Review of: "Flame Photometry: For the Determination of Alkali Metals in Commercially Sold Fireworks"

Ebenezer Aquisman Asare[1]

1 Ghana Atomic Energy Commission

Potential competing interests: No potential competing interests to declare.

Comment on the manuscript : Flame Photometry: For the Determination of Alkali Metals in Commercially Sold Fireworks

Overall Assessment (20 points)

Significance and Impact: 2/5 points

- The research addresses a minor problem with limited impact.
- Line 14-16: The justification for why detecting alkali metals in fireworks is important is weak. Authors need to provide concrete evidence of environmental or health impacts.
- Line 25-27: The implications of this research are not clearly stated. How will this method improve fireworks safety or reduce emissions?

Originality: 2/5 points

- The study is only slightly original with limited new insights.
- Line 30-32: The use of flame photometry for metal analysis is not novel. Authors need to clearly state what is new about their approach.
- Section 2.2: No new methods or concepts are introduced. Authors should highlight any innovations in their technique.

Scope and Relevance: 3/5 points

- The study is marginally within scope and somewhat relevant.
- Line 1-3: The relevance to environmental engineering is not well-established. Authors should strengthen the connection to environmental monitoring or pollution control.

General Questions: 2/5 points

- The strengths and weaknesses are imbalanced, with significant methodological flaws.
- Section 3: Authors fail to critically discuss limitations of their method. Add a dedicated limitations section.
- Section 2.3: Methodology lacks detail on sample preparation and potential interferences. Expand this section significantly.

Quality of Research (40 points)

Research Design: 4/10 points

- The design is marginally appropriate and the methods are weak.
- Section 2.3: No justification for sample sizes or compositions. Provide a power analysis or rationale for the chosen samples.
- Section 2.4: Equations for calculations are provided, but no validation of these methods is presented. Include method validation data.

Data Collection and Analysis: 4/10 points

- The data collection is poor, with significant issues in analyses.
- Section 3.1: LOD and LOQ calculations lack statistical rigor. Use proper statistical methods (e.g., 3σ and 10σ approaches).
- Figures 3 and 4: Error bars are missing. Include measures of variability (e.g., standard deviation) for all data points.

Results: 4/10 points

- The results are unclear or illogical, with weak support for the conclusions.
- Section 3.2 and 3.3: Results are presented without proper statistical analysis. Conduct and report t-tests or ANOVA as appropriate.
- Line 318-320: Claims of accuracy are made without proper statistical backing. Provide quantitative measures of accuracy and precision.

Specific to Research Field: 4/10 points

- The research has limited alignment with trends and unclear applications.
- Section 1: No discussion of current trends in fireworks analysis or environmental monitoring. Include recent advancements in the field.
- Section 4: Practical applications are not clearly stated. How can this method be implemented in industry or regulatory settings?

Presentation and Clarity (25 points)

Clarity and Organization: 4/10 points

- The manuscript is poorly organized, with clarity issues and low-quality figures/tables.
- Overall structure: Reorganize to follow the standard IMRAD format (Introduction, Methods, Results, and Discussion).
- Figures 2-5: Improve quality, add error bars, and ensure all axes are properly labeled.

Abstract and Title: 4/10 points

- The abstract is inadequate with a vague title.
- Abstract: Lacks specific numerical results and a clear statement of significance. Rewrite to include key findings and implications.
- Title: "Flame Photometry: For the Determination of Alkali Metals in Commercially Sold Fireworks" is vague. Consider a more specific title highlighting the novelty or application.

Literature and References: 2/5 points

- The literature review is limited, with few relevant works cited.
- Section 1: Outdated references. Include more recent studies (past 5 years) on fireworks analysis and environmental impacts.
- Throughout: Many statements lack proper citations. Ensure all claims are supported by references.

Ethical Considerations (5 points)

Ethical Approval: 1/3 points

- Ethical approval is unclear or missing, with some considerations addressed.
- Add a statement on ethical approval for sample collection and analysis, if applicable.

Conflict of Interest: 0/2 points

- No disclosure of potential conflicts of interest.
- Add a conflict of interest statement, even if it's to declare no conflicts.

Total Score: 36/100

Recommendation:

This manuscript requires substantial revision in all areas before it can be considered for publication. The authors need to significantly improve the rigor of their experimental design, data analysis, and overall presentation. Specific areas for improvement include:

1. Strengthen the justification for the research and its potential impact.
2. Improve the experimental design with proper controls and statistical considerations.
3. Conduct and report appropriate statistical analyses for all results.
4. Enhance the quality and clarity of all figures and tables.
5. Update and expand the literature review to place the work in proper context.
6. Address ethical considerations and conflicts of interest.

The authors should consider seeking statistical consultation to improve their data analysis and presentation. Additionally, they should carefully review recent literature in the field to better position their work within current research trends.