10-4-73
K. E. Bouche

I

Let us calc the case for Mono production
And use Hayberg equations

Given from single Plant Chlorinate - CSTR

	% wt	MW	MOLES	MOLE %
ϕ^2	48.8	154.2	.31647	54.75
O, MCB	23.7	188.65	.12563	21.73
m, MCB	2.0	188.65	.01060	1.83
p, MCB	12.7	188.65	.06732	11.64
DCB	12.1	223.1	.05424	9.38
TCB	.7	258.	.00388	.67
	100.0		.57814	100.00

35.

$$X = .2173 + .0183 + .1164 + 2(.0938) + 3(.006$$

.1876 .020

$= \underline{.5597}$ atom chlorine / mole benzene

where X is total atom of chlorine per mole of benzene constituted

$$F = 1 + \frac{1}{X} + \frac{1}{Y} = 1 + \frac{1}{11.087} + \frac{1}{1.9237} = 1 + .0901957 + .5198315 = 1.6100$$

$$k' = \frac{1.0 - .5475}{(.63) \times .5475} = \frac{.4524}{.344925} = 1.3116$$

(1)

$$B.P = \frac{1}{1 + 1.3116(\ )} = \frac{1}{1.82608} = \underline{.54762}$$

(2)

$$OMCP = \frac{1.3116 \times .54762}{1 + 1.3116/1.9952}$$

.7182503

.6573777

$= .4333654$

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KEN

III

$$B_1P = \frac{B_1P_I}{1 + h_1'F}$$

$$B_1P(1 + h_1'F) = B_1P_I$$

$$B_1P + h_1'FB_1P = B_1P_I$$

$$h_1' = \frac{B_1'P_I - B_1P}{F\,B_1P}$$

$$= \frac{1 - .5475}{1.61\ (.5475)}$$

$$= \frac{.4525}{.881475}$$

$$= 0.5133441$$

(1) $$B_1P = \frac{1}{1 + 0.5133\ (1.61)}$$

$$= \frac{1}{1 + .82691}$$

$$= .5475$$

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K.E.B

III

(2) $\dot{o}MCB = \dfrac{.5133441\ (.5475)}{1 + .5133441 / 1.9952}$

$= \dfrac{0.2810558}{1.2572895}$

$= .223541$

(3) $mMCP = \dfrac{(.5133441)(.5475) / 11.087}{1 + .5133441 / 1.9952} = \dfrac{.02535}{1.2572895}$

$= .0198467$

(4) $pMCP = \dfrac{(.5133441)(.5475) / 1.9237}{1 + .5133441 / 1.9952} = \dfrac{.14610}{1.25722}$

$= .1162036$

$\Sigma MCP = .3595913$

(5) $DCP = \dfrac{(.5133441)(.3595913) / 1.9952}{1 + .5133441 / 29.831} = \dfrac{.092516}{1.017208}$

$= .0909538$

(6) $TSP = (.5133441)(.0909538) / 29.831$

$= .0015651$

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IV

K.E.B

		MW	#	Wt %
B.P	.5475	154.2	84.4245	48.813
ø MCP	.22354	188.65	42.1708	24.382
m MCP	.01985	188.65	3.7447	2.165
μ MCP	.11620	188.65	21.9211	12.674
D CP	.09095	223.1	20.2909	11.732
† CP	.00156	258	.4025	.232
	.99960		172.9555	99.998

Comparison Actual vs Model.

	actual	Calc
ϕ^2	48.8	48.8
o	23.7	29.4
m	2.0	2.2
p	12.7	12.7
D	12.1	11.7
†	.7	.2
		100.0

Calculation of second stage

assume 'k' is the same

(1)

$$B.P = \frac{.5475}{1 + (.5133441)(1.61)}$$

$$= \frac{.5475}{1.826484} = .2997562$$

(2)

$$\text{øMCP} = \frac{.22354 + (.5133441)(.2997562)}{1 + .5133441}$$

$$\frac{.377418}{1.2572695} = .3001838$$

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V

(3) $mMCP = \dfrac{.01985 + (.5133441)(.2997562)/11.087}{1 + .2572895}$ (.153818)

$= \dfrac{.01985 + .0138791}{1.2572895}$ (.0337291)

$= .0268268$

(4) $pMCP = \dfrac{.11620 + (.5733441)(.2997562)/1.9237}{1 + .2572895}$ (.0799594)

$= \dfrac{.1961594}{1.2572895}$

$= 0.1560176$

$\Sigma MCP = .4830282$

(5) $DCP = \dfrac{.09095 + (.5133441)(.4830282)/1.995}{1 + .5133441/29.831}$ (.1242781, .0172084)

$= \dfrac{.2152281}{1.0172084} = .211587$

(6) $+CP = .00156 + (.5133441)(.211587)/29.831$

$= .00156 + .003641$

$= .005201$

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V1
KEB.

Ch on atom chlorine / mole benzene

1 stage

$$\alpha = .359513 + 2(\overset{.0454769}{.0909538}) + 3(\overset{.0046953}{.0015651})$$

$$= .4096852$$

2 stage

$$\alpha = .4830282 + 2(\overset{.423174}{.211587}) + 3(\overset{.015603}{.005201})$$

$$= .9218052$$

$\alpha/2 = .4609026$

$$\begin{array}{r} .9218052 \\ .4096852 \\ \hline \Delta = .5121200 \end{array}$$

Ch on balance

	Moles %
ϕ^2	.2997562
O	.3001838
M	.0268268
P	.1560176
D	.211587
T	.005201
	.9995724

Change in BiP

		Δ
stage 1	1 - .5475	.4525
stage 2	.5475 - .30	.2475

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