

KANEGAFUCHI CHEMICAL INDUSTRY COMPANY, LIMITED



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Mr. J. A. Debernardi
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Dear Sirs,

Catalyst and Diluent for Oxychlorination Process

Please find enclosed "corrected operation manual" which is already informed by our telex No. 722 of March 3, 1982.

Yours faithfully,

H. Mori

H. Mori
Market Development Sect.
Chemicals and Plastics Dept.
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Confidential Information

Operation Manual
Of
New Kanegafuchi Catalyst Systems
For
R-301 to R-303

March 4, 1982

Kanegafuchi Chemical Industry Co., Ltd.

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The following is an operation manual for catalysts and a diluent newly developed by Kanegafuchi Chemical Industry Co., Ltd. (Kanegafuchi) for R-301 - R-303 of the Stauffer Oxychlorination Process :

1. Caution in handling the catalysts and the diluent

The catalysts (KOC-101, KOC-201, and KOC-R3) and the diluent (KOD-55) should be kept from moisture at all times in a similar way to those for other catalysts for the Stauffer Oxychlorination process.

2. Catalyst and diluent loadings

The new catalyst system of Kanegafuchi employs the catalysts of three kinds ; KOC-101, KOC-201 and KOC-R3 with following mixing rates with the diluent KOD-55.

The catalysts and the diluent are loaded to reactor zones at determined mixing ratios. _____

Recommendable loading patterns are shown below :

Reactors	Catalysts	Diluent	Loading Patterns by zones (vol.%)				
			1st	2nd	3rd	4th	5th
R-301	KOC-101	KOD-55	65	65	65	100	100
R-302	KOC-201	KOD-55	68	68	77*	100	100
R-303	KOC-R3	KOD-55	90	90	100	100	100

Remark : revised figure

The above loading patterns may be changed in case of different sizes of reactor diameter from the Stauffer's original standard design.

The top and the bottom 9-inch section of each tube should be filled with an inert solid such as fused alumina, fused silica, ceramics and KOD-55 in a similar way to conventional catalyst systems. Care must be taken to ascertain that the tubes are uniformly filled with the correct volume of proper catalyst particles and solid diluent.

3. Physical properties (characteristics) and packing of the catalysts

Items \ catalysts	KOC-101	KOC-201	KOC-R3
Shape	Spherical	Spherical	Cylindrical
CaCl ₂ content (wt.%)	12.0 $\pm$ 1.0	16.0 $\pm$ 1.0	16.5 $\pm$ 1.0
Drying loss (wt.%)	3 max.	3 max.	3 max.
Packed density (Kg./l.)	0.76 - 0.80	0.78 - 0.82	0.75 - 0.79
Compression strength (Kg.)	2 min.	2 min.	1 min.
Size range	3.5 - 5 meshes 95 % min.	3.5 - 5 meshes 95 % min.	4.8 mm ϕ x 4.8 mm
Packing	175-Kg. net new steel drums	175-Kg. net new steel drums	160-Kg. net new steel drums

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4. Physical properties and packing of the diluent KOD-55

Shape Columnner, length of 4 - 6 mm., diameter of
 about 5 mm.

Carbon 99 % min.

Apparent specific gravity 1.5 - 1.7 Kg./l.

Packed density 1.0 - 1.1 Kg./l.

Packing New steel drums of 200 Kg. net

5. Mixing the catalysts with the diluent

Mixing the Kanegafuchi's new catalysts with KOD-55 is comparatively easier than mixing conventional catalysts with conventional diluents because of smaller difference in density between the new catalysts and the new diluent.

Manual mixing is recommended for a uniform mixture and a uniform loading to each reactor tube by measuring into a polyethylene bag, for example, of certain amounts of the catalyst and the diluent per tube.

6. Reactor loading

It must be ascertained that the correct amount of a uniform mixture of the catalysts and the diluent is loaded into each reactor tube.

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7. Protection of workers

A dust-proof mask, gloves, and other types of protectors must be worn by a worker being engaged in mixings and loadings of the catalysts and the diluent.

8. Start-ups

The know-hows of Stauffer Chemical Company are basically applicable to start-ups.

No special precautions are necessary for the new Kanegafuchi catalyst systems because the systems have relatively stable activities even at the initial stage of reaction.

The following are recommended, however, as the start-up conditions for safety :

1) Recommended*start-up conditions

HCl feed rate : Half the design load ✓

Volume ratio of C_2H_4 vs HCl : 0.50 - 0.52

Reactors	Recommended steam drum pressures Kg./cm ² G	Air feed rate volume ratio of Air vs HCl	N ₂ feed rate volume ratio of N ₂ vs HCl
R-301	16 227 psi ^g	0.37 - 0.40	0.13 - 0.15
R-302	17	0.33 - 0.36	0.13 - 0.15
R-303	19	0.27 - 0.30	0.13 - 0.15

The recommended pressure of PRC-309 : 2.5 Kg./cm²G 35.5 psi^g

2) Air feeding and confirmation of the reaction initiation

Air feeding to R-302 must be started after confirming the reaction of R-301 is sufficient by observation of the steam generation and the temperature rise in the reactor. Air feeding to R-303 must also be started after a similar confirmation of the reaction in R-302.

It is recommended that the high-pressured steam injection to each reactor steam drum should continue until the initiation of reaction is confirmed.

3) Hot-spot temperatures

Care should be taken that the hot-spot temperature will not exceed 300 °C by adjusting the steam drum pressures at the start-up of each reactor.

9. Shutdowns

Shutdown procedures for the new catalyst systems should follow Stauffer's operation manual.