

Abstract Submitted
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High pressure chemistry of red phosphorus by photoactivated simple molecules MATTEO CEPPATELLI, ICCOM-CNR and LENS, ROBERTO BINI, SAMUELE FANETTI, LENS and University of Florence, MARIA CAPO-
RALI, MAURIZIO PERUZZINI, ICCOM-CNR — High pressure (HP) is very effective in reducing intermolecular distances and inducing unexpected chemical reactions. In particular the photoactivation of the reactants in HP conditions can lead to very efficient and selective processes. The chemistry of phosphorus is currently based on the white molecular form. The red polymeric allotrope, despite more stable and much less toxic, has not attracted much attention so far. However, switching from the white to the red form would benefit any industrial procedure, especially from an environmental point of view. On the other side, water and ethanol are renewable, environmental friendly and largely available molecules, usable as reactants and photoactivators in HP conditions. Here we report a study on the HP photoinduced reactivity of red phosphorus with water and ethanol, showing the possibility of very efficient and selective processes, leading to molecular hydrogen and valuable phosphorus compounds. The reactions have been studied by means of FTIR and Raman spectroscopy and pressure has been generated using DAC and SAC. HP reactivity has been activated by the two-photon absorption of near-UV wavelengths and occurred in total absence of solvents, catalysts and radical initiators, at room T and mild pressure conditions (0.2-1.5 GPa).

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