

**Marie Curie: the woman Who Gave  
Everything and Gained Nothing**



**by  
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## Marie Curie

### Summary

My hero is Marie Curie. The reason I have chosen Marie Curie is for her groundbreaking achievements in chemistry and partly physics. This was noticed by the science community and awarded her a noble prize.



*Marie Curie*

The achievement I am going to discuss is her discovery of radium and polonium, which has helped so many lives. The first element discovered by the curies was polonium, which is found in the ore pitchblend, which emits strong radioactive energy. Marie Curie and her husband Pierre Curie wanted to see what substance gave off this energy source. Unaware at that time radioactive exposure with no protection was extremely dangerous they began experimenting. It didn't take long for the radioactivity to affect their health both of them becoming frail and commonly ill. Eventually though they bravely kept on with their attempts to extract a small amount of polonium from pitch blend and were successful. Making them the discoverers of the element polonium. This shows us the endurance of the curies doing this long process with poor health.



*Pierre Curie*

The curies then realised pitch blend must have another radioactive source in it, as the power and half-life of polonium were different to pitch blend. The curies then moved on to the discovery of radium. Their health was constantly getting poorer and Pierre had developed severe cataracts. Marie continued with their mission, which showed her courage as she was devastated by her husband's death, but managed to discover radium roughly one month and a half later.

***These new elements have saved or benefited many millions of life as they allowed x-rays for hospital patients to be invented allowing doctors to see inside an injured patient which will have saved millions of life's alone. Radium can also be used as a radioactive source in nuclear power stations which power many millions of homes.***



*Marie Curie at work*

**The Curies selflessly gave the process on how to make these elements to commercial companies for free when Marie could have easily become a millionaire by selling the process. She did this so people could be helped as soon as possible from the benefits of these elements showing Marie Curie was a real hero as she sacrificed her life to help millions of others.**

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## **Plan**

Topic: The discovery of Radium and Polonium

Questions: (i) Who discovered radium?  
(ii) What kind of research was done to discover Radium and Polonium?  
(iii) What did these two elements give to benefit the world?

I will use internet articles as an information source and also to get images and statistics on x-rays. I will also use books in the college library to gain more information.

## *Marie Curie: The discovery of Polonium and Radium*

Marie Curie is my heroine in the scientific world. This woman made great self-sacrifice to make the world a better place for many millions of people.

Marie Curie and her husband Pierre were the first scientists to discover the two radioactive elements polonium and radium. These elements have many uses that up until that day no other element could be used for. These were processes we take for granted now, such as x-rays and, more recently, a radioactive source in nuclear power stations.

Marie Curie was born in Poland during the period where the Russians owned the land and Poland had lost its independence. Education was hard to come by and Marie's father and a tutor were the ones that educated Marie. Marie was lucky in the fact that her father worked in a university and taught Science as it allowed Marie in later life to be very knowledgeable in Science. After Marie's father became ill and bed-ridden Marie had to gain an income to help her father. Marie moved to France where she would study at a university while doing various poorly paid jobs. Eventually she fell in love and married a man called Pierre. They became working partners in Science and were the people to discover the elements polonium and radium.



fig1: *Marie Curie at work in her laboratory*

Polonium was actually named after the country she was born in Poland. This was the first element to be named on a political basis, as it was a statement to show that Poland should have independence. Marie wished this all her life but had little time to devote herself to that cause.

The uranium ore pitch blend that was mined in the wilderness of the Czech Republic was a highly radioactive ore. What the Curies noticed, thanks to Pierre's devices for measuring radioactivity, was that the energy from pitch blend was much higher than in other ores. This led them to the conclusion there must be another substance or substances that was making this ore so radioactive, other than uranium. Thanks to Pierre's university contacts they were able to get several tonnes of pitch blend to be purified. This process however, took years of work. On some occasions Marie would be stirring a huge vat of molten pitch blend for whole days.

During the months of constant unprotected exposure to this strong radioactive source the Curies were becoming weaker and weaker by the day. The radioactivity was

cracking their skin, causing Pierre to develop cataracts and Marie's premature death was probably because of this radiation as she developed leukaemia. Their poor health continued through the whole research process but they bravely carried on, with cracks increasing in size on their skin day by day. Their determination was what allowed them to continue with their extremely strenuous research which shows their heroism.

