Hot Water Heater

Introduction

When it comes to hot water heaters, there are two concerns with a hot water heater – flushing the sediment out and maintaining a healthy anode rod. What on earth is an anode rod? It's a sacrificial rod! (Water heaters just got a lot more exciting)

Here is the tl;dr version of why this is important:

Water + metal of your pipes + the different metal of your tank = galvanic corrosion (basically, one metal corrodes another). In super, over simplistic terms, the tank creates the prefect arena for the two metals to fight. Fighting metals means one must lose. Nobody has time for that.

Enter the Mighty Anode Rod.

The anode rod 'sacrifices' itself by corroding first, releasing electrons that protect the tank. If you do not replace the anode rod when it's gone, the tank itself will start to "sacrifice" itself and start to corrode and rust (and might leak). Worse, the rod can break off and fall into the bottom of the water heater where it bounces around and causes damage. This will shorten the life of the water heater and empty your bank account.

The sacrifice usually takes about 5 years or so, depending on the type of water you have, how much water you use, what temperature you keep your heater at, and which way the wind blows. (btw- if you soften your water, it can corrode much quicker. Sometimes in as little as 6 months! Note- I said softened…. Not soft water).

Important Note: Water heater designs vary across brands, models, and years, leading to different methods for removing and installing anode rods and flushing out sediment. We strongly recommend consulting your water heater's manual before starting this project for the first time. The first time is always the hardest, but it gets easier with practice. So, grit your teeth, find the manual, and get on with it. Also, check out the book 'How Your House Works' for more information on water heaters

Now or Later? A Quick Inspection

- This is a must-do IF it has been more than a year or two since your last anode rod check and flush. If you have naturally soft water, you may only need to flush it every two years or so. If you have hard water, you should flush it every 6 months to once a year. Not sure what is the right schedule for you? You can also perform a quick flush and check for sediment to help you determine an appropriate schedule. **Note:** if it's been more than 4-5 years since the last known rod check and flush, proceed with caution and read Tips for Flushing Stubborn Sediment at the end of this task before proceeding.
- Got a water softener? It is important to keep the anode rod healthy (not all the salt gets flushed out and the softened water is slightly saline, which speeds up corrosion inside the tank).
- A must-do if you hear popping noises when it heats up, if you have weird slime coming out of the faucets, or there is a rotten egg smell to the hot water. Also, a must-do if you have inconsistent water temperature, a premature depletion of hot water, or it takes longer to heat up.
- If you see signs of water seepage at the bottom, you may need to replace asap as it can be a sign that it may fail catastrophically soon. If your Spidey senses are tingling, you may want to peek at it monthly to look for water seepage. (seepage is a weird word)
- You may put this off if you have recently done this, none of the above is true, and life is too busy. Just don't let more than 4 years pass if possible as the task gets a little more difficult (see Tips for Flushing Stubborn Sediment).

Tools Needed to Check Anode Rod

- Closed end wrench or 1-1/16" socket wrench and ratchet or breaker bar or long heavy pipe give you leverage when getting the rod out. (tip: consult the manual so you know you have the right tool).
- Pipe wrench (for hot water outlet anode rods only)
- PTFE thread sealing tape or quality thread sealing compound
- A new anode rod (about 30 bucks).
  - There are a few options.
    - **Aluminum**- the standard. Longest lasting and least expensive.
    - **Magnesium**- will corrode slightly faster than aluminum but there are health benefits to drinking water with dissolved magnesium.
    - **Combo of aluminum/zinc/tin**: can control growth of iron bacteria that causes a rotten egg smell.

- If you have a difficult access point for your rod, there are **segmented rods** available.

Tools Needed to Flush System

- Standard garden hose
- Bucket if needed to catch the water.
- A flat-head screwdriver
- Maybe a washing machine hose and perhaps a connector to connect it to a garden hose

Time

- Since first time is the worst time, block off a couple of hours in the afternoon the first time. After that, it should take no more than 1 to 2 hours or even less. Less if you are just doing a flush.
- Tip: if you turn off the water heater the night before, the water will have time to cool down. This makes everything easier. See instructions for how to turn yours off. If this is not possible, you can also turn off the heat and then turn on a nearby hot water faucet to drain the hot water.

Instructions to Flush

1. **Turn off power to the heater**
    - *For electric heater*: flip the circuit breaker for the water heater to the off position. If you do not do this, it can ruin the element.
    - *For a gas heater*: Look for the gas shut-off valve for the heater. Turn it to off. Turn the temperature to vacation or pilot.
2. **Open a hot water faucet in the house**
    - This will let in air and relieve pressure in the system
3. **Do a quick flush**
    - Connect your water hose to the drain valve. It should be along the bottom front of the heater.
    - Put the other end of the hose either outside or in a bucket. Whatever method you use, just be sure you can tell if sediment is coming out.
    - Open the drain valve for a few seconds and then close it again. Do this a few times. Is the water flowing well? Or does it feel like it might have a lot of sediment in it? (fyi- sediment may look like slime, fine grit or large chunks)
        - If it's flowing well, go to step 4.
        - If you think you need a power flush, skip to step 5: To power flush.
        - If it seems the water is so clear you do not need to do more than a quick flush, skip to step 7.

