

Propellants

Propellants are an explosive particle which through combustion provides velocity to the projectile. Generally two types of propellants are used in firearms.

1. **Smokeless powder**- Smokeless powder is almost used universally as a propellant in small firearms. The active constituents of smokeless powder are Nitrocellulose and Nitroglycerin. When only one active constituent is used as propellant the powder is called single based powder. Nitroglycerin is not used alone in the manufacture of ammunition because of its high energy and its corrosive action on the barrel.

When nitrocellulose and nitroglycerin are used together it is called double based powder.

When nitrocellulose, nitroglycerin and nitroguanidine are used together it is called triple based powder.

2. **Gunpowder**- The gun powder consists of Potassium Nitrate, Sulphur and Charcoal in proportion of 75:15:10. Gunpowder is not suitable for high velocity ammunition as large amount of the powder is required to get high velocity.

Besides it leaves large quantity of powder residue which tends to foul the barrel.

Mechanism of formation of gunshot Residue

When a weapon is fired large volume of gaseous material is produced. These gaseous materials are mainly the combustion products from the propellants and it consists of carbon dioxide, carbon monoxide, and oxides of Nitrogen etc.

In among this vast cloud of gases there are some partially burnt and unburnt propellant particles, and these solid particles are collectively called as gunshot residue. They are present at/ found-

1. In the barrel of the firearm.
2. On the firearm.
3. Hand of the shooter.
4. Clothes of the Shooter.
5. Articles around the shooter.
6. Articles in between the shooter and the victim.
7. Articles around the target.
8. On the target around the projectile hole/ entry point of projectile.

Scorching

Scorching effect is due to hot flames and gases.

It is also known as burning /singing/charring.

It is caused by flames of the hot gases.

It is a sure sign that a firearm has been discharged from a close range.

Hot gases can travel to a limited distance.

The burning angle depends on-

1. Distance between firearm and target
2. Barrel length
3. Types of propellant used

Blackening

Blackening around the bullet hole is caused by the deposition of the smoke particles.

The intensity is maximum at the close range and in cases where gunpowder is used.

In case of smokeless powder the intensity is less (quantity and distance being the same).

Smoke particles are formed due to the burning of the powder charge.

They are propelled out along with the projectile.

Blackening also consist contusions which are caused due to impact of the bullet.

Tattooing

Tattooing is caused by embedding of the unburnt or semiburnt powder particles onto the surface of the target body.

It is also known as Peppering.

These are slightly heavier than the smoke particles thus they retain the motion to somewhat longer interval and causes tattooing (they are present in the vacuum behind the bullet).