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Classification of Explosives

Explosives are classified into different types and categories in various ways depending on their usage, sensitivity to initiation, and finished product packaging.

1.1

Initiation Sensitivity

- *Cap-sensitive explosives*: The explosive can be fully detonated with a measurable unconfined velocity in low diameters (1 inch) by initiating with a single detonator of No. 6 strength, which is the lowest strength detonator commercially made.
- *Booster-sensitive explosives (blasting agent)*: This type of explosive is detonated only when a booster of sufficient power is used to initiate it. These boosters are made of high explosives like pentaerythritol tetranitrate (PETN) and trinitro toluene (TNT) and are much more powerful than detonators (Figure 1.1).

Explosives are further classified into primary, secondary, and tertiary explosives depending on its level of sensitivity to external stimuli. Standardized testing evaluates the sensitivity in terms of friction, impact, heat, shock and based on these results, explosives are classified accordingly.

Nitroglycerine (NG) is very sensitive and classified as a primary explosive. TNT/RDX/dynamites are secondary explosives. These are relatively safe for handling and can be handled in large-scale production plants with acceptable degree of safety. Ammonium nitrate (AN) explosives are the least sensitive and come in the tertiary explosives group. Even though they may have higher detonation velocities and pressure than NG explosives, they are much safer to produce in very large quantities.

1.2

Size

- *Small diameter explosives*: These are usually explosives made in diameter of 7/8 to 2 in. and generally cap-sensitive.
- *Medium diameter explosives*: These are usually explosives made in diameters of 3–5 in. and are booster-sensitive only.

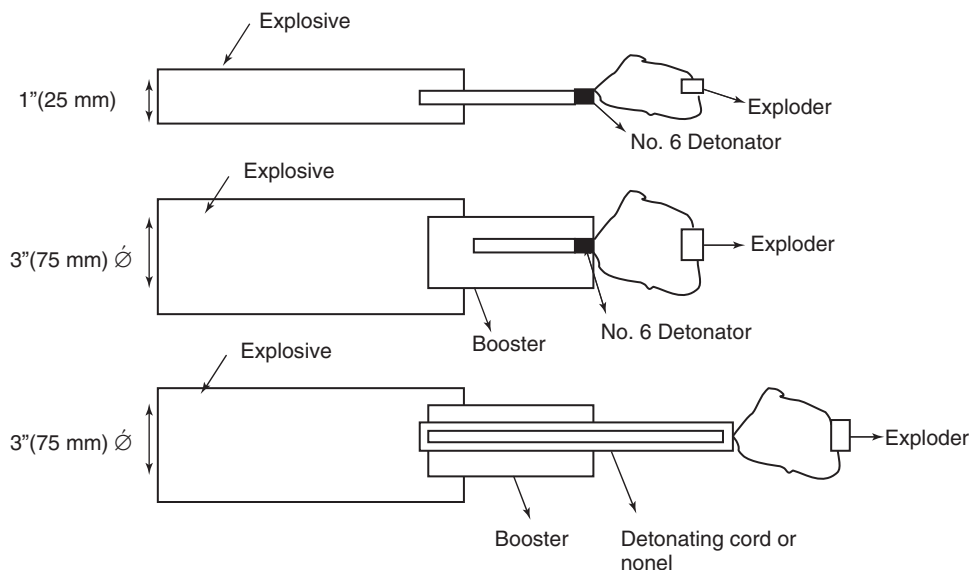


Figure 1.1 Types of initiation.

- *Large diameter explosives:* These are usually explosives made in diameter of 5–10 in. and are booster-sensitive only.

The boosters are in turn set off by either detonator or by a coil of detonating cord wound over and through it (see Figure 1.1).

1.3

Usage

The explosives are also classified into general purpose and permissible categories.

- *General-purpose explosives:* Usually in small diameter and cap-sensitive used for quarrying, tunneling, and cannot be used in underground coal mines.
- *Permissible explosives:* Cap-sensitive small-diameter explosives from 1 1/4 to 1 5/8 in. diameter, allowed by authorities for use in underground coal mines. Depending on the degree of gassiness (methane emission) found, there are further subclassifications. These differ from county to county depending on the test Procedures used.

1.4

Physical Form

Classification according to physical form of end product is as follows:

- *Cartridged explosive*: Here the explosive is in the form of cylindrical package, enclosed in paper or polythene tubings (flexible or rigid).
- *Pumpable explosives (bulk explosives)*: Here the explosive is in the form of a flowy material and is capable of being pumped, augured, or poured. There is no outer packaging at all and the product is directly moved into the bore hole using bulk delivery trucks.

Any material which cannot be fully set off with a measurable velocity of detonation (VOD) either by detonator or by detonation is considered as “nonexplosive” in nature. However such nonexplosive material can be converted into an explosive by increasing its sensitivity.

