EXPLOSIVES

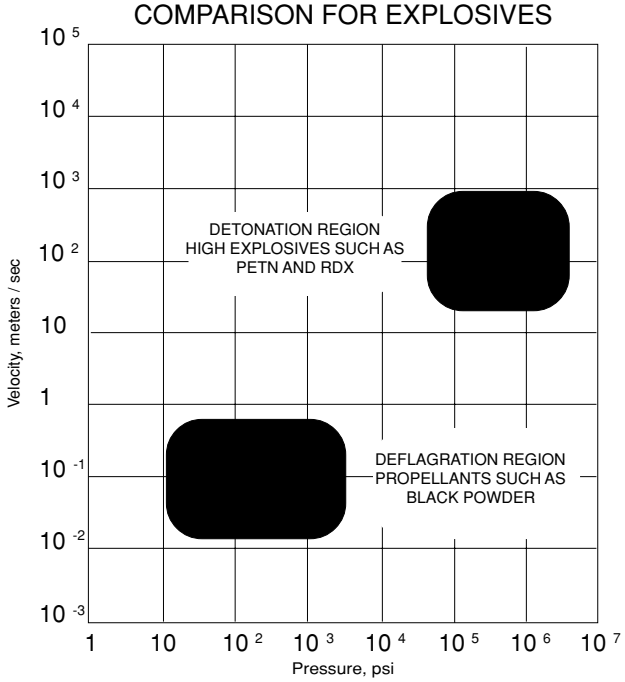
The objective of this discussion is best achieved by classifying explosives according to the generally accepted classifications:

Primary Explosives
Secondary Explosives
Propellants

In general, there are two types of chemical phenomena which occur during the ignition and functioning of an explosive. These phenomena are defined as either a detonation or a deflagration. The detonation of an explosive is the propagation of a shock wave through the explosive material where the rates of reaction are controlled by thermodynamic considerations. The pressures generated in a detonation shock wave are in the order of 10^6 psi with the wave traveling at a velocity of approximately 7000 meters/sec. The deflagration rate of an explosive consists of the chemical burning of the material wherein its propagation rates are dependent on chemical kinetics. The pressure pulse from a deflagration is on the order of 10^3 to 10^4 psi with the pulse traveling at a rate of less than one meter/sec.

The differences between detonation and deflagration are extreme; both phenomena are used to perform specific functions. Refer to Figure 1 for a graphic comparison.

Figure 1
REACTION RATES VERSUS PRESSURE
COMPARISON FOR EXPLOSIVES



In general, a detonation is used for fracturing without the use of a pressure buildup; whereas a deflagration builds up a pressure which in turn performs useful work. In general, primary and secondary explosives detonate and propellants deflagrate. However, under certain conditions, primary and secondary explosives can deflagrate and some propellants can detonate.

PRIMARY EXPLOSIVES: Primary explosives are considered a sensitive explosive in that they will detonate when subjected to a spark, flame, friction or a heated wire which causes a crystal to reach its ignition temperature. The reaction of a primary explosive starts with a deflagration, but within a few milliseconds or less becomes a detonation. The more common primary explosives are:

Mercury Fulminate • Lead Styphnate • Lead Azide