

UNIVERSITI TEKNOLOGI MARA

**IMPROVEMENT OF TRADITIONAL GOLD
RECOVERY PROCESS FOR JEWELLERY SCRAP**

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ABSTRACT

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Problem Statement: The problem statement in this research is “to refining and recovering the gold scrap from the work bench”. Current application in jewelry fabrication process includes technique like filing, piercing, grinding, drilling and etc are amongst the popular application that is widely used for a long time. All this while, the process has yielded various type of scrap. These scrap (in dust form) would eventually mix up with other form of dust from polishing wheel vacuum collectors and sweeping floor dust and it's very difficult to recognize. Gold and other precious metals “lost” during the fabrication process can be a significant cost factor that impacts product cost and business competitiveness. Much of the scrap generated in production can be cleaned and recycled, but contaminated scrap and other wastes need to be collected and refined back to pure gold to recover the value of the precious metal. Such scraps and wastes need to be pre-treated before refining to reduce costs and maximize recovery of precious metals.

Research Objectives: As the research intent to measure the reliability and effectiveness level of local traditional gold recovery method vis a vis available modern refining technique, key deliverables would be to give evidence that there is a substantial quantity of gold contained in each of the workbench wastes. It is a challenge to also proof that the gold quantity could be recovered safely and effectively via an efficient cost recovery method that could maximize the chances of bringing more profits to the business. To do this, this research has gathered various inputs from credible sources and reference points such as World Gold Council (WGC) in United Kingdom for benchmarking purposes. A full cycle of physical and chemical testing via traditional and sophisticated means have been conducted to derive and validate findings and conclusions.

Scope of study : This study is confined to “recover the gold scrap only from jewelry work bench” and merely involved a medium and small scale Jewelers House in the state of Kelantan. The research is keen to identify and develop a suitable new method that could be applied for in-house gold recovery process. An area of concern would be on the suitability of the proposed recovery method to be introduced and implemented by the small scale jewelry workshop at their premises. The creation of the new suitable method would be more on technological enhancement of the founded traditional gold recovery process with emphasis on the safety, health and environmental issues.

Research Hypothesis: In order to have a clear research deliverables, three hypotheses will be tested to reach the findings of the research. The first hypothesis: New identified process in laboratory experiment is a reliable method to extract gold as compared to traditional method. Hypothesis 2: The traditional gold recovery process method is an unsafe and unsystematic approach as compared to the identified new process in laboratory experiment. Hypothesis 3: The systematic process of gold recovery process would further enhance the purity of gold recovered.

Methodology: Five stage of data collection adopted in this research include literature review, interview (preliminary survey), observation and lab experiment. Respective lab experiments were conducted at Sirim Berhad, Faculty of Applied Science, and Engineering Faculty of UiTM Shah Alam to derive and validate relevant findings.

Findings: From the findings, the researcher has identified suitable aspects of enhancement for the current traditional method to be used as a proposed method for the small scale jewelry solution. The result has indicated that the traditional process has not been able to filter out all silver and copper elements and other element such as rhodium. The research has been able to identify ways to avoid pollution during the recovery process with a more systematic and refined method as proven in the lab experiment with high percentage of gold purity.

Conclusion and recommendation: The nitrogen dioxide produced from the traditional gold recovery process caused the air pollution and derived to the safety issues. This problem relates to the quality control of each methods used by the refiners. The finding also derives that this method was unable to filter out all silver and copper element and in a same time affect the quality of gold in terms of percentage. Therefore, it is importance to produce a good, innovative device to recover gold especially in a work bench scrap to avoid any losses that can reflect to the profit margin with a safer and systematic system.

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