

## SIIC044

### SYNTHESIS AND CHARACTERIZATION OF PKFAD-IMPREGNATED CHITOSAN AS POTENTIAL SELECTIVE BIOSORBENT FOR SELECTIVE GOLD AND COPPER SORPTION FROM AQUEOUS SOLUTION

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#### **Abstract:**

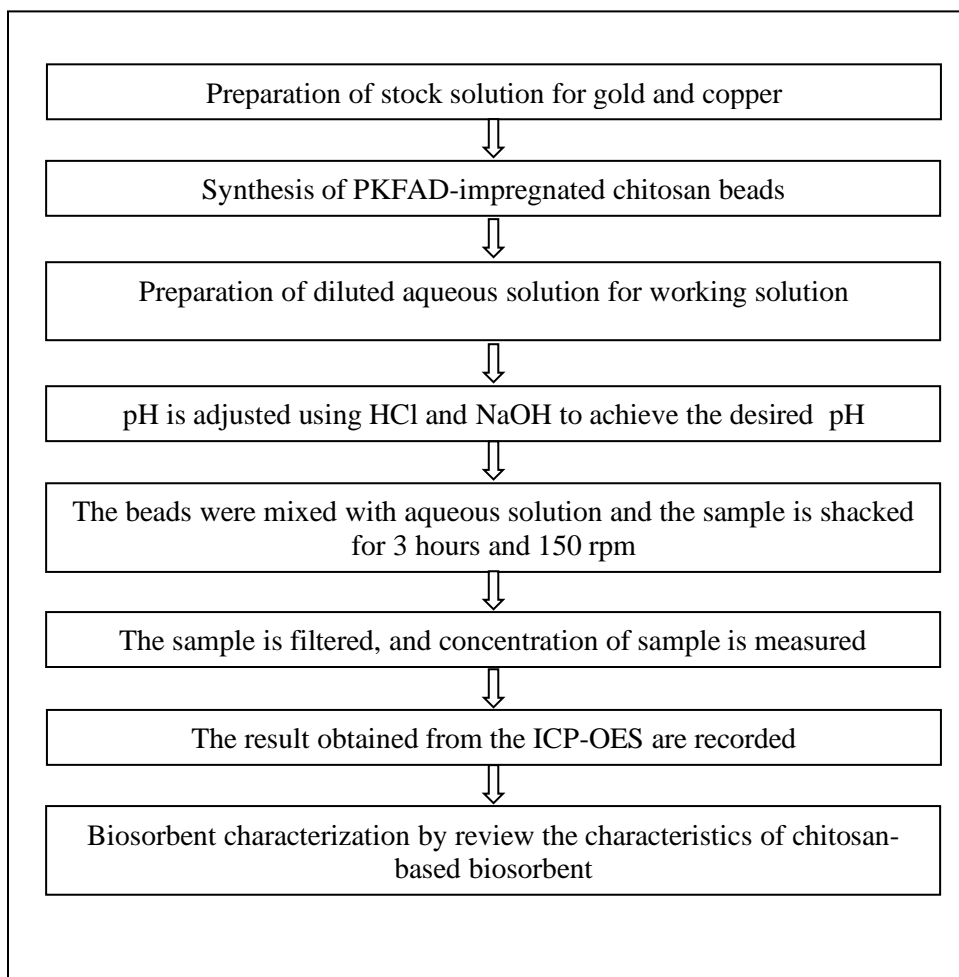
A new PKFAD-Impregnated chitosan as a biosorbent was synthesized for the gold and copper sorption from the aqueous solutions. Chitosan is proven as one of the best adsorbents in order to recover or remove heavy metals in the aqueous solution. However, the problem with this chitosan is it has some disadvantages that restrict its application in the water treatment and purification. Chitosan show a poor acid resistance and low porosity and with these limitations, it clearly proves that raw chitosan is not suitable to be used as sorbent in adsorption process for metal recovery without further modification. Thus, the synthesise of PKFAD-impregnated chitosan can be used as a new biosorbent and it can solve the limitations of the existing chitosan-based biosorbent. In this reseach, the adsorption capacity of Au (III) and Cu (II) from the aqueous solution on newly developed biosorbent PKFAD-impregnated chitosan beads were evaluated through batch experiments. The PKFAD-İmpregnated chitosan beads were synthesized into two ratio, which are chitosan: PKFAD (1:1) and chitosan: PKFAD (5:3). The sorption experiment is conducted by different value of Ph which is from ph 3, 3.5, 4, 4.5, 5 and 5.5. The sorbent used in the adsorption experiment is 0.1g. The characteristics of chitosan-based biosorbent were reviewed in order to predict the characterization PKFAD-Impregnated chitosan beads. The analysis including the Brunauer, Emmett and Teller (BET), scanning electron microscopy (SEM) and FTIR spectroscopy of chitosan-based biosorbent were reviewed in order to predict the characterization PKFAD-Impregnated chitosan beads. The maximum adsorption capacity of Au (III) obtained is 9.11 mg/g (98.65% ) which is in the ratio of chitosan : PKFAD (1:1). The maximum adsorption of Cu (II) is 8.677 mg/g (87.65%) which is in the ratio of chitosan : PKFAD (1:1). The selectivity (Au (III) / Cu (II)) is higher at a low value of pH for both ratio (1:1 & 5:3). The maximum selectivity (Au (III) / Cu (II)) is 55.633 which is in the ratio of chitosan : PKFAD (1:1). The results show that the PKFAD-İmpregnated chitosan beads were efficient biosorbent for removal gold and copper in aqueous solutions.

