Executive Summary

This month, I did two static tests of the PLA fuel cores infused with a lower concentration of $KMnO_4$. This was the 4th infusion of $KMnO_4$ using the original solubility of 50 gm/L. In the first test, ignition occurred in less than one second due primarily to a small leak in the solenoid valve. In the second test, a larger leak in the solenoid resulted in an explosion.

The ignition test of the 4th infusion was inconclusive. However, I surmised that by using a motorized ball valve on the class II engine, I can scale the engine to higher thrust by leaking HTP into the fuel core thus preheating the fuel core prior to ignition.

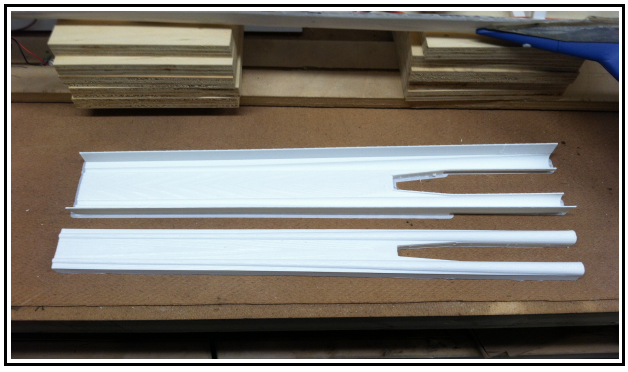
Technical Stuff

This month, I assembled a rocket engine and performed a static test (1st picture). I used the PLA/$KMnO_4$ fuel cores that have been stored in a dry bag since 03/24/25. This was the 4th infusion of $KMnO_4$ using the original solubility of 50 gm/L. Ignition occurred in less than one second due primarily to a small leak in the solenoid valve. I had to rush through the test and only have video from the high speed camera.

Although the ignition test of the 4th infusion was inconclusive, the small leak of HTP dropping onto the PLA/$KMnO_4$ fuel core resulted in a preheating of the fuel core. Post analysis of the fuel core showed little to no melting of the core during the leak.

I did a second static test using the same solenoid valve. The leak was much larger and the melt must have been significant because the engine exploded. I surmised that the PLA/ $KMnO_4$ plugged the throat resulting in an over pressure in the plumbing. The whole test article was destroyed. I now have a boundary. A small leak results in preheating. A large leak results in an explosion.

The class II rocket engine will have a motorized ball valve rated at 150 psig. I can open the valve just enough to preheat the core for several seconds then full ignition. I'm confident that scaling the PLA/$KMnO_4$ to higher thrust is possible due to the preheating of the fuel core.



Also this month, I continued to design and print new canopy molds (2st picture). I plan on using a bottom mold and a top mold. The fiberglass will be sandwiched between the top and bottom mold. This should result in a more uniform canopy with ventral nacelles.

Next month, I plan to launch the MkI Viper with the ventral fin nacelles. Also, since the static test article was destroyed, it is a prime time to start testing a class II engine using a motorized ball valve.