

A photograph of a nuclear power plant at sunset. The sky is a mix of orange, yellow, and blue. A large cooling tower is visible, emitting a thick plume of white steam. In the foreground, there is a body of water reflecting the sky, and a dark shoreline with some vegetation. The text "Nuclear Energy- Changing the Moderator" is overlaid in a bold, red, sans-serif font.

Nuclear Energy- Changing the Moderator

About Nuclear Energy

This project is based on **nuclear energy**. Nuclear energy is, as to what I strongly believe, vital if we want to completely get rid of coal. Nuclear energy starts when **fission** takes place. Fission is when a fast moving neutron hits uranium 235 and the uranium splits, releasing protons, neutrons, and heat. A **moderator** is used to keep the neutrons from going too fast, and the moderator is normally water. In this project, I will test 3 different materials and find the best moderator amongst them.

Question: What solid substance (tin, rubber, and wood) can slow the ping-pong ball neutron the most without stopping it?

Changed (Manipulated) Variable: The surface the 'neutron' bounces off of.

Measured Variable: The distance it bounces.

Prediction: I **predict** that the tin will slow the neutron (ping-pong) ball the most, because **rubber** balls are bouncy and will gain distance, and balls bounce well off our walls, which are wood

Materials:

A wooden floor

A LONG measuring tool (tape measure, meter stick, yardstick)

A ping-pong ball

A short, thick plate of wood (not larger than 4 feet by 4 feet)

A small amount of tin or metal (from household objects such as a small tin pot)

Some source of rubber (shoe soles, etc)

A launch item (like a slingshot)

A friend to help you

Procedures:

1. Get the rubber, tin, and wood and set them on the floor.
2. Have your friend take and hold the wood up (with the wood standing up flat in any direction against the ground).
3. Take the launch item and ping pong ball and launch the ball (aimed at the wood).
4. When it bounces off the wood (like a neutron), measure how far it traveled after it bounced off the wood and settled
5. Replace the wood with tin and repeat the process
6. Replace the tin with rubber and repeat the process

The surface in which the ball bounces and travels the least distance is the best moderator!

Wood

1	2	3	4	A
14.14	14.4	15.0	15.5	15.75

Rubber

1	2	3	4	A
10.54	11.1	11.22	11.5	11.9

Tin

1	2	3	4	A
14.4	15.54	15.6	16.54	16.6

Here, I am measuring the ball's distance



The notes I took during the experiment



Taking notes (the notes sheet is the first picture)

I'm about to bounce the ball against the wood slab



	Trial 1	Trial 2	Trial 3	Trial 4	Average
Wood	24 ft	19 ft	23 ft	19.5 ft	21.375 ft
Rubber	10.5 ft	11 ft	15 ft	15.5 ft	13 ft
Tin	19 ft	13.5 ft	15 ft	16.5 ft	16 ft

The changed variable is the material the ball bounces against.

The measured variable is the distance the ball travels

After completing this experiment, I conclude that rubber is the best moderator. This is because it slowed our ping-pong ball neutron down the most, with an average distance of 13 ft. This is the best, at least compared to the other materials. Tin/metal ranks a close second, with an average distance of 16 ft. Wood comes last, with a (quite long) 21.275 ft!

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