markedly by reducing the gravity field from 1g to that of the STS or MIR in low earth orbit.
3) The reduction of g-jitter, afforded by MIM, reduced the measured value of the diffusion coefficient even further, perhaps by another factor of 2 for the Pb-Au system.
4) The diffusion coefficient obtained with a larger specimen diameter (3 mm), and with MIM in latched mode, was somewhat larger than that of the equivalent specimen of smaller diameter (1.5 mm).
5) The experimental data obtained so far in the present study suggested a linear relationship between the diffusion coefficient and the temperature for both metallic and semiconductor alloys.
6) The use of the MIM on any manned space platform operating in low earth orbit (LEO) is essential when attempting to obtain accurate experimental values for liquid diffusion coefficients, even taking note

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that MIM is ineffective in isolating the experimental facility from disturbances induced by "jitter" of less than 0.01 Hz. These more accurate diffusion coefficient values should permit a detailed examination of the current understanding of the structure(s) of liquid metals and semiconductors. Such an understanding should eventually permit the accurate prediction of the diffusion coefficient values for all alloy systems, a feat only possible as a result of the judicious use of LEO processing.
7) Low frequency, small amplitude (< 4 milli-g) single axis forced g-jitter does appear to induce appreciably increased liquid transport in narrow long capillary liquid diffusion specimens in the Pb-Au system.

Taken from reference #2, p.80.