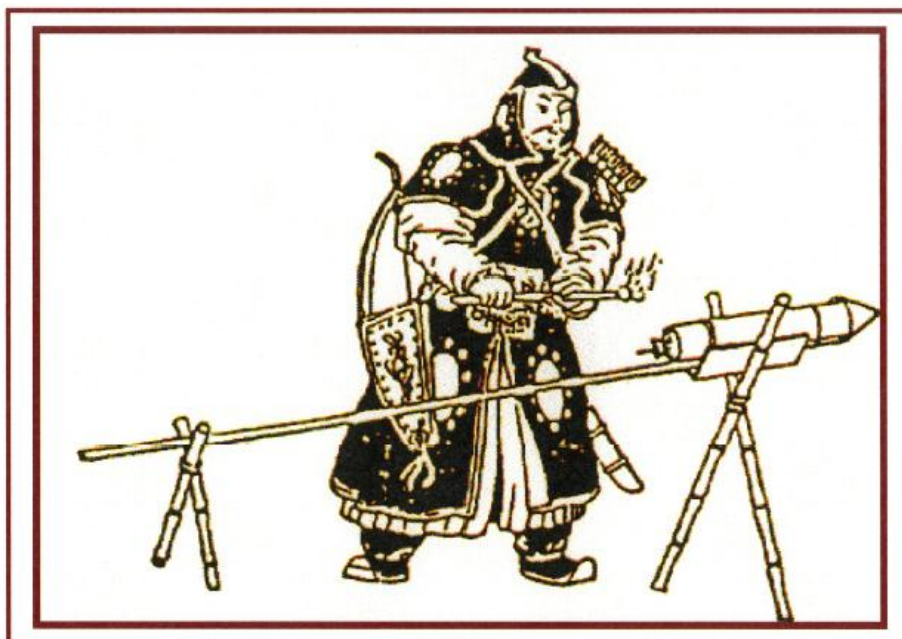




Student's Name :



The aim of this document is to give students the opportunity to think about balancing chemical reactions and how to calculate the amount of reactants and products in relation to a particular chemical reaction.

PART 1)

Historic background of Black Powder.

Gunpowder, also known since the late 19th century as **black powder**, was the first chemical explosive and the only one known until the mid-1800s. It is a mixture of sulfur, charcoal, and potassium nitrate (saltpeter) with the sulfur and charcoal acting as fuels, while the saltpeter works as an oxidizer. Because of its burning properties and the amount of heat and gas volume that it generates, gunpowder has been widely used as a propellant in firearms and as a pyrotechnic composition in fireworks.

Gunpowder was, according to prevailing academic consensus, invented in the 9th century in China, and the earliest record of a written formula for gunpowder appears in the 11th century Song Dynasty text, *Wujing Zongyao*. This discovery led to the invention of fireworks and the earliest gunpowder weapons in China. In the centuries following the Chinese discovery, gunpowder weapons began appearing in the Arab world, Europe, and India. The technology spread from China through the Middle East or Central Asia, and then into Europe. The earliest Western accounts of gunpowder appear in texts written by English philosopher Roger Bacon in the 13th century.

Source : Wikipedia

PART 2)

Word Chemical Equation

Write a chemical word equation knowing that when Black Powder burns, this is what happens :

Charcoal, Potassium Nitrate and Sulfur **react together to give** Potassium Carbonate, Potassium Sulfate, Potassium Sulfide, Carbon Dioxide, Carbon Monoxide, Water and Nitrogen.

PART 3)

Symbol Equation : by asking your teacher or by doing some research, find the chemical symbols and formulas used to write the different chemicals involved in the previous reaction.

PART 4)

Write then a BALANCED chemical reaction representing the combustion of Black Powder.

PART 5)

If you know

<i>the molar masses of :</i>	> Carbon	= 12.01 g / mol
	> Hydrogen	= 1.01 g / mol
	> Oxygen	= 16.00 g / mol
	> Nitrogen	= 14.01 g / mol
	> Sulfur	= 32.07 g / mol
	> Potassium	= 39.10 g / mol

calculate how many kilograms of Carbon dioxide and water are going to be produced by using 1 kilogram of charcoal ($C_7 H_4 O$). Use the balanced reaction from PART 4) to answer this question.