



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Tulsi S. Shah	Project Number S1825
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Project Title
Blue Sky on Mars? An Analysis of Using Terrene Filtration Methods to Remove Dust Particles from the Martian Atmosphere

Abstract

Objectives/Goals

The Martian atmosphere is extremely toxic, composed of 99% limonite particles and 1% magnetite particles. My project tests two filtration devices--the N-95 mask and the Ionic Pro Turbo--to see if they can sufficiently remove the dust particles from Mars to the extent that the Martian sky would be blue.

Methods/Materials

I tested both the N-95 mask and the Ionic Pro Turbo using equipment such as the SMPS, or Scanning Mobility Particle Sizer, CPC, or Condensation Particle Counter, an atomizer, and a silica drier. The atomizer changed the limonite or magnetite solution into air particles that could be passed through the drier. The Condensation Particle Counter counted the number of particles of the size inputted by the SMPS. I used this device to count the particles before and after using the filter and used my data to calculate the efficiency of particles removed.

Results

The N-95 mask was 81.29% efficient in removing the particles, whereas the Ionic Pro Turbo was 99.99% efficient.

Conclusions/Discussion

From analyzing the data I gathered, I concluded that the N-95 mask and the Ionic Pro Turbo are sufficiently efficient filtration devices to remove dust particles. Assuming an average 81% particle filtration and a linear effect of particle number on scattering properties, the reduction of particles in the atmosphere may change the color of the Martian sky to greenish-yellow using the N-95 mask. On the other hand, the Ionic Pro Turbo is extremely efficient to remove the thousands of particles on Mars and completely change the scattering. With a rounded 100% efficiency, the almost complete elimination of particles in the atmosphere will change the color of the Martian sky from a red to a blue. From these conclusions, I made the assumption that if the Ionic Pro Turbo, the obviously better filtration device, has the ability to eliminate so many particles, then it is worth trying to use a similar device on Mars.

Summary Statement
My project determines whether two earthly filtration procedures--the N-95 mask and the Ionic Pro Turbo--can efficiently remove dust particles from the Martian atmosphere by representing limonite and magnetite as the dust found on Mars.

Help Received
Professor Akua Asa-Awuku at Bournes Engineering at the University of California, Riverside guided me with this project, and allowed me to work in her lab and perform the experiments under her supervision. Xiaochen Tang, a graduate student at UCR, also supervised me in the lab.