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Use of the Berkeley Gas-filled Separator to Study Cold Fusion Reactions  
Leading to the Production of Elements 110, 111, and 107

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The production of neutron-deficient transactinide isotopes using cold fusion reactions has been studied in recent experiments with the Berkeley Gas-filled Separator (BGS). These experiments were part of a systematic study of using odd-*Z* projectile reactions for heavy element synthesis. Targets of <sup>208</sup>Pb were bombarded with projectiles of <sup>64</sup>Ni, <sup>65</sup>Cu, and <sup>55</sup>Mn to produce <sup>271</sup>Ds, <sup>272</sup>111, and isomers of <sup>262</sup>Bh, respectively. The excitation function of the <sup>208</sup>Pb(<sup>64</sup>Ni, n)<sup>271</sup>Ds reaction was measured and seven atoms of <sup>271</sup>Ds were produced. This result was used to estimate the optimum beam energy for the <sup>208</sup>Pb(<sup>65</sup>Cu, n) reaction, and one decay chain of <sup>272</sup>111 was observed. Lastly, the excitation function of the <sup>208</sup>Pb(<sup>55</sup>Mn, n)<sup>262</sup>Bh reaction was measured and preliminary results will be presented. These results will be characterized in terms of the performance and use of the BGS for heavy element production.

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