



# THE ADVENTURES OF MEG A. MOLE FUTURE CHEMIST

## Featured Chemist: Dr. Martha Williams – NASA Kennedy Space Center, FL

Dr. Williams works at NASA's Kennedy Space Center. The Space Center is huge with all sorts of buildings, security and rockets.

Dr. Williams makes new insulating materials to keep astronauts and valuable instruments from getting too hot during take-off, and too cold in outer space. The insulating foams that she makes can not catch on fire, and they must be able to stand up to very extreme temperatures.

Dr. Williams uses many different instruments in her work. The day that I was there we used an X-ray photoelectron spectrometer and an infrared microscope to look at a sample of insulating foam that she had made.

The X-ray Photoelectron Spectrometer is very unusual looking and big. It does not have a place to look inside like the microscopes that I have seen before. Instead, you put what you want to see inside, and then look at it using a computer that is connected to it. X-rays allow you to look at and analyze the surface of foams and tell you what elements are there and what is happening on the surface.

Dr. Williams also let me look at a sample through an infrared microscope. It looks more like the ones I have seen before, but it uses a different kind (color) of light called infrared. The infrared light let us see the different parts of the foam.



Dr. Williams and Meg using an X-ray photoelectron spectrometer to examine samples of spacecraft insulation at NASA's Kennedy Space Center.



Dr. Williams let me look through an infrared microscope at a sample of insulating foam. The microscope was hooked up to a computer, so that the pictures of the foam could be studied using the computer.



Dr. Williams and me next to polymer extruder. I am sitting to the right of the extruder, and the tank of liquid nitrogen is behind us on the left side.

In the afternoon, Dr. Williams showed me how she makes other types of polymers. She uses a machine called an extruder (x-true-der). At the top of the extruder is a funnel where Dr. Williams poured in some pellets of plastic. Different types of plastics and other materials can be mixed together to give new types of plastics. The extruder melts the plastic as it is being pushed through the machine. The machine is hooked up to a large tank of liquid nitrogen that when it turns into a gas helps the machine work right. Dr. Williams also uses liquid nitrogen in experiments to test the insulation foams.



Dr. Williams and me at the end of the day typing our reports.

We had to wear special gloves, goggles, and face masks while using the liquid nitrogen.

I had a good time on my trip, and I am glad that Dr. Williams let me come for a visit.

If you have questions about my visit, you can write to me at [meg@acs.org](mailto:meg@acs.org).

### Personal Profile: Dr. Martha Williams

What is your favorite food?

Seafood (fish and shrimp)

What is your favorite color?

Black

What month were you born?

October

What are you most proud of?

My two daughters and of finishing my degree

What do you like most about your job?

I am never bored, and my brain is always challenged.

What is the best thing about being a scientist?

I am always learning and I get to solve different types of problems.

Describe where you do most of your work.

I work in a laboratory most of the time, and I spend most of my time on a computer.

What were your favorite subjects in school?

Biology, Chemistry and History

Were you always interested in science?

Yes, I originally wanted to be a medical doctor.

What made you want to go into science?

Science helped me to understand what things were made of. I enjoyed making things in the laboratory, and I enjoyed solving problems.

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