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## Why is the raw form of vibranium too dangerous to be transported at high speeds (MCU)?

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### 2 Answers



Don Tran, studies at Hillsborough Community College (2020)  
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**I am not a physicist by any means. Im just doing the research so you guys don't have to. Please feel free to correct me! If you want to skip the science lesson, scroll down until you see the Black Panther.**

There's a reason why this rare element is called Vibranium.



Its most renown physical property is that it can absorb *vibrations*. And yeah, its cool to see Thor get knocked back after bringing the hammer down because of this. But what does it mean scientifically?

On a basic level, vibrations within an object/material occurs when its molecules change from one state of motion to another, back and forth, while passing by a point of equilibrium(constant/calm state) in between its transition. It is an example of a mechanical wave, in contrast to electromagnetic waves which don't need a medium to travel such as a body of water or, in this case, a metal. Best way to understand this visually is to look at a pendulum swinging in a grandfather clock or a kid on a playground swing.

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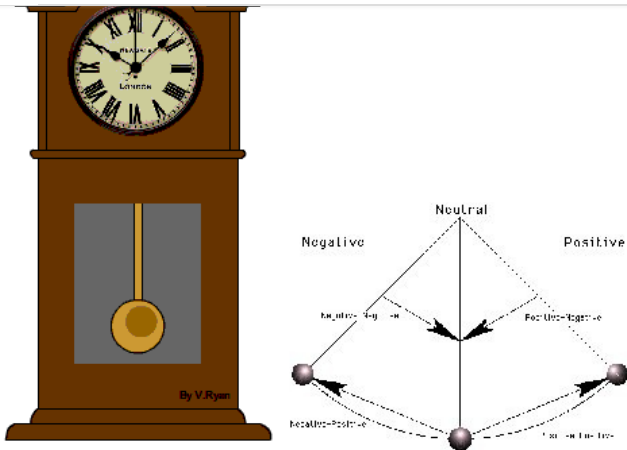
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Mechanical waves, like electromagnetic waves, transfer a certain kind of energy when traveling through objects. There are several types of energy including: thermal energy, mechanical energy, chemical energy, nuclear energy, etc. In this scenario, we are dealing with mechanical energy which is comprised of kinetic and potential energy.

To make things clear, kinetic energy can either be positive or neutral. When an object is in motion, kinetic energy is positive. When it is not, it is neutral.

Potential energy however can be either three things: positive, neutral, or negative. When it's unstable(ball on a hill, ready to be pushed), it is positive. When it is stagnant( ball just on a flat plane), it is neutral. When it is stable(ball in a ditch), it's negative. Referring back to the vibration explained earlier, these are the different states of motion that an object's molecules experience when an object is vibrating.

Another principle we need to understand is the elasticity of collision and the elasticity of an object/material's molecular structure.

First, let's talk about collision elasticity.

When a collision between two bodies is perfectly elastic, all of the kinetic energy is conserved when being transferred between two bodies. When it is inelastic, the kinetic energy is converted into some other kind of energy, whether it be potential or thermal or whatever, when traveling from one body to another.

Let's apply this to the MCU, shall we?

Perfectly Elastic



Inelastic

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Now, the elastic collision is pretty simple. All the kinetic energy that Hulk produced with his punch made it past Thor's body.

But what happened when Captain America blocked Thor's hammer strike?

Usually in mechanical waves, kinetic energy can be converted into two kinds of energy: potential or thermal energy.

If it is the latter, than Cap's Vibranium shield is like a typical shock absorber



but on steroids. The function of a shock absorber is to cushion the force of impact from a shock impulse( earthquake, explosion, drop kick, etc.) It does this by taking the kinetic energy and then giving it off as heat. But this most likely isn't the case because we don't ever get any details from the movies that would indicate it such as Cap's shield smoking after being hit. (If there is, let me know)

It's most likely the former, where the kinetic energy is converted into potential. The kinetic energy from when Thor "put the hammer down" turned into potential energy as it struck Cap's shield. The potential energy then traveled through Mjolnir and then through Thor's body, sending him backwards as kinetic energy. So not only can vibranium absorb vibration(the shifting between kinetic and potential and neutral energy among molecules), but it can also redirect it. (This scientific phenomenon will be an important part of my answer below)

