2007 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Chemistry

PROJECT : Detection Device for Alcoholic Drunk Persons

AWARDS : Chemistry Second Award

SCHOOL : Kanlayanawat

FINALISTS : Mr. Prasit Boonjuang
Mr. Teerasak Pinyoyang

COUNTRY : Thailand

Detection Device for Alcoholic Drunk Persons

CATEGORY: Chemistry
TITLE: Detection Device for Alcoholic Drunk Persons
NAME: Mr. Prasit Boonjuang and Mr. Teerasak Pinyoyang
COUNTRY: Thailand

The purpose of this project was to create a detection device for alcoholic drunk condition in human by using the principle of vapor pressure difference between breath samplings from normal and alcoholic-drunk men. The work comprises of three major steps. The first task was an experiment to determine an average air volume that can be fully blown out from the lungs of non-drunk people as a control. Twenty adult Thai volunteers weighing between 50 - 80 kg (average 59 kg) were used. The average blown out air volume was found to be 369.9 mL, with the range in values from 340-400 mL (sample size N = 20, SD = 15.47). The second task was an experiment to measure relationship between the blown air volume (100-700 mL, both from alcoholic-drunk and control groups of people) and the resulted vapor pressure by using manometer. The vapor pressure of normal breath increased from 400 to 1,600 newton/m^2 with increasing blown air volume, whereas that of the alcoholic-drunk was found to be 600 to 1,800 newton/m^2. The last task was to create a detection device prototype to gauge the alcoholic content in the human body from the breath. Air volume of 300 mL was arbitrary chosen to trigger lighting up of indicator lamps. The breath samples of low vapor pressure (low amount of alcohol, 21.12-44.00 mL, equivalent to 14.00-29.17 mg%) would trigger a green lamp to light up. A moderate vapor pressure range (medium amount of alcohol, 88-132 mL, equivalent to 58.33-87.57 mg%) would trigger green and yellow lamps to light up while a high vapor pressure (high amount of

alcohol, 250 mL, equivalent to 165.72 mg%) would trigger green, yellow and red lamps to all light up. None of the three lamps would light up from (non-alcoholic) breath of control people. This device has also been tested to external group of volunteers. The work in this project has successfully demonstrated a useful application of simple principle in chemistry on partial vapor pressure.

評語

A simple technique was developed to detect alcoholic drunk condition by using the vapor pressure of alcoholic-drunk men. The idea is good and the device has been tested for a group of volunteers. The good results were obtained. It is a good work.