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Journal Name:	International Research Journal of Pure and Applied Chemistry
Manuscript Number:	Ms_IRJPAC_38221
Title of the Manuscript:	A New and Successful Utilization of Aluminum Solid Waste Derived from Aluminum Company in Adsorptive Removal of Nitrates from Water Supplies
Type of the Article	Original Research Article

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PART 1: Review Comments

	Reviewer’s comment	Author’s comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
Compulsory REVISION comments	This work is very common. Many researchers are using adsorption model to show the nitrate uptake, I donot see novelty in the materials design and functionalisation to maximise the nitrate uptake. Activated carbon, Zinc and tiatnia combination are being explored. a. Why gamma alumina would adsorb ? b. Chemisorption is mentioned. Alumina is in dispersed phase in the system and nitrate in dissolved phase in the same system, by varying pH <7, it is mentioned adsorption is increasing. May I know (i) What is the byproduct formed and in which state? if it is chemical reaction there should be 100% removal in nitrate. (ii) Show the pH and potential graphs for the formation of compounds. c. XRD graphs need base correction. Need to show peaks. d. Both equilibrium curve is fitting such as Langmuir and Fruendlich. Is it monolayer adsorption and followed by multilayer? e. Intra particle diffusion model, can it be draw schematically ? How the process flow film diffusion, surface diffusion etc.,	We thank the reviewer for bringing up these points, the reviewer’s comment made us aware that we did not explain some points clearly. a) For using gamma alumina in adsorption process, Activated γ-alumina is one of the most important oxidic adsorbents which is widely utilized for water treatment due to its high affinity for a broad range of analytes. γ-alumina exhibit a relatively large number of surface OH groups, which substantially define its adsorption properties.γ-alumina is insoluble in water and can react with both acidic and basic materials due to the amphoteric nature of aluminum oxide. Alumina is characterized by its high specific surface area, mechanical strength, low-temperature modification, very good thermal stability, amphoteric properties, porosity, and ability to be shaped with well-defined pores. Due to these unique properties, porous alumina is typically an excellent candidate as a potential adsorbent in several purification and bleaching processes as well as a catalyst and catalyst support for a large number of industrial processes. Alumina has different forms (α, γ, η, δ, θ, γ, ρ, κ), where positively charged Al₃⁺ ions and negatively charged oxygen or hydroxide ions are arranged in such a manner that the different charges compensate each other. On the surface, this regular structure is disturbed and the charges have to be compensated by other opposite ions. In aqueous solutions, the negative charges of the surface oxygen ions are neutralized by protons, whereas the positive charges of the surface Al₃⁺ ions are neutralized by hydroxide ions. As a result, the surface of activated alumina is covered with surface OH groups. These groups are subject to protonation or deprotonation depending on the pH value of the solution. $\text{Al-OH} + \text{H}^+ \leftrightarrow \text{S-OH}_2^+$ $\text{Al-OH} \leftrightarrow \text{S-O}^- + \text{H}^+$ Currently, activated alumina is showing a superior adsorption capacity for various aquatic pollutants such as many heavy metal species and various anions such as arsenate, arsenite, nitrate, and fluoride, cyanide, boron compounds, or phosphate. Moreover, it can be applied for removal of organic compounds such as phenols, tetracycline, and dyes. <u>(Please see page 2 and the references [4, 5, 16, 44 & 45] included in our revised paper).</u> b) i. For the byproduct of the reaction, According to the following equation: $\text{Al-OH}_2^+ + \text{NO}_3^- \leftrightarrow \text{AlOH-NO}_3 \text{ (or AlNO}_3 + \text{H}_2\text{O)}$ <u>No byproducts</u> According to above equation will be estimated from nitrate adsorption onto gamma alumina. <u>See reference [3] and [9] in revised paper).</u> Also, why nitrate removal was not 100%? That was because the removal of nitrates is governed by different operating parameters such as <u>pH</u>, <u>initial concentration</u>, <u>adsorbent loading</u>, <u>agitation time</u>, <u>presence of competing anions</u>, and <u>temperature</u>. These parameters highly influence the uptake rate of nitrates. The mentioned conditions are the aim of our study to get the maximum removal of nitrates. ii. For the potential graphs for the formation of compounds, It’s a good suggestion. We agree that additional analyses, would be useful, but we believe these graphs are outside the scope of this study, but it might be incorporated into future work. c) For XRD graphs, The observation was revised.



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		d) For the equilibrium curve, The values of correlation coefficients (R^2) of both Langmuir and Freundlich equations are higher than 0.94 , <u>which imply that both monolayer adsorption and heterogeneous surface conditions are possible.</u> Also of note, that the R^2 values of two models were very close to one another, <u>that indicate the adsorption of nitrate on A-AISW is complex and may be controlled by multiple processes.</u> <u>(Please see page 15 and the reference [5] included in our revised paper).</u> e) For drawing the Intra particle diffusion model schematically, It's a good suggestion for further work in the future.
Minor REVISION comments		
Optional/General comments		