4. **Shut off the water**
    - Locate either the cold-water valve above the water heater or the main water supply to the house. If you are facing the tank and the tank is facing you, the cold line should be on the right-hand side as a rule of thumb. There should be a stamp on the heater labeling the cold line.
    - Turn it off.
5. **Drain the tank OR do a power flush**
    - **To gravity drain the tank:** With the hose attached, open the drain valve on the spout where your hose is attached with either your hands or your flat-head screwdriver. Once it's opened, water will begin to come out. If you are using a bucket, turn it off so you can dump it when it fills. It might take 30 minutes to drain completely.
    - **To do a power flush:** If the water is really slow or not coming out, you may want to consider doing a different kind of flush.
        - *Method one:* you can attach a washing machine hose to a nearby faucet. Connect the end of the hose to your water hose (you may need a connector for this). Open the faucet you attached the washing machine hose to for several seconds to blast water into the tank. This should break up the sediment. Disconnect the washing machine hose and try draining the tank again. You may need to repeat a few times.
        - *Method two:* power flush method. Turn the cold water to the tank back on. Then open the drain valve for 30 seconds at a time until the water is running cold through the hose AND running clear.
6. **Flush the tank**
    - Once empty, turn on the cold supply valve or main water supply for roughly 20 seconds again and again until water runs clear.
    - Look around the hot water heater for signs of damage or leakage.
    - Disconnect the water hose.
7. **Refill the tank**
    - Make sure there is a hot water faucet still open.
    - Slowly and partially open the cold-water valve or the main water supply again.
    - Check the faucet. You should hear the air being pushed out of the system. It takes a while. Once you get a steady, smooth stream of water, you can turn off the faucet. This tells you the water heater is full again.
8. **Turn on the power to the heater again**
    - *For electric heater*: flip the circuit breaker for the water heater back to on. If you do not do this, it can ruin the element.
    - *For a gas heater*: Look for the gas shut-off valve for the heater. Turn it to on. Relight pilot if necessary. Turn the temperature back to where it was.

Instructions to Change the Anode Rod

1. **Read all the instructions, then watch this video**: How to Change a Water Heater Anode Rod | This Old House (youtube.com), then read the instructions again as you move thought the steps, compare these instructions to your manual, defaulting to the manual when appropriate.

2. **Locate the anode rod to know how much water to drain** (tip: only drain what is absolutely necessary. More is not better here!)
   - If your anode rod is on the **top** of the heater, you will only need to allow the tank to drain about a quart or 1/2 a gallon of water.
   - If the anode is located on the **side**, then you will need to drain the tank until the water is below the anode rod port.
   - Some heaters have the anode attached to the **hot water outlet port** and appear to be a pipe nipple, to see what they look like click here. See the "Hot Water Outlet Anodes" section below for information on this type of anode. (this is where it is helpful to either find your manual or search in YouTube for your unit).

3. **Turn off power to the heater**.
   - *For electric heater*: turn off the circuit breaker for the heater. If you do not do this, it can ruin the element.
   - *For a gas heater*: note what temp you have it set to so you can turn it back to that same temp. Then turn the gas control valve to the lowest setting or the "vacation" setting. Be careful not to turn completely off because it saves you from the trouble of relighting the pilot light.

4. **Turn off the cold-water supply line to the heater**.
   - You should see a flexible line coming from the wall to the hot water heater. Look where the line is meeting the water heater. You should see something blue to indicate it's the cold-water line. There should be a valve on this line. Turn it until it's in the off position.

5. **Partially drain the Tank**.
   - Find the drain valve at the bottom. Connect your garden hose to it, putting the other end of the hose to a drain, outside the house, or into a large container. (Be sure to account for gravity here. The hose must be lower than the water level in the tank). Open the drain valve and allow the correct amount of water to flow out (see step 2). Note- the water will be hot so be careful when handling the hose.
   - Open a nearby hot water faucet to relieve pressure. Find a faucet close to the heater that has a hot water supply and turn on the hot side. This relieves pressure in the tank by allowing air into the tank, which breaks the vacuum and allows the water

heater to drain. If the tank is still under pressure when you try to loosen the anode, it just might shoot out like a rocket!

- Again, only drain the amount necessary as the weight of the water will help you remove the anode rod.

