

### 19.13.1: Lecture Demonstrations on Mass Energy Relationships

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Get an idea of the magnitude of binding energy by comparing the energy produced by exploding a hydrogen/oxygen mixture in a balloon with 400 mL hydrogen and 200 mL oxygen (about 0.04 g of hydrogen). Alternatively, soap bubbles with the mixture can be exploded. Caution: No bigger! Loud! Use hearing protectors.

With  $\Delta E \sim -125$  kJ/g, this will give about 5 kJ. Compare to the binding energy for deuterium:

$$3.57 \times 10^{-13} \text{J/atom} \times (1 \text{ atom} / 2.14 \text{ amu}) \times (1 \text{ amu} / 1.66 \times 10^{-24} \text{ g})$$

$$= 1.0 \times 10^{11} \text{ J/g}$$

From ChemPRIME: [19.12: Mass-Energy Relationships](#)

#### Contributors

- Ed Vitz (Kutztown University), [John W. Moore](#) (UW-Madison), [Justin Shorb](#) (Hope College), [Xavier Prat-Resina](#) (University of Minnesota Rochester), Tim Wendorff, and Adam Hahn.

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