



CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s) Ben Laniado	Project Number S0512
Project Title An Inexpensive Microscale Method for Studying the Laws of Definite and Multiple Proportions	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The laws of definite and multiple proportions were major clues leading to the atomic theory. We have devised a method to observe both laws in a simple inexpensive microscale experiment.</p> <p>Methods/Materials . Steel wool was burned in air. The product was characterized as iron(II) iron(III) oxide (Fe_3O_4) in a yield of $105\% \pm 7\%$. This was treated with hydrochloric acid giving a product that was characterized as iron(III) chloride (FeCl_3, yield $100\% \pm 3\%$). The FeCl_3 was hydrolyzed and the product was characterized as iron(III) oxide (Fe_2O_3, yield $107\% \pm 13\%$, at the time of writing)</p> <p>Conclusions/Discussion The good reproducible yields of Fe_3O_4 and FeCl_3 demonstrate the law of definite proportions. The simple ratios of mass of oxygen per gram of iron in the two oxides demonstrate the law of multiple proportions. Further work is needed to improve the precision of the measurement of Fe_2O_3.</p>	
Summary Statement We observed the laws of definite and multiple proportions using a simple, cheap, fast, method.	
Help Received Teacher did some preliminary experiments. High school lab was used.	