



# Smoking? You Must be Joking.

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## Introduction:

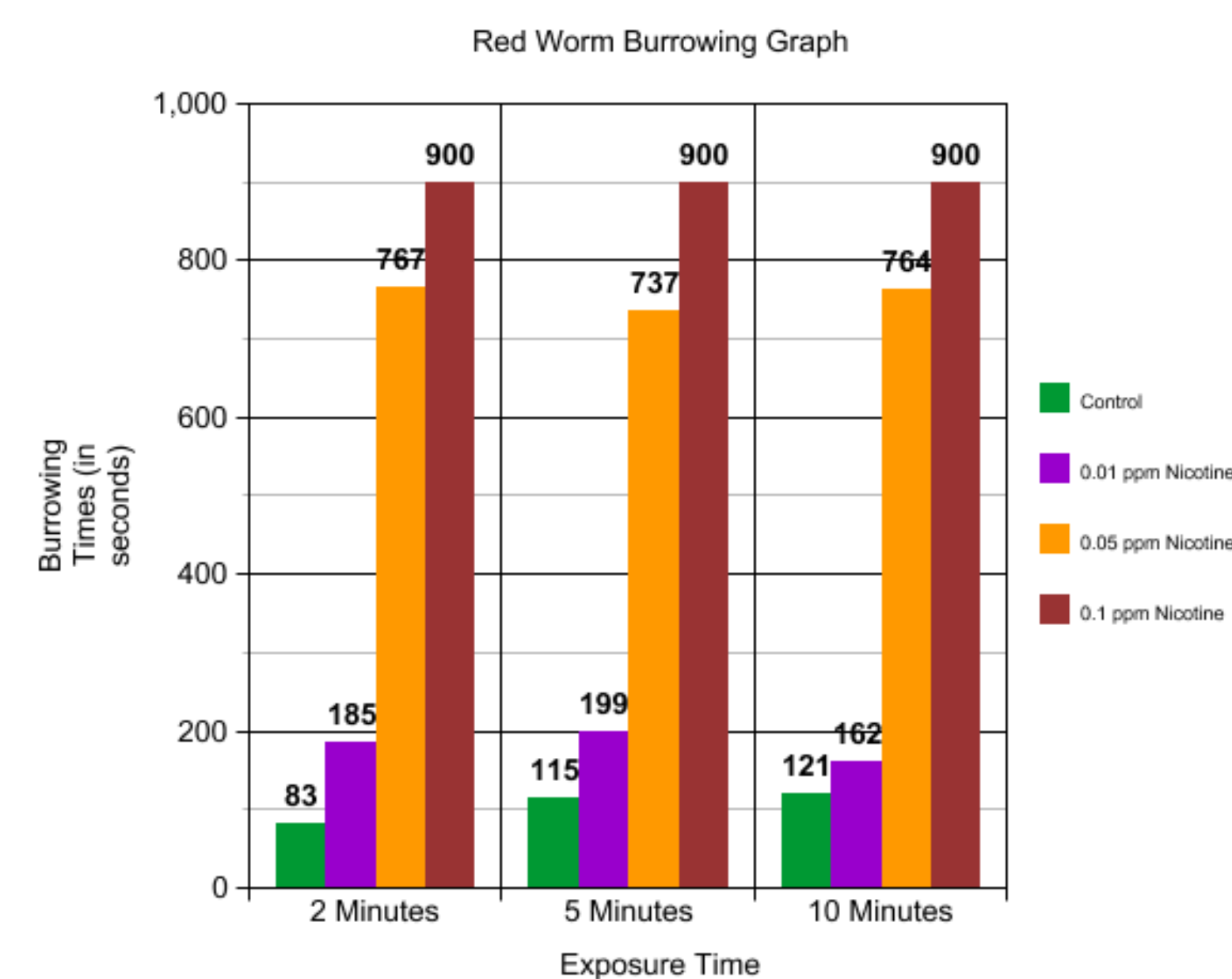
Nicotine is a chemical substance containing **nitrogen** and the **tobacco plant**. The chemical nitrogen is a colorless, odorless, tasteless gas. Nicotine is also made in a synthetic form. Synthetic nicotine products state that their nicotine is developed in a lab and is not derived from the tobacco leaf. There are many **effects** nicotine can have on a person's body including side effects, long term effects, short term effects, and even effects from a one time use. In addition, nicotine use can also lead to **death**. Scientists conducted this experiment in hopes that it would give them some insights to the effects nicotine has on humans, and tested on red worms because red worms and humans have similar muscle structures. After doing some research, the scientists came up with a hypothesis: If scientists expose red worms to nicotine, then the red worms will experience a negative effect and take longer to burrow because they will have a reaction to the nicotine.