6. **Remove the old anode rod**.
   - Use a closed end wrench or 1-1/16" socket wrench and ratchet or breaker bar on the hex head to remove the anode. Anode rods are usually installed and kept in the heater for several years, so it may be a bit hard to get loose. You can try using a "breaker bar" for better leverage or you can also try tightening the rod just a little to loosen up the threads. You can hit the breaker bar with a hammer but you also run the risk of cracking the tank….so don't go crazy)
   - You want to prevent the heater from moving around as this could cause damage to the pipe connections. It is a good idea to have someone hold the heater while you try to loosen the anode. Expect the water heater to try to turn with the force you are putting on the anode. If needed, you could use a battery powered impact wrench (not cheap but may save you money if it keeps you from hiring it out. You could always ask a neighbor to borrow theirs, and in exchange, you could offer to help them (and learn bc if they have an impact wrench, they likely know a few things).

   - DO NOT use any chemicals to try to loosen the threads, as they could get into the water heater contaminating the water.
   - Once the anode is loose, lift it out from the heater. Depending on how much clearance you have above the heater, you may need to bend the anode to remove it. Generally, there is not much left of the anode by the time it needs replacing since it is intended to corrode within the tank. If you find that the anode is hard to remove because it appears to be enlarged and cannot pull through the inlet hole, then there is still enough of the anode material to be working properly and it does not need to be replaced just yet. In this case you can simply screw the anode back into the heater and replace it later.

7. **Inspect the anode rod.** Once you pull out the anode rod, what shall you see?
   - **A smooth, cylindrical metal rod.** Even shiny if it's relatively new. The newer it is, the more rigid it is. No action needed except to mark in your calendar when to look again.
   - **A partially corroded rod.** You might see pitting or small holes on the surface. You may see thinning of the rod in some areas. It may have a rough, uneven texture. It's up to you if you replace or not.
   - **A heavily corroded rod.** You will see a significant reduction in diameter. Large sections may have already been sacrificed. The rod may even be broken into pieces. You may just pull out a portion of the rod. You may only see cables.
   - **Note:** it is normal to see some loose particles or sludge clinging to the rod. You may see various colors depending on your water composition. You may even notice a sulfur-like odor, especially if you have an aluminum rod.

8. **Install the new anode rod**.
   - **Wrap the threads** of the new anode rod with PTFE thread sealing tape, in a clockwise direction if holding the rod and looking at the threads or counter-clockwise if the rod is placed in a standing position and you are looking at the face of the nut. Only about five or six wraps around the threads are needed. Or use a quality thread sealing compound.
   - **Insert the new anode rod**. Most anode rods are completely straight and should not be bent. If your space is limited, you may consider using a segmented (aka flexible) anode.
   - **Tighten the new anode** with your closed end wrench or 1-1/16" socket wrench and ratchet. Again, to prevent the heater from moving and potentially damaging the pipe connections, have someone else hold onto the heater to keep it in place. This will be easier than removal.

9. **Refill and restart the system (or use this time to flush the system – skip to those instructions above)**.
   - Make sure the drain valve is tightly closed.
   - Open the cold-water supply to the heater to refill the tank. Keep the faucet we mentioned earlier and in the hot position until water flows steadily.
   - The tank is full when water comes out of the faucet. Let the water flow from the faucet until all the air is released from the tank. The faucet will usually spit some air out with the water until the air is expelled. The tank should be rid of any air when the water runs freely.
   - Check for any leaks in the connections on the heater.
   - Turn the power on for electric. For gas set the control back to the original temperature setting.

Videos & Other Resources

- How to Change a Water Heater Anode Rod | This Old House - YouTube
- 2 EASY WAYS To Flush/Drain WATER HEATERS! (Pro Plumber Tips For Flushing Your Water Heater GAS/ELEC) (youtube.com)
- How to replace anode rod and solve rusting and odor problem
- Why Dielectric Unions Are Common Failure Points in Water Heaters
- Water heater glossary: definition of pipe nipples
- Understanding Water Heater Anode Rods - PlumbingSupply.com

Tips

- If it's been more than 4-5 years since the last known flush, proceed with caution. Some people say you shouldn't flush it as the mineral buildup inside may be plugging any holes that might have formed in the bottom of the water heater. They claim a flush may loosen those minerals, causing your heater to leak and perhaps fail. My advice is to weigh the risk of failure against action. Are you having trouble with smell or temperature? Seeing any of the other must-do signs from above? If so, consider taking the risk. It could solve your problems. You may be looking at buying another one anyways if it doesn't.
- If you can't clear the sediment or the water never runs clear, it may be time to call a plumber.
- Some water heaters have a hose bib type drain valve. This makes it difficult to flush as it is more difficult for the sediment to come out. You can ask a plumber to replace it with a full port ball valve (or do it yourself). This then provides a full ¾" diameter opening for flushing/draining.
- To extend the life of your hot water heater, consider setting the temperature to no more than 120 degrees.
- If you have read this far and feeling uneasy, no worries. It's normal! Watch the videos. Read the directions here again. Find your manual. And most importantly, go out and look at your water heater. Do you recognize anything? I find that sometimes things make no sense until I make myself go and look at whatever the thing is I am working on. Put on your detective hat and see what you can figure out! And ask as many questions as you need! We got you!