Review of: "Neutronic Chain Reactions for Polonium-210 Production"

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Potential competing interests: No potential competing interests to declare.

Dear Editor,

Thank you for choosing me as a reviewer of the manuscript entitled **Neutronic Chain Reactions for Polonium-210 Production**" by Solomon Lim. This is good work and well written manuscript. However, few English mistakes are there in the manuscript. Few needed corrections are given below. So the manuscript for its publication in ***Qeios*** after **minor revision**.

With regards

Reviewer

Needed corrections

Abstract

1. Few long sentences are there in the abstract. Those can be splitted.
2. ---on light element and bismuth-209 nuclei respectively.

A comma is missing. So change as

---on light element and bismuth-209 nuclei, respectively.

Introduction

3. ---the 209Bi(n, γ) 210Bi reaction, measured to be 20.5 ± 1.1 millibarns [4,5].

It should be mentioned that at what neutron energy, the 209Bi(n, γ) 210Bi reaction cross section is 20.5 ± 1.1 millibarns?

4. The threshold reactions of (n,2n) and (n,a) reactions of mentioned elements should be mentioned.

2. Materials and Methods

2.1. Bismuth salt selection and synthesis

5. ---were selected which have a substantially higher yield than the rest – beryllium, boron, and fluorine.

A comma is missing before the word “which”. So change as

---were selected, which have a substantially higher yield than the rest – beryllium, boron, and fluorine.

2.2. Materials

6. All right.

2.3. Neutron irradiation setup

7. Mast-mounted and plated americium-241 sources containing 60 µCi and 10 µCi of 241AmO2 respectively---

Comma is missing. So change as

Mast-mounted and plated americium-241 sources containing 60 µCi and 10 µCi of 241AmO2, respectively---

8. ---exposing a 0.3mm-thick layer of---

Gap is missing before “mm”. So change as

---exposing a 0.3 mm-thick layer of---

9. --- the salt itself, which would have cause the outer layers to receive very little neutrons---

Comma is missing before the word “which”. So change as

--- the salt itself which would have cause the outer layers to receive very little neutrons---

2.4. Radiation monitoring and analysis

10. Authors must have used alpha and beta spectrometers or not. They should mentioned what detector or counter are used for spectra.

2.5. Mathematical modelling

11. --- the decay ratio of polonium-210 from bismuth-210 respectively.

A comma is missing. So change as

--- the decay ratio of polonium-210 from bismuth-210, respectively.

3. Results and Discussion

3.1. Alpha source characterization

12. The alpha spectrum of the mast-mounted and plated americium-241 sources are shown below in Fig. 7 and 8 respectively.

A comma is missing. So change as

The alpha spectrum of the mast-mounted and plated americium-241 sources are shown below in Fig. 7 and 8, respectively.

13. ---the relative activities of the sources (60 and 10 μCi respectively)---

A comma is missing. So change as

--- the relative activities of the sources (60 and 10 μCi, respectively)

14. This causes two peaks to be observed in the spectrum at 4.93 and 6.15 MeV respectively.

A comma is missing. So change as

This causes two peaks to be observed in the spectrum at 4.93 and 6.15 MeV, respectively.

15. Authors should mentioned the alpha energy belongs to which actinides in Fig. 8?

3.2. Neutron source characterization

16. Neutron flux can be measured by using neutron detector. Why author has not mentioned about that.
17. --- the small neutron capture cross section of bismuth-209 which---

A comma is missing before the word “which”. So change as

--- the small neutron capture cross section of bismuth-209, which---

3.3. Chain reaction propagation

18. --- m to form polonium-210 which then emits---

A comma is missing before the word “which”. So change as

--- m to form polonium-210, which then emits---

3.4. Alpha spectrum (210Po)

19. Why a gap is given before 210?
20. What spectrometer was used for alpha spectrum? It should be mentioned.

3.5. Beta spectrum (210Bi)

21. Why a gap is given before 210?
22. What spectrometer was used for beta spectrum? It should be mentioned.

4. Conclusions

23. All right.

5. Future Work

24. ---polonium-210 (T1/2 = 138 days) which hinders its incorporation into RTGs for long journeys---

A comma is missing. So change as

---polonium-210 (T1/2 = 138 days), which hinders its incorporation into RTGs for long journeys---

Acknowledgement

25. Acknowledgement has not ben given. At least, it should be given to the head of institute.

References

26. All right.