Elasticity of an object measures how much a material can keep and regain its shape when force is applied to it and how long it takes for it to do so. And you might not see it, but at a molecular level, the molecules of a piece of metal shake violently when it experiences a vibration. Metals can vibrate well because their uniform and organized molecular structure allows them be elastic. It's also why they're a good conductor of electricity. This is what makes Vibranium so strong and why it is so much special and different from the other metals. But there are materials out there that can "absorb" vibration like polymer, which is used for things like recording studios and footwear. **Somehow, Vibranium shares the same properties as vibration/sound absorbent material, except that it is at a supernormal level.**

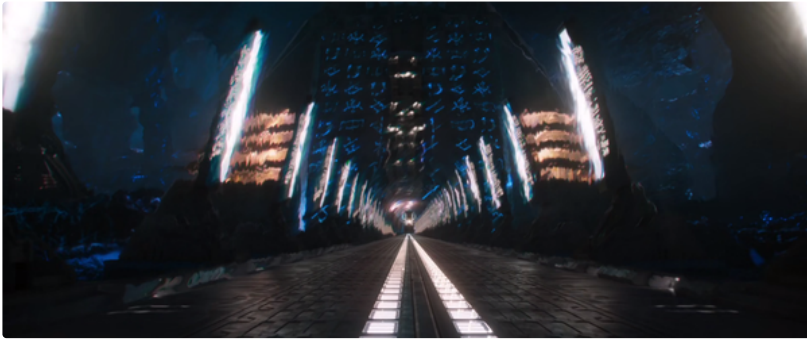


And speaking of footwear...

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If that's not a testament to how much Vibranium is so much different from the rest of the metaloids, then I don't know what is.

All right, time to answer the question at hand: why is the raw form of vibranium too dangerous to be transported at high speeds?



As established earlier, vibranium is an abosrbent of vibrations, particularly when it has been refined and processed.

What I'm guessing is that the raw vibranium behaves in the same way as the nanites on the Black Panther's new suit.



When his suit gets hit by bullets or other attacks, it absorbs the kinetic energy and then holds it in place, almost trapping it. Then, when the suit is attacked again or when T'Challa attacks, all the accumulated kinetic energy is released outward.

What I've deduced is that the raw vibranium works by the same priniple. We know that an object produces kinetic energy when in motion. So if the raw vibranium were to move at high speed without the sonic stabilizers, it will absorb the kinetic energy produced from its own velocity, thereby turning it into an immense cluster of potential energy. And the rest is self explanatory. You *don't* wanna touch that stuff after it's finished doing that. **(Another thing I've inferred is that raw vibranium, in contrast to the nanites in T'Challa's suit, takes kinetic energy from *any* source rather than just attacks and collisions, and it will, possibly, unleash all the energy with even the slightest touch)**

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Mike Prinke, That man is playing Galaga

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Vibranium conducts kinetic energy at a rate close to 100%, in the form of vibrations. How it does so is mostly at the mercy of screen logic rather than real-world physics, but its capabilities range from perfectly deflecting any bullet that strikes its surface to bouncing at perfect angles off peoples' heads with no loss in velocity.

As such, vibranium moving at high speed is fantastically dangerous, as any sudden changes in acceleration, or for that matter any turbulence during motion, will result in a transfer of force through the vibranium. In an extreme case, fragments of the metal within vibranium ore could end up shooting off in all sorts of directions, resulting in a cabin full of bullet-sized projectiles bouncing around like superballs with no way of slowing them down. In even a minor case, though, you run the risk of causing the vibranium to vibrate at continually greater frequencies until it eventually breaks containment, which is inconvenient if not necessarily hazardous.

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In Captain America: Civil War at 204:54, Tony fires a blast but Captain America's shield reflects it. If Tony's blasts are powered by the Spac...

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In the MCU, where did Howard Stark get enough vibranium to make an entire shield?

Without the Infinity Gauntlet, can Thanos break Vibranium with his bare hands?

In Endgame Thanos broke Cap's shield with his sword, what metal is his sword made of? Vibranium is supposed to be the strongest.

Which place does vibranium get?

How has Vibranium been used in the MCU?