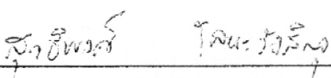



Suttiiphong Loharangsikul 2006: A Calculation of Evacuation Time for Indoor Ammonia Coolant Leakage in Cold Storage. Master of Engineering (Safety Engineering), Major Field: Safety Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Penjit Srinopakun, Ph.D. 122 pages.
ISBN 974-16-2743-2

The Objective of this research is to calculate the evaluation time according to the evacuation plan of cold storage incase of indoor ammonia coolant leakage. This suggestion is for safety person to be used as reference of evacuation time for his confidence. Nevertheless, this research will guide to the assessment of the commercial door, 0.8 m width and 1.8 m height, whether or not the door size supports the proposed evacuation time. The concept of modified source model theory was applied to calculate the volume of ammonia leakage from the cold storage according to mass balance.

Due to the ammonia coolant pressure at 0.2, 5, 10, 12 and 15 pound per square inch gauge (psig) from the data collected for 1 month of cold storage temperature of fresh frozen Durian freezer data and Ammonia saturated liquid and vapor standard table. The leakage hole size of 0.5, 0.7, 1, 2, 3, 4, 5 and 6 mm were investigated. From above coolant pressure and leakage hole sizes, the accumulation rate of ammonia leak at different pressure was calculated. It is found that the maximum ammonia expansion of 9.77×10^{-5} pound per minute was leaked at 15 psig and 6 mm diameter of hole leak condition. The maximum indoor ammonia accumulation rates are 1.979, 0.660, 0.124 and 0.01732 cubic meter per minute at constant pressure of 15 psig and 6 mm leakage to reach 25, 75, 400 and 2,800 ppm respectively. The minimum evacuation time is calculated from the time different between ammonia accumulation from human detection (25 ppm) and human irritation (75 ppm). It is found that at the pressure of 15 psig leak diameter of 6 mm, cold storage size 30, 75, 120, 300, 500, 5,000 and 10,000 m³ the minimum evacuation time are 30, 76, 121, 303, 505, 5055 and 10,109 min. In addition, for the present commercial freezer door available (1.44 m²) the calculation illustrated that the door was big enough for evacuation in case of ammonia leakage from the cold storage.


Student's signature


Thesis Advisor's signature

6/10/20