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A novel method to create molecular mixtures at high pressures MICHAEL PRAVICA, QUINLAN SMITH, DANIEL SNEED, YONGGANG WANG, MELANIE WHITE, Univ of Nevada - Las Vegas — We have successfully created a segregated mixture of hydrogen and oxygen at high pressure in a diamond anvil cell (DAC) using *useful hard x-ray photochemistry.* A keyhole (two holes connected by an opening) sample chamber was created in a metallic gasket to support two segregated powders of ammonia borane and potassium perchlorate in each hole, respectively at $\sim$ 5.0 GPa. Both holes were separately irradiated with synchrotron hard x-rays to release molecular oxygen (via $KClO_4 + hv \rightarrow KCl + 2O_2$) and molecular hydrogen respectively. Upon irradiation of the first $KClO_4$ – containing hole, solid reddish-orange O_2 appeared in the irradiated region and molecular oxygen diffused throughout the entire sample region. The second ammonia borane-containing hole was then irradiated and H_2 was observed to form via Raman spectroscopy. Water was observed in the ammonia borane-containing hole and possibly (in the form of ice VII) in the second hole. This unique experiment demonstrates the ability to easily create solid mixtures of simple molecular systems via x-ray irradiation and then react them via further irradiation which will aid chemistry at extreme conditions. In particular, the ability to easily determine intermolecular potentials of detonation products and better understand diffusion and molecular mixing or segregation under extreme conditions.

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