

## 19.1 Discovery of Radioactivity



*The late 1890's were an exciting time in physics. X-rays were newly discovered and photography was being used in many ways. Electricity was being developed. The Industrial Revolution was in full swing. Imagine these conversations between the French physicist, Henri Becquerel and his wife, Louise in 1896. Another new discovery was about to happen.*

### Henri Becquerel (1852-1908)

Henri: *(excitedly)* You'll never believe what I learned at the French Academy of Science today. In Germany, they've discovered an invisible X-ray that causes a sharp image of living bones on photographic plates. "Sacre bleu!"

Louise: *(puzzled)* That's interesting, dear. But that has nothing to do with your research on the phosphorescence of uranium rocks.

Henri: But it might. I wonder if uranium will give off the same kind of energy and cause changes in photographic plates, too.

Louise: Dear husband, you and your father and your grandfather have studied the phosphorescence of uranium for over 50 years. Surely you already know everything there is to know about uranium. There couldn't be anything worth learning after all your careful study.

Henri: Scientists are always curious and want to learn more about the world. I think I'll set up an experiment to test this hypothesis.

Louise: In your previous studies, you set the uranium rocks out in the strong sunlight for different lengths of time and then studied the spectrum of the phosphorescent glow of light they emitted. How will you set up this experiment?

Henri: I will wrap the photographic plates in sealed black paper so the sunlight will not expose them. Then I'll put the uranium rock samples on top of the wrapped plate in the direct sunlight. After sitting in the sun, I will develop the photographic plate to see if there is an image of the uranium rock. Perhaps I can vary the time exposed to sunlight to determine how to make the clearest image.

Louise: What will you do if it's a cloudy day and there is no sunlight to energize the uranium samples?

Henri: I am monitoring the amount of cloud cover each day. I also hypothesize that on cloudy days the image will be weaker than on sunny days.

Louise: It sounds like you have thought of how to address all the major variables affecting your experiment. When will you start?

Henri: Right away. I want results as soon as possible, so I can report my findings to the Academy.

*A few days later.....*

Louise: *(excited)* Your experiment is a success! You are seeing an image of the uranium rocks on the photographic plates just as you predicted.

Henri: *(frustrated)* Yes, but it is little more than a smudge. The reports from the X-ray experiments tell of detailed images. It's been so blasted cloudy lately. I'm not getting the results I hypothesized.

Louise: Dear husband, you've told me many times that experiments don't always support an original hypothesis. You've also said that sometimes we learn more from a failed hypothesis than a correct one.

Henri: Yes.... that's true. I think I'm going ahead with my experiment even if it is cloudy. I expect the images will be very weak, but I really want more results to report to my colleagues.

*The next day....*

Henri: *(astounded)* I can't believe it! The images of the uranium rocks are just as strong on cloudy days as on sunny days. What can this mean?

Louise: I'm sure you'll figure it out. Science isn't always easy.

Henri: It looks like the uranium doesn't need to be energized by the sunlight. Can that be true? The uranium gives off energy on its own. That's unbelievable. No one has ever heard of such a thing.

Louise: *(admiringly)* How brilliant of you to discover something new!

Henri: *(excitedly)* I believe that the energy is coming from the uranium by itself. This may be a big breakthrough. Let's see... uranium actively gives off energy in rays. I think I'll call the uranium "radioactive."

Louise: What a fascinating time we live in!

Henri: Now I need to set up another experiment...

Author - Marian Schraufnagel

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