

TG5 Gunpowder ingredients

The processes of gunpowder making

*Text that follows gives more detailed information for teachers.
These articles could be the basis of a variety of literacy activities.*

GUNPOWDER

Gunpowder “Black Powder” was invented by the Chinese. The earliest records of its manufacture date back to 850 A.D. when the results of the following experiment was reported “some have heated together the saltpetre, sulfure and carbon of charcoal with honey; smoke and flames result, so that their hands and faces have been burnt, and even the whole house burnt down” The invention seems to have been discovered by accident by alchemists seeking the elixir of immortality.

The first use of gunpowder in China for military purposes was in 919 A.D. It reached Japan, Islam and Europe in the 13th century.

GUNPOWDER INGREDIENTS

Gunpowder is made up of three chemicals, in the following proportions - 75% Potassium Nitrate (KNO_3) + 10% Sulphur (S) + 15% Carbon (C).

The Foxfire Book,* giving advice on how to make your own gunpowder records

By weight measure, black powder is made of seventy-five parts saltpetre finely ground, fifteen parts charcoal and ten parts sulphur. All ingredients must be ground separately. This can be accomplished with either a mortar and pestle, or with a hand-cranked flour mill. Never mix all three ingredients before grinding unless you want to turn your mill into a deadly grenade, or your mortar into a canon that can blow off your fingers or even your hand.

Then the ingredients can be mixed with a small amount of water so the mixture comes out with biscuit- dough consistency. Usually when I mix the ingredients, I add just enough stale urine to make the batch bunch about like biscuit dough. The urine, substituted for water, gives the powder more oxygen and higher performance.



Gunpowder is used in weapons as the propellant for the shot. The saltpetre produces the oxygen for the other ingredients when it is lit; the charcoal provides the carbon, which when burning assists in making potassium carbonates and carbon sulphates during the one hundredth of a second that it is burning.

The resultant explosion of the combustible materials expels the shot from the gun barrel at high velocity. The carbon residue has to “be swabbed out about every third shot if the shooter wants the round ball to continue to shoot true”¹

¹ *See the website for further fascinating information www.dangerouslaboratories.org/foxfire5.html

THE PROCESSES OF GUNPOWDER MAKING

Two of the three ingredients used in the making of gunpowder were imported by ship and brought to the wharves on the Oare Creek or the Faversham Creek. Brimstone (sulphur) was brought from the volcanic areas of Italy and Sicily and saltpetre from Italy and India. Charcoal (carbon) was usually produced locally from native tree species planted in coppices near or around the powder mills. Two tons of wood were needed to produce charcoal for one ton of gunpowder.

1. Preparation. The saltpetre that was shipped in was refined at the Works prior to use and could often be used straight from the refinery. However, the charcoal and sulphur had to be pulverised and sieved to remove foreign matter. Horse-driven crushing mills were used for this purpose up until the 19th century.
2. Mixing The saltpetre, charcoal and sulphur were weighed out in the required proportions:- 75 : 15 : 10 and then mixed together in a revolving drum, adding a little water to produce a 'green charge' for the Incorporating Mills.
3. Incorporating Originally, incorporating of the ingredients (which involved grinding and mixing them together) was done by hand with a pestle and mortar and later used a horse or water wheel power. In the late 17th century Incorporating mills with stone edge runners were introduced into Britain and were in wide use by the 18th century. In the 19th century horse or water power was replaced by steam driven engine power or water turbines.
4. Breaking down The product of the incorporating mills was mill cake which still contained a small amount of water. The mill cake was crushed using mallets or a crushing machine to form meal powder.
5. Pressing The meal powder was then pressed and compacted to about half its former thickness to form cakes of hard press cake.
6. Corning This next stage of the process was introduced in the sixteenth century in order to provide a consistent product. The press cakes were broken down to form small granules of powder or corns of approximately the same size. Originally this was done by hand, but later the process was mechanised, passing the cake through a series of toothed, fluted or smooth rollers. It was then cut and separated by sieving to produce different sizes for different purposes.
7. Dusting Any remaining dust was removed in this process using a sieve of gauze-covered revolving cylinder. The dust was collected and returned to the system.
8. Glazing. The granules of gunpowder were tumbled and polished to increase their resistance to moisture. In the nineteenth century a coat of black lead or graphite was applied to the exterior.
9. Drying The granules were sometimes dried during glazing, but if not, were dried separately in stoves at a temperature of 40 degrees C to reduce their moisture content to 1%.
10. Testing Samples of gunpowder were tested for quality and consistency using mortars and canons on a firing range. ²

² Oare Gunpowder works – Conservation Plan. Broadway Malyan