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--    How to make   --
--   Sugar Rockets  --
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--Written & Typed by--
--  Cloaked Warrior --
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Combine these 3 substances in the following proportions by weight:

  Potassium Nitrate.......63%
  Sugar...................27%
  Sulfur..................10%
(you can by this stuff at the drug store)

Note: use a diet scale or a gun reloading scale to measure the ingredients

What to do with the chemicals

Put the 3 combined chemicals into a plastic refrigerator container with a very tight lid (use a soft margarine container). Now be sure that the lid is on TIGHT. Shake the container for about three minutes. You just made the rocket propellant! This should be a yellowish powder...

Making the Casing(s)

Items needed:

- 2 inch wide gummed, brown paper packaging tape
- Scotch tape
- 1 foot length of 1/4 inch diameter hardwood dowel
- single edged razor blade
- wet sponge

Cover the hardwood dowel with several strips of Scotch tape (layed lengthwise onto the dowel). Now cut a strip of gummed paper packaging tape (8 in. long) and lay it, gummed side DOWN, on a flat surface. Dampen all but the last inch of the back of the tape with a wet sponge. Turn the tape over and start at the dampened end, start rolling it up around the Scotch-tape-covered dowel. After having one layer of tape around the dowel, moisten the GUMMED side of the rest of the tape and roll it up around the dowel as tightly as possible.

Problem(s):

Many times the paper tape will start to run off to one side or the other. You

can correct it like this (example-run off to the LEFT):

Use a single edged razor blade to the unrolled portion of the tape right next to the roll. Start the slit at the LEFT edge of the tape and cut across the tape to within 1/4/ of an inch of the RIGHT edge. Once the tape has been partially cut, pull it to the RIGHT and correct the mistake. (Or vice-versa)

LAST STEP IN MAKING THE CASING: when done rolling a casing, hold the last edge of the tape against a flat surface for a few moments; then slide the casing off the dowel and ALLOW IT TO DRY...you can also bake the casing(s) in your kitchen oven at 160 degrees (F) for about 30 minutes...

Making the Nozzles

Items needed:

- Durham's Rock Hard Water Putty
- Epoxy Glue (part A and part B)
- 'Six Penny' (3/32") Ungalvanized finishing nails
  (quantity: amount of casings made)
- one length of 1/4 inch diameter hardwood dowel
- a 7/64 inch diameter drill bit
- a 1/8 inch diameter drill bit

'Six Penny' finishing nails are about 3/32 inch in diameter. You will now make the core of your rocket(s). Instead of using finishing nails you may use piano wire that have the same diameter. You must pack the propellant down around the finishing nails or piano wire., then removing it when you're finished.

Problem(s):
The finishing nails have a little row of grooves right near the head. This will cause problems as you pull the finished rockets of the nail, so piano wire is prefered.

The nozzle is made of the putty. To one you are first going to form a little 1/4 inch long plug of putty in one end of each casing. You MUST only form a 1/4 inch long plug of putty otherwise...

We are now going to tell you how to make a gauge (in case you use too much putty or too little than required). Cut off a six inch length of the 1/4 inch hardwood dowel that you bought to use the casing with. Wrap about a dozen layers of masking tape around it so that one edge of the masking tape is EXACTLY 1-3/4 inches from one end of the dowel. Slide a casing over the dowel and run the end of it up against this edge of the tape. If you look in the open end of the casing, you will see a cavity exactly 1/4 of an inch deep. Pack this cavity full of putty (not yet).

Mix the putty with water in a small tuna can to the appproximate consistency

of stiff bread dough. You can pack each cavity by simply pressing a wad of putty into the end of the casing with your finger and wiping the excess of with your thumb. Try to avoid creating air pockets or bubbles. After your done with this, SLOWLY remove the dowel depth gauge. Then let it sit to dry for a day or lay them on a cookie cheet in the oven and heat them at 140-160 degrees (F), depending on how many you made, for an hour to an hour and 30 min. After the putty is hard and dry, drill a 7/64 inch diameter hole completely through the center of each putty plug. If I were you, I would use a power drill. But a hand drill is okay if you are careful and patient.

