

The mathematical theory of gunpowder

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Abstract

In this paper, I describe the mathematical theory of gunpowder.
The paper ends with "The End"

Introduction

Mixtures of the elements potassium, nitrogen, oxygen, sulphur and carbon have been used in battle since ancient times to the present. The general name for those mixtures is **gunpowder**.
In this paper, I describe the mathematical theory of gunpowder.

The theoretical formula of gunpowder

The theoretical formula of gunpowder is

$$KNO_3 + S_8 + C_4$$

where

K is potassium, N is nitrogen, O is oxygen, S is sulphur and C is carbon.

The mathematics of production of gunpowder

We look for positive integers $\alpha, \beta, \chi, \delta, \epsilon$ such that

$$\alpha K + \beta N + \chi O + \delta S + \epsilon C = K + N + 3O + 8S + 4C$$

and

$$\alpha \tilde{K} + \beta \tilde{N} + \chi \tilde{O} + \delta \tilde{S} + \epsilon \tilde{C} = \tilde{K} + \tilde{N} + 3\tilde{O} + 8\tilde{S} + 4\tilde{C}$$

where

$$K = 19, N = 7, O = 8, S = 16, C = 6$$

are the atomic numbers of elemental Potassium, Nitrogen, Oxygen, Sulphur and Carbon.
and

$$\tilde{K} = 39, \tilde{N} = 14, \tilde{O} = 16, \tilde{S} = 32, \tilde{C} = 12$$

are the atomic masses of the most common allotropes of Potassium, Nitrogen, Oxygen, Sulphur and Carbon.

14 solutions to the mathematics of production of gunpowder

14 solutions to the mathematics of production of gunpowder are

1. $\alpha = 1, \beta = 9, \chi = 2, \delta = 5, \epsilon = 4$
2. $\alpha = 1, \beta = 9, \chi = 3, \delta = 3, \epsilon = 8$
3. $\alpha = 1, \beta = 1, \chi = 3, \delta = 5, \epsilon = 12$
4. $\alpha = 1, \beta = 1, \chi = 1, \delta = 3, \epsilon = 20$
5. $\alpha = 1, \beta = 15, \chi = 1, \delta = 1, \epsilon = 9$
6. $\alpha = 1, \beta = 5, \chi = 7, \delta = 5, \epsilon = 2$
7. $\alpha = 1, \beta = 7, \chi = 4, \delta = 6, \epsilon = 1$
8. $\alpha = 1, \beta = 3, \chi = 8, \delta = 2, \epsilon = 11$
9. $\alpha = 1, \beta = 15, \chi = 2, \delta = 2, \epsilon = 5$
10. $\alpha = 1, \beta = 1, \chi = 10, \delta = 3, \epsilon = 8$
11. $\alpha = 1, \beta = 1, \chi = 8, \delta = 1, \epsilon = 16$
12. $\alpha = 1, \beta = 1, \chi = 6, \delta = 2, \epsilon = 16$
13. $\alpha = 1, \beta = 9, \chi = 1, \delta = 1, \epsilon = 16$
14. $\alpha = 1, \beta = 1, \chi = 5, \delta = 1, \epsilon = 20$

The End