

CHAPTER 6
CONCLUSION

(6) CONCLUSION

In this project, it is found that the DPP mode and DPSV mode are the useful electroanalytical techniques for trace metal analysis. It is due to both of these two methods can detect the low concentration of the metals.

Both of these two modes (DPP and DPSV) also can be used to identify the metals by observing their half-wave potential, $E_{1/2}$. In this project, it is showed that each of the metal will have different half-wave potential and there is no significant difference of the half-wave potential for the metals (lead, cadmium, and zinc) in the four different types of supporting electrolytes. The half-wave potential for the lead is in the range of -0.5 V to -0.6 V (Table 5.5) for the DPP mode and -0.4 V to -0.6 V (Table 5.15) for the DPSV mode. The half-wave potential for the cadmium is in the range of -0.7 V to -0.8 V (Table 5.5) for the DPP mode and -0.6 V to -0.8 V (Table 5.15) for the DPSV mode. The half-wave potential for the zinc is in the range of -1.0 V to -1.3 V (Table 5.5) for the DPP mode and -1.1 V to -1.2 V (Table 5.15) for the DPSV mode.

From the study, it also shows that the DPP and DPSV modes can use to determine the concentrations of the trace metals, such as lead, cadmium, and zinc. It is because the peak currents from the voltammograms are proportional to the concentrations of these metals.

Meanwhile, the detection limits for the metals by using the DPSV mode are lower than the DPP mode. In DPP mode, the detection limits for the lead, cadmium, and zinc is 0.1493 ppm, 0.0746 ppm, and 0.0597 ppm (Table 5.9). On the other hand, the detection limits for the lead, cadmium, and zinc by using the DPSV mode are 0.4975 ppb, 1.9900 ppb, and 0.4975 ppb (Table 5.20).

Since, the DPSV mode is more sensitive and can manage to provide with the lower detection limits for the lead, cadmium, and zinc, so this technique is suitable to use to determine the concentrations of the metals (lead, cadmium, and zinc) in the river water. From the study, the optimum condition for the DPSV mode is liked the following:

(i) The drop size of the mercury-	13
(ii) Scan rate-	5 mV/s
(iii) Stir rate-	100 rpm
(iv) Deposition time-	300 s
(v) Pulse amplitude-	50 mV
(vi) Quiet time-	30 s
(vii) Supporting electrolyte-	0.1 M KCl solution

From the calibration graphs (Appendix VII, VIII, IX), the concentrations of the metals (lead, cadmium, and zinc) are shown in the Table 5.23. The concentrations of the lead in station 1, 2, and 3 are 0.122, 0.078, and 0.065 ppm. The concentrations of the cadmium in station 1, 2, and 3 are 0.0085, 0.0067, and 0.0065 ppm. The concentrations of the zinc in station 1, 2, and 3 are 0.0208, 0.0183, and 0.0175 ppm. However, the concentrations of these metals are not accurate. It is because the concentrations for all these metals are only represented the particular time and location of the sampling, but not the real concentrations in the river. So, the real concentrations of the metals can be obtained by doing the proper monitoring program.

In this project, there are some difficulties and problems, which are listed like the following:

- (i) Since this technique is very sensitive, so the experiment needs to carry out in a very clean condition to avoid the contaminants.
- (ii) The preparation of the solutions also needs to be very clean until they are free of the contaminants.
- (iii) The volume of the standard solutions, which are needed to pipette into the glass cell, is very small, but it needs to be done with high accuracy by using the 50 μL pipette.
- (iv) The mercury is used for this technique is very toxic, so it needs to remove properly from the glass cell for another new setting.

There are a few suggestions that might be used to improve on this technique for the trace metals analysis:

- (i) These experimental procedures can be carried out in a clean room, which is free from any contaminants.
- (ii) All these solutions that have prepared should seal with the aluminum foil tightly.
- (iii) All the apparatus, such as pipettes, volumetric flasks, beakers, spatulas, and so on should also keep them clean and cover with the aluminum foil.
- (iv) The auto-pipette can be used to make sure the volume is injected with high consistency and accuracy.