Why does this matter?

Because look-- you're going to need the scale again.

So please keep it.

Here you go.

Here's another chart of ionic bonds.

These are lattice energies.

OK, these are lattice energies, oh kilojoules per mole, it's just per mole of stuff.

Right, don't get confused by that.

Joules, electron volts, energies, per mole is per mole of atoms, right?

OK, so we can isolate it down to one bond or a mole of bonds.

All right, 15,000 for aluminum.

Look at that.

That's why aluminum is in your toothpaste.

Aluminum oxide is in your toothpaste.

It's in your pans.

It's in sandpaper.

It is a very hard material.

It is a very hard material.

Why?

Because of this.

Literally.

Those Q's are really high, right?

Why does this matter?

Well, I'm going to give you an example in hemodialysis.

Hemodialysis is something that people have to go into a hospital.

People in their kidneys, don't clean their blood efficiently or enough have to have it cleaned by a machine, and 650,000 patients suffer from this and go to a hospital for literally four hours, three times a week.

It devastates their weekly schedule.

And if you could make this portable, you would change lives in a really big way.

One of the big-- there are people out there trying to do this.

This is an example of a design for a portable hemodialysis machine.

One of the single biggest drawbacks in making it portable is making a filter, because you're filtering blood.

You're filtering toxins out of the blood.

It's something that the body can't do.

So you need to do it for them.

But the filters get mucked up and gunked up, and they're not strong enough, and they can't be cleaned.

And look at this one.

Here is a filter made out of aluminum.

All right, and these things are what's needed.

We need super strong, super resilient new filters that can filter things like blood and toxins out of the blood.

So very, very tiny sizes that we can make over large areas and uniformly.

This is the kind of starting material that we need to make new filters, and it all comes back down.

Why would that be a good one if we can overcome it's brittleness?

Because of the Q's.

Because of the atom sizes, because of everything that we talked about today.