## Abstract:

Nicotine is a harmful chemical that is used everyday by people all over the world. Some scientists decided to test nicotine on red worms and find an answer to their question. “How does nicotine affect the burrowing time of red worms?” The scientists had to **research** their contaminant, form a **hypothesis**, collect the **materials** they needed, perform the procedure, collect **data**, and finally, reach a **conclusion**. By the end of their experiment, the scientists knew that they’re initial hypothesis was correct. As the scientists looked at their data, they saw that as the liquid nicotine solution became stronger, the worms couldn’t burrow as fast, they had very little movement, and some of the worms even died. The red worms were exposed to a small amount of nicotine for a very small amount of time, so the scientists hypothesized that nicotine would also have a negative effect on smokers.

## Sources:

<https://www.medicalnewstoday.com/articles/240820>  
<https://www.britannica.com/science/nitrogen>  
<https://truthinitiative.org/research-resources/harmful-effects-tobacco/what-you-need-know-about-new-synthetic-nicotine-products>



## Results:

Nicotine can cause many problems in the body such as nausea, stomachache, it can even cause you to throw up. There are different effects from nicotine depending on how you're exposed to it. Take liquid nicotine for example; if it gets on your skin, it can be poisonous within a matter of three minutes. It could even be fatal. If you inhale it by smoking nicotine; then it can cause an increase in heart rate, blood pressure, and flow of blood to the heart; all very bad things. It is also a highly addictive chemical, meaning if you get addicted, it will get worse with possibly worse effects. This investigation with nicotine and worms was very important. The scientist tested on worms because their muscle structure is much like ours. It is important to understand how nicotine can affect the human nervous system. Nicotine can be a problem to everyone; even the people who don't use it. (weather it's mental, emotional, or physical). Nicotine has been used in many possible ways by about 1.1 billion people worldwide. If scientists expose worms to nicotine for different amounts of time at different amounts of nicotine, then it will cause the worm confusion and it will have a negative effect on their movement because they will react to the chemical and its components.

## Methods and Materials::

Materials we used were things like 16 oz plastic cups, coffee filter paper, worms, (three of all those) different nicotine solutions, 60 ml beaker, foam tray, and a stopwatch/timer. You will need to cut out circles of filter paper by tracing the bottom of one plastic cup. Cut out multiple of theses circles. What we did was fill a plastic cup and filled it  $\frac{4}{5}$  with moist dirt. On the tray, we three worms, then fill the 60ml beaker with 2ml of water. In a different plastic cup, we put one of the filter paper circles at the bottom of the cup. We put our the two milliliters of water into the cup with the filter paper and put the three worms in the cup with the filter paper. we put another piece of filter paper in the cup over the worms and gently placed the unused cup in the cup with the worms. Then we set a timer for our first time (2 min) and when it was done, we got the worms and get a stopwatch ready. We grabbed the worms and set all three into the cup with the dirt and started the stopwatch. when a worm burrowed, we looked at the stopwatch and recorded the time it took to burrow. When we finished, we repeated our steps. We followed the same proceedure but this time, exposed them to the control (water) for 5 then 10 minutes. When control was finished, we repeated the procedure with each of our contaminates solutions.

## Discussion:

A pattern in the worm's action was being slow as the component got stronger. As well as curling into a ball when they hit the dirt. The earthworms reacted to the different amounts of nicotine. The earthworm usually burrowed very slowly. This was because the chemical messages were being disrupted. For an earthworm to move, it has to think about what it needs to do. Normally, the chemical binds to the receptor site and the receptacle closes. That makes the muscles contract. The chemical message is broken down by the enzyme, this opens the receptacle cite again and the muscle relaxes. But when the worm was exposed to high amounts of our nicotine solutions, it changed how that could function. Instead of it being broken down, the chemical message goes to the receptor cite. Now the receptor cite is occupied. The muscles contract, but they don’t relax because the message isn’t being broken down; and until it does the worm cannot make another movement.

The nicotine probably had this effect on the worm because Nicotine can stimulate muscle movement. This is most likely the reason for the worms curling into a ball and flipping around. These actions caused the worms to burrow slower. The investigation the scientists did is important; it shows how Nicotine can affect the human nervous system. Some people-even Nicotine users- think about what Nicotine is doing to them and their overall ability to do things. This experiment shows how Nicotine can affect those things.