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Nearly pure tritium filled capsule implosions to measure the time dependence of mix D.C. WILSON, Los Alamos National Laboratory, T.C. SANGSTER, Laboratory for Laser Energetics, P.S. EBEY, LANL, W. SHMAYDA, M.J. BONINO, LLE, A. NOBILE, JR., LANL, D. HARDING, V. YU. GLEBOV, F.J. MARSHALL, LLE — We have designed, built, and fielded a unique experiment to measure the time dependence of atomic mix in directly driven plastic capsules. The time history of the burn is measured in two capsules, a reference capsule of 20 μm thick plastic (CH) and an experimental capsule of the same thickness but with a 1μm thick deuterated plastic (CD) layer on the inner surface. Both capsules are filled with 10 atm of nearly pure tritium gas containing 0.2 atm % deuterium. Without atomic mix the DT yield of the experimental capsule should be comparable to the reference capsule ($\sim$1 10^{11} with mix). Using the Scannapieco and Cheng model of fully atomic mix we calculated a reference capsule yield of 8 10^{12}. First results gave yields of 3 10^{12}, confirming the dominant role of atomic mix, but comparison with other plastic capsule implosions suggests that some of the mix is "chunk," or non-atomic in character. In a simple model the ratio of yield rates is proportional to the time dependent amount of atomic mix. Fielding these capsules was a major accomplishment. Because the purest possible tritium was required, a special fill station was built at Los Alamos. Tritium diffusion through the plastic shell required storage and shipment to the University of Rochester at near liquid nitrogen temperatures.

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