CHAPTER 4

CONCLUSION

The nitrogen dioxide (NO_2) test kit based on passive sampling was developed. Nitrogen dioxide in ambient air reacts with triethanolamine (TEA) to form nitrite ion, which can be determined using Saltzmann reagent and spectrophotometry under the optimum conditions. Efficiency of material including types of sorbent, cleaning of the absorbent filter, type of diffusion tube, use of membrane and sampling duration have been tested. An accuracy of the method was performed by comparison of values obtained from the passive sampling with the active sampling of the PCD air quality monitoring station.

Determination of NO_2 by spectrophotometry was done by mixing an extractant and Saltzmann reagent (1:2). Optimum extraction times of NO_2 from the sampler and reaction times for color developing were at least 10 minutes each step yielded 92±2% recovery. Under the optimum conditions, a linear calibration graph was obtained in the range of 0.02-1.7 mg/l. LOD and LOQ of spectrophotometer for NO_2 measurement were 0.01 and 0.03 mg/L, respectively. The relative standard deviation of repeatability and reproducibility of the method obtained from 10 replicates of 0.2 mg/l nitrite were 2.2% and 2.7 % respectively.

The developed passive sampler for NO_2 measurement composes of a polypropylene tube containing GF/A filter treated with 20%TEA. A set of passive sampler consists of 5 open-end sampling tubes and 3 capped blank tubes vertically up-right fixed in protective shelters. Recommended duration is 24 hours. The NO_2

concentrations obtained from passive sampling were strongly correlated with active analyzer (r=0.924).

The nitrogen dioxide test kit based on color comparison for application in the field was constructed. The test kit consists of passive samplers, protective shelter, chemical reagents and a standard color chart. The color chart represents NO_2 concentrations in the air in a range of 0.03 -1.5 mg/l equivalent to 9.5-477.7 ppbv (based on calculation using 24 hours exposure). The color can be divided into 6 categories belong to the solution with different nitrite concentrations.

The nitrogen dioxide test kit are agreeable to the chemiluminescence technique of the Pollution Control Department air quality monitoring station at Yupparaj Wittayalai School, Chiang Mai, which proves that the test kit is reliable to be used for determining the nitrogen dioxide in the air sample. The stability of test reagents could be kept and used within 1 month at room temperature (20-27 ^{0}C) However, 20%TEA must be freshly prepared to ensure good stability. Analysis of test forms has overall yielded encouraging facts 64.9%.

Recommendation for further work

The nitrogen dioxide passive sampling device, which has been developed in this work, has some limitation that should be improved such as capacity of the sampler, which affects to sampling period. In this research the sampler can not use for long sampling (not longer than 3 days) period due to limitation of absorbent capacity. Diffusion tubes should be fixed in the same shelter to reduce variation of collected gas concentrations.

To construct the nitrogen dioxide test kit in ambient air using passive sampling technique, further refinement of this test kit is still needed to be fully practical and it will for sure contribute to development of reasonable technology. The color chart of nitrogen dioxide such as density of color, which effects to reliability in estimation of nitrogen dioxide content should also be improved. Even though the self-constructed of nitrogen dioxide test kit has been tested with chemiluminescence technique. However, it should also be compared with a commercial test in different ambient nitrogen dioxide levels such as urban and rural areas to confirm validation of nitrogen dioxide test kit

Caution: Azodyes complex (product of color development) is highly poisonous, including skin (skin cancer) and eye irritation. Avoid contact with skin, especially with eyes. If spilled on skin, flush with water immediately. Do not ingest and wash hands after used