Now I will show you how to make a jig to hold the casings upright so drilling a hole in each putty plug won't be a tough job. Get a thick block of wood and drill 3/8 inch diameter holes in it and stand the casings, putty ends UP, in the holes in the block. Mount your 7/64 inch drill bit in your drill press, and start drillin' a hole in each putty plug. Get each hole well entered, so work CAREFULLY.

Loading the Propellant

The sugar rocket that you are making are core-burners. To make a core-burner, simply pack the propellant down around a dowel or mandrel. When the mandrel is removed, it leaves behind a hollow core. The mandrel I used was a short length of 3/32 inch diameter piano wire (well you can use a finishing nail or piano wire). The core has to be about 1-1/4 inch long. The core starts at the inside edge of the nozzle plug and extends to the inside edge of the forward bulkhead plug. The nozzle plug is 1/4 of an inch thick, so the mandrel should be 1-1/2 inch long. To make a mandrel, use a small hammer to pound on a six penny finishing nail into a block of wood. Then use a pair of wire cutters to snip it off to a length of exactly 1-1/2 inches. If you are using piano wire and not finishing nails then do this:

Drill a 3/32 inch diameter hole in the block. Roughen up one end of the wire with sandpaper or a file and glue the roughen end of the wire into the hole in block with epoxy glue. When the glue is completely hard, grind the wire to length with a grinding wheel.

X = Quanity of
If you made X rockets, make X mandrels on ONE block of wood (or a few blocks if you made about 100 rockets). To use this, set each rocket casing, drilled end DOWN, over each mandrel (you're ready to load them).

LOADING THE ROCKETS:

Step One

To load the propellant, you must pack it down around the mandrel(s), so the tamp that you use must have a hole drilled right in its center and deeper than the length of the madrel wire inside the paper casing. Here is how to make the tamp. Cut a 4 inch length of 1/4 inch hardwood dowel, sand the ends square, stand it upright under the drill press, and drill a 1/8 inch diameter hole right down the center of the dowel to a depth of 1-1/2 inches. You can also use a brass or aluminum rod to make a nicer tamp instead of using the dowel. But DO NOT USE STEEL! It is for your safety.

Note: If you have access to a machine lathe, the job will be much easier...

Step Two

Next, make a paper funnel and place it over the open rocket casing, and fill it with about 1/8 teaspoon of sugar-based rocket propellant. Use a small stick or wire and poke it down into casing. Remove the funnel and insert the tamp you made (drilled end DOWN) into the end of the casing. Pack the propellant down around the wire mandrel by striking the tamp with a small hammer. Repeat this step (3) until the tamped powder reaches the top of the mandrel. Wad up some tissue paper, or paper towel, and pound it in on top of the powder. This plug keeps the epoxy glue used to plug the front of the rocket from running down and sticking to the madrel. Once the tissue plug is in place, fill the rest of the casing with epoxy glue. After it has hardened, twist and pull each rocket casing off of the mandrel.

Priming and Firing

Go to a gun shop and buy a can of FFFF Fine black powder.

Priming the Rocket(s)

To prime or fuse one these rockets stand it on end, nozzle-UP, and use a small paper trough to fill the entire core hole up to the top with the black powder you bought. Now you must cap it. Put about a teaspoon of the powder into a jar and add water a few drops at a time, stirring with a stick as you go, until the mixture is about the consistency of toothpaste. Then you take a small dab of this powder paste on the tip of your finger and smear it over the nozzle hole of the rocket that you just fused (primed). Make sure that the hole is completely covered. Now just set the rocket(s) aside to allow the paste (cap) to dry for about 30 minutes or so.

Firing the Rocket(s)

The easiest way to launch the rocket(s) is to glue it onto a guide stick. You can use hibachi sticks or shish kabob skewers. You can use a drop of instant cyanoacrylate model cement or just use white glue and masking tape to glue on the sticks. To ignite the rocket(s), you can use an electric igniter or just

tape a filament of wire from a piece of coarse steel wool over the priming cap, attach each end to an electrical lead or alligater clips. Attach leads to a strong battery (6-9 volts or a car battery), and fire by closing a switch to complete the circuit. The current will make the steel wool wire glow red hot, causing it to burn and ignite the priming cap...

How 'bout an Option:

A slow lift off: Prime or fuse with pyrodex or don't fill the core all the way to the top with black powder. Put a little in....