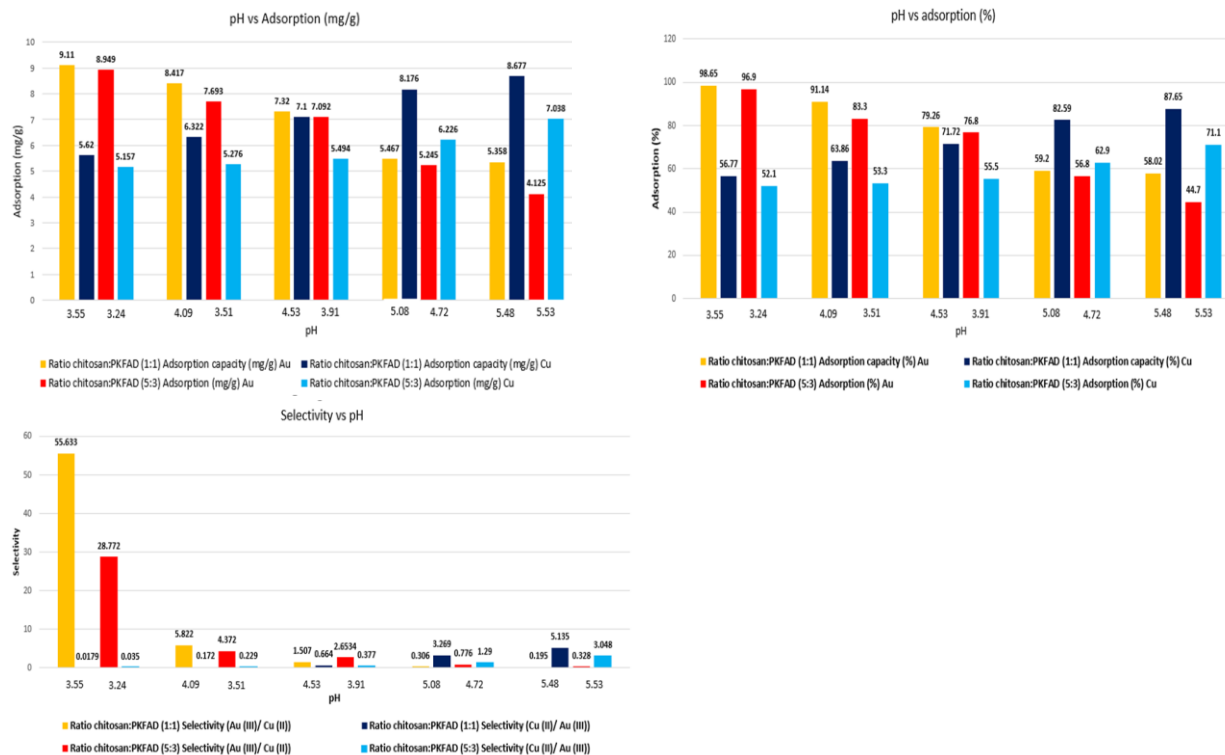
**Keywords:** PKFAD-Impregnated chitosan; Gold; Copper; Recovery; Adsorption

**Objectives:**

- To synthesize PKFAD-impregnated chitosan for selective metals (gold and copper) sorption from aqueous solutions.
- To review the characteristics of chitosan-based biosorbent for the prediction of the characteristics of PKFAD-impregnated chitosan.

**Methodology:**



**Results:****Conclusion:**

As a conclusion, an experiment of adsorption for the gold and copper ions in aqueous solution were conducted by using Chitosan-PKFAD as a biosorbent. The chitosan-PKFAD beads are synthesized in two different ratios in which chitosan : PKFAD ratio of 1:1 and 5:3 respectively and it is used to determine the adsorption capacity of gold and copper ions in aqueous solution based on different pH value. From the result obtained, ratio of Chitosan : PKFAD (1:1) has a higher of the maximum adsorption capacity of Au (III) and Cu (II) in aqueous solution compared to the ratio of Chitosan : PKFAD (5:3). This is because the maximum adsorption capacity of Au (III) obtained for the ratio of chitosan : PKFAD (1:1) is 9.11 mg/g which is 98.65% in the pH value of 3.55, while the maximum adsorption of Cu (II) is 8.677 mg/g which is 87.65% in the pH value of 5.48. Then, compared to the ratio of Chitosan : PKFAD (5:3), the maximum adsorption capacity of Au (III) obtained for the ratio of chitosan : PKFAD (5:3) is 8.949 mg/g which is 96.9% in the pH value of 3.24, while the maximum adsorption of Cu (II) is 7.038 mg/g which is 71.1% in the pH value of 5.53. Next, the selectivity (Au (III) / Cu (II)) is higher at a low value of pH for both ratio (1:1 & 5:3). However, the Selectivity (Cu (II) / Au (III)) is higher at a high value of pH for both ratios. Then, characterization of Chitosan-based biosorbent is reviewed for the prediction of characteristics of PKFAD-Impregnated chitosan beads for gold and copper sorption from aqueous solutions which include apparatus such as the FTIR spectroscopy, scanning electron microscopy (SEM) and BET.