Polonium was the first element to be discovered. Radium, however, was discovered just a couple of months later. Polonium was split from the ore by electrolysis and was considerably more abundant than the other more radioactive substance radium. Radium was so scarce in pitch blend not even a gram could be made of pure radium with a tonne of pitch blend. Radium was extracted as radium chloride salt under electrolysis in the presence of hydrogen.

These newly discovered elements were quickly wanted by the outside world as they had many highly useful properties. Radium has been used for X rays, saving the lives of many people as the radiation can penetrate the body and create an image of internal organs and bone structure. Radium has also been used to power millions of homes through the use of nuclear power being the first main element to be used as a radioactive source. However radium is extremely radioactive and it was used in paint for watches as the paint glowed but many watch makers licked their paint brushes and this tiny doze of radium killed many of these people as it replaced their bone marrow cells. Radium, being similar to calcium, causes the body to treat it like a mineral and absorb it into the bones, thus causing cancer of the bone marrow. Even with these draw backs radium could be said to have started a new age in the hunt for large amounts of seemingly clean energy with the introduction of nuclear energy to the world which now generates so much domestic power. Polonium is mainly a discovered element, as radium is a more powerful version of it. Polonium is not used nearly as commonly as radium.

Sadly, just after the discovery of polonium Pierre was killed in a freak accident which was put down to the cataracts he had developed. As Pierre was heading to a meeting at the university he taught at. He was crossing a road and was hit by a horse drawn cart. He was pronounced dead at the scene.



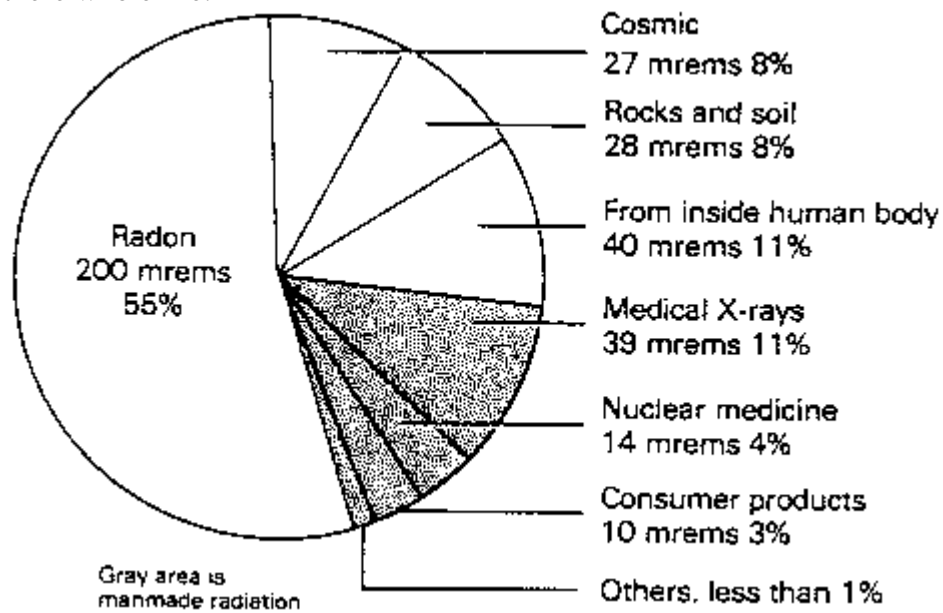
Scanned at the American  
Institute of Physics

fig2: *Marie with her husband Pierre Curie*

Marie Curie was absolutely devastated at the loss of her husband and reportedly became very depressed for several years afterwards, perhaps because of loneliness as Pierre was almost her only company and they had a deep trust in each other. Marie carried on with their research, however, as she was determined she would discover the

still elusive radium. This ,perhaps, was what made the noble institute recognize Marie’s achievements through all this hardship. At this time in history the scientific world was still prejudiced towards females. This highlights how major the discovery was that Marie had made as they awarded her with a noble prize in Chemistry. Earlier she had won a noble physics prize being only the second women to achieve this prestigious award, and was the first women to win in the Chemistry category.

