Executive Summary

This month, I did a static test of the PLA fuel cores infused with a lower concentration of KMnO₄. Ignition occurred in less than one second. Lower solubility means lower cost and lesser mess. Also, I did a MkI Viper launch using the larger styrofoam fins. The Viper still pitched up but not as much. The addition of ventral nacelles will introduce drag at the port and starboard fins counteracting the pitch up.

Technical Stuff

This month, I continued working on cleaning and organizing my lab. I installed some ceiling panels and LED lighting. To get back into a routine, I set up my rocket engine test stand and did a high pressure test on the propellant tank using distilled water. Everything checked out.

I assembled a rocket engine and performed a static test (1st picture). I used the PLA/KMnO₄ fuel cores that have been stored in a dry bag since 09/17/24. This was the 3rd infusion of KMnO₄ using the original solubility of 50 gm/L. Ignition occurred in less than one second. I did two static test and a Viper launch using the 3rd infused fuel cores.

On the Viper launch, ignition occurred well under one second mainly due to a small leak in the solenoid valve. As I began to pressurize the propellant tank, HTP leaked onto the fuel core causing a premature ignition. I increased the pressure to 140 psig, closed the valve, depressurized the feed line, disconnected the feed line, closed the nose cone, and launched the Viper in what seemed like two seconds. As such, I did not get any video of the launch.

The MkI Viper cleared the launch rail and began to pitch up. I gave it some nose down on the controls but not enough. The Viper did one flip (maybe two) and crashed about 10 feet in front of me. The starboard fin and the equipment bay were damaged. The damage was minimal. So, I'm getting better.



Also, over the last two months I've been working on streamlining the Viper (2nd picture). I designed and printed out ventral fin nacelle molds. I used the molds to make fiberglass nacelles for the vertical, port, and starboard fins. By design, the two lower nacelles should produce more drag than the single upper nacelle. This should counteract the pitching up as the Viper leaves the rail guide.

Next month, there will be another static engine test using the 4^{th} infusion of KMnO₄ into the PLA fuel core. Also, I plan to launch the MkI Viper with the ventral fin nacelles.