Basic explosives

This will be the most informative discussion on theoretical and practical pyrotechnics that I can deliver in a relatively short phile.

I don' reccomend that anyone uses this information to create any illegal explosives or weapons. It is in fact, not a good idea to use explosive devices to inflict personal or property damage because of the possibility of hurting yourself or innocent people. Any explosive is dangerous, and should be handled only by proffesionals.

We'll start with the basics:
There's basically two categories of explosives: high explosives, and low explosives. High explosives are also called detonating, and low eplosives referred to as burning mixtures. The difference between detonation and burning, is that a burning mixture simply burns at a very fast rate, usually not exceeding the speed of sound, needing other methods to actually produce an explosion. Detonation, on the other hand, occurs almost simultaneously thru out the whole mass of the mixture. The main difference between the two, chemically, is proximity of the oxidizing and reducing compounds. In detonating mixtures, the oxygen is bound rather loosely to the reducing agent (the stuff that wants to burn using the oxygen), so loosely in fact, that it takes very little external energy to brek them apart. This chemical composition is an actual molecular bond as opposed to the simple mixture of burning explosives. This means that the oxygen is alot closer to the reducing agent, hence, it is much easier to utilize. It should be pointed out, that although the bonds in a detonating molecule are loose, they require a great deal of energy to keep them bound. The greater the tension contained in these bonds, the more powerful the detonation will be, once they are broken apart Because of these differences, in order for a low explosive to explode, it must be contained in a very strong enclosure. Here, enough pressure and heat can be built up to force the oxygen and reducer together, and result in a chain reaction. This is why firecrackers have many layers of paper around the chemicals. In a pipe bomb, the resulting explosion is usually much more powerful, owing in part to the much stronger enclosure. A pipe bomb, however, is extremely dangerous due to the schrapnel effect. High explosives, although they usually can be detonated without being enclosed, are more powerful when they are confined.

If all this seems confusing, it will be explained a little better later.

Here are some examples of the compounds used in low or burning explosives.
1.oxidizers (listed in increasing level of power):
A.Sodium nitrate
B.Sodium chlorate
C.Ammonium nitrate
D.Potassium bichromate
E.Potassium nitrate
F.Potassium bichlorate

G.Potassium chlorate
H.A whole slew of other ones
2.Reducers:
A.Sulfer
B.Charcoal
C.Aluminum
D.Magnesium
E.Titanium
F.Almost anything else that burns.

These chemicals are mixed in varying proportions to produce the desired effect. The formula varies according to the amount of oxygen in the selected oxydizer and the heat at which the selected reducer burns at. Titanium burns the hottest, and Potassium chlorate produces the most oxygen. These two will burn the fastest when mixed together. One thing I forgot to mention: the heat from the burning reducer is what releases the oxygen from the oxydizer. The hotter the oxydizer gets, the more oxygen it releases.

If you ever decide to mix any of these chemicals, DO NOT COMPRESS, SCRAPE, OR MAKE ANY SPARKS. Potassium chlorate especially, will combine with sulfur at the drop of a hat- sometimes with out any heat or pressure. Potassium chlorate should be avoided if at all possible. Potassium bichlorate is almost as powerful, but more stable. It is the choice of professional fireworks manufacturers.

One formula for the mixture used in pro fireworks:
1 part sulfur
1 part aluminum (titanium is better but costlier)
2 parts potassium bichlorate
these quantities are by weight.

These materials are all very finely divided. The aluminum or titanium should be at least 400 mesh, with 600 mesh burning much faster.
Also, if you mess around with this stuff, wear a surgical mask. The metal dust is very damaging to your lungs and can kill you.

Enough of that. Let's move on to high explosives.

There are 3 kinds of high explosives:Primary, booster and secondary. Primary explosives are extremely sensitive to shock, vibration, heat, electricity, and probably insults. PRIMARY explosives are usually contained in a small metal tube and electrically ignited. They are used to initiate another, less sensitive high explosive, called the SECONDARY explosive. Sometimes, the secondary explosive is so insensitive, it needs a BOOSTER explosive to set it off. In other words, the primary sets off the booster , which sets off the secondary. This process is known as the explosive train. Booster explosives are often secondary explosives themselves

Here are some examples of primary explosives:
A. Mercury fulminate

B. Lead azide
C. ALmost any azide
D. Lead picrate
E. Lead styphnate
F. DDNP
G. HMTD
H. TACC (Tetraminecopper (II) chlorate)
I. Double salts

Examples of booster and secondary explosives
A. Nitroglycerine (actually glyceroltrinitrate)
B. TNT (trinitrotoluene)
C. RDX/Cyclonite/Cyclotrimethylenetrinitramine (RDX= Research Department Explosive)
D. PBX
E. PETN (pentarythritoltetranitrate)
F. Nitrostarch
G. Cellulose nitrate(guncotton)
H. Ammonium nitrate
I. Potassium chlorate
J. Amatol
K. Urea nitrate
L. Reportadly, a liquid made from hydrazine and ammonium nitrate
M. A whole slew of others

Contrary to some opinion, nitroglycerine is the most powerful of all explosives known. Some might have more shattering power (brisance), but 'nitro is the standard against which all other explosives are measured.

I will explain how alot of these explosives are made in a later installation. One primary/secondary combination that merits attention now is HMTD/RDX. The rason that this combo is remarkable, is that both explosives are made from the same base compound. This compound is hexamethylenetetramine. The HMTD is made using hexamethylenetetramine, hydrogen peroxide, and citric acid. The RDX is made using hexamethylenetetramine, nitric acid, and acetic anhydride. HMTD is very reliable and easy to make (and very sensitive). RDX is one of the most powerful explosives, having 94% power of 'nitro, and about 30% more brissance. The acetic anhydride can be ommited resulting in only about 40% efficiancy (it takes alot more of the other chemicals to make the same amount of final product. That will be all till next time. If there are any questions, leave me E-mail and I will answer promptly.