

Abstract Submitted
for the 4CF10 Meeting of
The American Physical Society

Acoustical characterization of exploding hydrogen-oxygen balloons JULIA A. VERNON, KENT L. GEE, JEFFREY H. MACEDONE, Brigham Young University — Exploding balloons are popular demonstrations in introductory chemistry and physical science classes and as part of outreach programs. However, as impulsive noise sources, these demonstrations constitute a possible hearing damage risk to both the demonstrator and the audience. To study the peak levels generated and other waveform and spectral characteristics, measurements of various hydrogen and hydrogen-oxygen balloons were made in an anechoic chamber at Brigham Young University. Condenser microphones (6.35-mm and 3.2-mm) were placed at various angles and distances from the balloon and time waveform data were collected at a sampling frequency of 192 kHz. For all balloon sizes tried, hydrogen-only balloons were found to produce peak sound pressure levels less than 140 dB at distances greater than or equal to 2 m. On the other hand, large (but reasonably sized) hydrogen-oxygen balloons can result in peak levels reaching 160 dB at a distance of 2 m, which constitutes a significant hearing risk for unprotected listeners at typical distances. These findings and other waveform and spectral features that help characterize the balloons as acoustic sources are discussed.

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Date submitted: 10 Sep 2010

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