

## Shooting - exothermic reactions and the fire triangle

Shooting, as the sport it is recognized to be today, was originally invented to aid hunters in providing food and also as an offensive and defensive weapon. Now widely used for recreation, both for hunting and for sport, shooting relies on mechanics and chemistry to propel bullets from the gun barrel. Gunpowder, one method used to propel bullets, has a raft of chemistry associated with it. Use what you have learned from exploring gunpowder through this module to answer the related questions.

1. What are the three inter-related components which make up the fire triangle in order for fire to take place? Explain the role of each component.

1.

2.

3.

2. What are the three most common components of traditional gunpowder?

### Fact

1.

2.

3.

The composition of modern day gunpowder has changed since traditional gunpowder was first invented although traditional gunpowder is still almost identical to when it was first used in 1780.

3. What is the difference between an exothermic reaction and an endothermic reaction?

4. Using the following data, is the formation of water from hydrogen and oxygen an exothermic or an endothermic reaction? Bond energies in kJ/mol: H-H is 436, O=O is 496 and O-H is 463. Show your workings.

Workings:

Answer:

5. Draw an energy diagram for the reaction in Q4.

#### **Fact**

Fire is an example of a combustion reaction and a great example of an exothermic reaction, the energy being released in the form of light and heat. When gunpowder is ignited it is another example of a combustion reaction but as sound is also often produced it is known as an explosion. This can be shown when a gun is fired as the shot can be heard as well as energy being released in the form of light and sound.