SAFETY

Safety aspects of a bubbly medium inside a chemical reactor 2
Weapon inspection system for detecting weapon in public vehicles 2
A simple assessment method to prevent silicon hydride explosion during tungsten chemical vapor deposition 2
Assessing exposure and fume control requirements during arc welding of steel 2
Accidental releases of titanium tetrachloride (TiCl4) in the context of major hazards-spill behavior using REACTPOOL 3
Experimental studies and estimates of the explosion limit of some environmentally friendly refrigerants 3
Safety aspects of a bubbly medium inside a chemical reactor
2005-08-17
The possibility of explosion of a compressed oxygen bubble in liquid cyclohexane due to interaction with a spherical shock wave emitted by a nearby exploded bubble has been experimentally and theoretically investigated. Calculations for the explosion limits of a single bubble have been performed too. It is shown that in order to prevent bubble explosions inside a chemical reactor, the operating conditions (temp. and pressure) should be within a certain range.
Authors: Mitropetros, K.; Fomin, P. A.; Hieronymus, H.
Full source: Chemical Engineering Journal (Amsterdam, Netherlands) 2005, 107(1-3), 27-32 (Eng)

Weapon inspection system for detecting weapon in public vehicles
2005-08-17
The system includes a detector for detecting pathogenic agent and toxin used in biological warfare agent and chemical substance used in chemical weapon in the moving mass transportation vehicles, like bus, trains, and a means for automatic sending out the detected information via network.
Authors: Haruta, Takeo

A simple assessment method to prevent silicon hydride explosion during tungsten chemical vapor deposition
2005-08-17
SiH4 is a toxic material and should be reduced to a low concentration to prevent explosions during tungsten CVD. A simple method is presented for the safety assessment in this paper. Empirical equations were deduced to generalize the calculation procedure. The method should help process engineers to estimate whether a recipe will meet minimum safety requirements before a process begins.
Authors: Chen, Ping Hsun; Lu, Scotty; Shih, Han Chang
Full source: Chemical Health & Safety 2005, 12(1), 34-35 (Eng)

Assessing exposure and fume control requirements during arc welding of steel
2005-08-17
Exposure to welding fume may be hazardous to health. Therefore, a risk assessment, to estimate the likelihood of exposure exceeding safe levels prescribed in regulations, must be performed before work commences. Estimating exposure without prior knowledge or measurement of similar activities is difficult, so work was performed to assist in this task by quantifying the effect of various parameters on exposure to fume during arc welding of steel. Fume control is almost always required but local exhaust ventilation will usually provide the control necessary.
Authors: Carter, Graham J.
Full source: Welding and Cutting 2004, (6), 364-371 (Eng)
Accidental releases of titanium tetrachloride (TiCl₄) in the context of major hazards-spill behavior using REACTPOOL

2005-08-17

TiCl₄ is a highly toxic and corrosive substance that is used widely in the process industries. On accidental release, it creates liquid pools that can either boil or evaporate. The main feature of the liquid pool is the reaction of TiCl₄ with water. There are 3 sources of water available for reaction: free groundwater, atmospheric moisture and substrate water. Unfortunately, there is no specific study that examines the liquid phase hydrolysis reaction of TiCl₄. Based on thermodynamic calculations and relevant information found on the topic, it is concluded that liquid TiCl₄ reacts exothermically with all 3 sources of water yielding HCl gas and a solid complex of TiCl₄. The purpose is to describe the spill behavior of TiCl₄ reporting a number of results using the REACTPOOL model. It also addresses the dangers involved in cases of accidental release of TiCl₄ and reports its properties, referring to toxicity data and other relevant information. The spill behavior of TiCl₄ was incorporated into REACTPOOL. Model results indicate that the pool behavior is mainly affected by the amount of free groundwater, the wind speed and surface roughness. Although TiCl₄ has been involved in a number of major accidents, there are no experimental data relevant to the modeling requirements.

Authors: Kapias, T.; Griffiths, R. F.
Full source: Journal of Hazardous Materials 2005, 119(1-3), 41-52 (Eng)

Experimental studies and estimates of the explosion limit of some environmentally friendly refrigerants

2005-08-17

This paper develops diagrams of the explosion limit of binary mixtures of R125 and one of six refrigerants based on experimental studies and proposes a mathematical model to calculate the concentration and the explosion limit of a tricomponent mixture containing one nonflammable component. The explosion limit of the mixtures can be estimated by using these diagrams.

Authors: Zhao, Yang; Wu, Ting; Li, Xihong
Full source: Combustion Science and Technology 2005, 177(3), 613-626 (Eng)