

## Sizzling Colored Comets

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The sizzling colored comets described in this article have brilliantly colored heads, have short white tails and produce a sound much like frying bacon. They are very simple modifications of standard potassium perchlorate color compositions, are inexpensive and are relatively easy to make. These sizzling colored comets are suitable for use as comet stars in shells or for use as single large comets.

Presented below are standard formulations for blue, purple and red stars. The blue and purple formulations are taken from T Shimizu's excellent article in *Pyrotechnica VI*. The red formulation is analogous to those presented by Shimizu. The formulations all use potassium perchlorate as oxidizer, red gum (Accroides resin) as the primary fuel, and dextrin as the water soluble binder. The only modification of these formulations, to turn them into sizzling color comets, is the addition of 10 to 20% of 20–50 mesh atomized magnesium. Varying the percentage of coarse magnesium has the effect of increasing the density of the tail and the sound level produced. The addition of unprotected magnesium makes it inappropriate to use water to activate dextrin as the binder. Instead, alcohol, denatured ethanol or methanol (with proper ventilation), should be used to activate red gum as the binder.

The dampened composition is fairly sticky, and while cutting stars is possible it is not easy; making pumped stars is preferred by the author. On drying, the stars/comets are quite water resistant and priming can be easily accomplished by dipping them into a water-slurry of home-made meal powder containing 5% dextrin. To make the stars/comets easy to handle while the wet prime is drying, they can be sprinkled with dry meal powder or rolled in a bowl that is partially filled with dry meal powder.

It is somewhat difficult to judge the color of these comets when burned on the ground. In part this is because they will be surrounded by a

number of bright white sparks which are not propelled very far from the star. However, the main reason is that one's eyes do not perceive color well when over-powered by the high light intensity produced by these stars. Tests should be made with the stars/comets in motion and at a distance of at least a few hundred feet.

The comet stars function very much as one would expect. When the star burns, the large particles of magnesium are partially consumed within the flame envelope. This has the effect of raising the flame temperature which in turn results in increased light output. Because the composition is fuel rich from the addition of magnesium the size of the flame envelope is greater making the star appear slightly larger. Because the magnesium particles are large and rounded, only their outer surface is consumed inside the flame envelope. The burning particles appear white, in the absence of a color agent and chlorine donor, and form the tail of the comet. (Readers wishing additional information on the subjects of chemical color production in stars, flame temperature, etc. are referred to a paper on those subjects that appeared in *Pyrotechnica IX*). The mechanism of generation for the sizzling sound produced by these comet stars is not fully understood.

<b>Standard Color Formulations (parts by wt.)</b>			
Chemical	Blue	Purple	Red
Potassium perchlorate	64	64	64
Parlon	14	13	10
Red gum	9.5	9.5	10
Copper carbonate	13	5	—
Strontium carbonate	—	8	13
Dextrin	5	5	5
(bound using water)			
<b>Additions to Make Sizzling Color Comets:</b>			
Magnesium 20–50 mesh, atomized	15	15	15
(bound using alcohol)			