Marie Curie’s selfless devotion to Science was evident by her actions. She gave the information on how to refine pure radium away to anyone who wanted it. If she had sold the method she would have earned many millions and could have allowed her to have comfortably lived the rest of her life. This extreme generosity was very costly as she was never a rich women and this lost wealth could have really helped her. It is a common misconception that Marie Curie was a rich women but she always struggled for money. She did manage to earn enough for her children to be educated but for a person of her calibre, this is virtually nothing as she worked huge hours. Another thing to mention is that x-rays even though they benefitted people if badly injured expose the person to a lot of radiation which can potentially be very harmful. In an average persons life medical radiation is a big amount of radiation absorbed by the body. This table shows the percentage of radiation absorbed by an average person in there whole life.



As you can see the largest amount of man made radiation absorbed by a person is from medical sources.

A more modern use of what radium started is MRI scanners which allow the bodies organs to be seen in almost a perfect 3D image. Recently Toshiba gave a state of the art scanner to Scotland which will no doubt save many lives. This scanner can give video footage of the person and has a lower radiation dose than normal scanners. This couldn’t have happened if not for Marie Curie’s research at the start of 20<sup>th</sup> century so even today her initial research still develops.



fig3: *Pierre Curie*

After Pierre's death there was an important vacancy left in the University of Paris he worked as Head of Science. Because of his wife's help with their discoveries, Marie was offered the post in the university as Head of Science sharing his post with another staff member. Again the sexist views of many at this time meant that even though this was a very important job the pay was not huge for Marie in comparison to the other professor who happened to be male, Pierre's salary was also bigger than Marie's as well. This wage could only just fund a modest lifestyle with children needing to be educated. Even though this was not fair it was a big event as Marie was the first member of staff in the University of Paris to be a female teacher. Pupils at the university flocked to see her lectures, expecting to see the amazing new element radium. However, Marie had different ideas, giving calm and proper lectures.

#### Conclusion

I think that Marie Curie was a real hero. Her husband should also be mentioned as he went through much of the hardships with Marie. Perhaps his death robbed him of the credit he fully deserved. However Marie showed extreme strengths at all stages of her life. She had a tough up bringing and was penalized for being a woman by many in her earlier life. She had to work hard even before she had finished university, needing to help her father. Perhaps her two great strengths were the ability to carry on with the extremely hard research after the devastating blow of her husband's untimely death. The other amazing thing was giving this fantastic discovery away to anyone who wanted it as benefiting many lives when she could have delayed this to make herself very wealthy. She did this while raising her young children and helping to educate them. This shows that Marie Curie was a selfless person and would help as many people as she could to the best of her ability no matter how hard the situation. This is what makes Marie Curie such an amazing person and my heroine.

#### Evaluation

The evidence gathered was sufficient enough to gain enough material to work out how Marie Curie managed to make her discovery of Polonium and Radium as it is well documented by many sources. However other than the actual discovery of Marie Curie made, it was hard to find information on what she did before the discovery which I felt was quite important for this investigation. It is possible to draw different conclusions due to the fact that nobody really knew Marie Curie that well. So her motives for things like giving the way to make radium and polonium for free could only be speculated as no one officially knows why she did this. So there is not really enough evidence to draw a certain conclusion.

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# Appendix

## Marie Curie

- Marie's past life
- Marie's achievements
- Why these achievements defined Marie as a hero

### Marie's Past Life

- Came from a struggling family in Poland
- Her father suffered from an illness which made him bed ridden Marie had to move to France to make an income.



## Marie's Research

- Marie and her husband Pierre made a study into pitchblende ore to see why it was so radioactive
- This material was expensive and hard to get large quantities of.



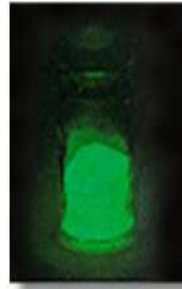
## Marie Curie

- The radioactivity made the Curies very ill with cracks in the skin forming
- This however did not stop them pushing on to discover there pioneering elements



## The discovery of radium and polonium

- Polonium was first discovered through electrolysis.
- Radium was discovered a couple of months later when the Curies realised pitchblende still had an unusually high level of radiation



## Marie's Achievements and Recognition

- The scientific community recognised Marie's efforts by awarding her a noble prize in chemistry
- These elements especially radium benefitted millions of people

