DATE: Jan. 11, 2014

TO: DIERS Users Group

FROM: Joseph C. Leung Design/Testing Committee chair

cc: Harold G. Fisher DIERS Users Group chairman

SUBJECT: DIERS Round-Robin (RR) Design Exercise (Submittal deadline: April 20,2014)

The proposed RR design exercise is a follow-up phase of the vinyl acetate (VAM) RR experimental activity. The runaway system is a VAM solution polymerization in toluene with LPO (dilauroyl peroxide, Laurox) as free-radical initiator. The experimental phase has largely been completed. Note that there are two scenarios we are interested:

Scenario #1 – adiabatic runaway starting at 50°C

Scenario #2 – runaway simulating external heating of 1.5 °C/min (for those using heat input, this rate would be equivalent to 0.05 watt/g sample)

Vessel data: 1.89 m^3 (500 gal), 1.22 m dia. x 1.22 m T/T (4 ft dia. x 4 ft T/T), elliptical heads

Design rating: 3.45 barG (50 psig)

Charge : 680 kg (1500 lb) of following mixture (with tank about half full)

60% wt. VAM

39% wt. Toluene

1% wt. Dilauroyl peroxide

Set pressure: 3 cases:

Case 1 - 1 barG (14.5 psig)

Case 2 - 1.72 barG (25 psig)

Case 3 - 3.45 barG (50 psig)

Only require to submit ideal vent area (no tailpipe resistance and other losses)

Deadline for Submission: April 20, 2014

Send data or inquiry to: Joseph Leung at the following Email: leunginc@cox.net

For people interested in VLE modeling on VAM-TOL binary system, the following article might be of interest (a fit of the VLE data using van Laar activity model with α=0.27, β=0.336 is shown in the graph below):

The Systems Vinyl Acetate–Toluene and Vinyl Acetate–Propyl Bromide–Toluene

Jaime Wisnlak* and Abraham Tamir

Department of Chemical Engineering, Ben-Gurion University of the Negev, Beer-Sheva, Israel 84105

Table II. Experimental Vapor–Liquid Equilibria Data for Vinyl Acetate (1)–Toluene (3) at 760 mmHg

t, °C	x_1	y_1	γ_1	γ_2
74.20	0.923	0.967	0.991	1.324
74.61	0.854	0.939	1.027	1.272
77.20	0.752	0.894	1.029	1.194
78.72	0.698	0.865	1.023	1.181
79.52	0.667	0.847	1.023	1.182
80.20	0.638	0.835	1.034	1.146
80.34	0.636	0.830	1.026	1.168
81.98	0.574	0.797	1.041	1.129
84.95	0.470	0.730	1.069	1.094
87.55	0.398	0.675	1.085	1.067
90.10	0.325	0.619	1.135	1.029
91.30	0.289	0.583	1.164	1.030
92.11	0.276	0.570	1.165	1.017
95.27	0.212	0.482	1.179	1.022
97.54	0.170	0.417	1.199	1.020
97.62	0.161	0.408	1.234	1.021
99.19	0.140	0.371	1.241	1.011
100.34	0.127	0.337	1.256	1.013
106.04	0.048	0.157	1.291	1.006

J. Chem. Eng. Data **1989**, *34*, 301–305