



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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| Name(s) Shamik Mascharak | Project Number J0523 |
| Project Title Are Vegetables Stealing Zinc from Your Diet? | |
| Objectives/Goals 1) Will phytic acid (an organic acid present in vegetables) form an insoluble complex with zinc? 2) Will the complex form at a certain ratio of concentration of zinc and phytic acid? At what pH? 3) Will presence of other metals like calcium influence the precipitation of zinc by phytic acid? | |
| Abstract Methods/Materials In experiment 1, I determined the concentration ratio of Zn:phytic acid required for precipitation of zinc from an aqueous solution by adding various amounts of phytic acid to a solution of zinc. In experiment 2, I tested the effects of pH on zinc precipitation by phytic acid. The pH of a mixture of 1:1 zinc:phytic acid solution was varied from pH 3 to pH 8 by the addition of KOH. In experiment 3, I tested the effect of calcium on the precipitation of zinc by phytic acid. Here, the Ca:Zn:phytic acid ratio was 5:5:0.5. A control experiment with no calcium and another with no zinc were also included. After the white precipitate of Ca/Zn-phytate formed, I filtered the reaction mixtures and checked for zinc in the filtrate by using Zincon reagent. A standard curve technique was used where I plotted the absorbance values of the blue Zincon-Zn solutions vs. concentration of zinc (in ppm) in standard solutions. This standard curve was used to determine the concentration of zinc in the unknown filtrates (after proper dilution). | |
| Results I found that when the Zn:phytic acid ratio approached 4:1, all the zinc precipitated out. The precipitation was very effective upto 1:1 ratio; excess phytic acid however redissolved the white precipitate of Zn-phytate. For precipitation of zinc-phytate, pH 5 was the most suitable pH. Finally, I found that calcium did aid precipitation of zinc by phytic acid. | |
| Conclusions/Discussion Excess intake of vegetables does hinder absorption of zinc from our diet. Also, presence of calcium increases the extent of precipitation of zinc by phytic acid. | |
| Summary Statement I investigated whether eating excess vegetables inhibits absorption of zinc (an essential micronutrient) from our diet. | |
| Help Received Allegra Eroy-Reveles, a chemistry graduate student of UCSC, helped me in making the absorbance measurements and understanding the standard curve technique with the aid of spectrophotometry. | |