

TABLE 4-continued

Diammonium Succinate Conversion and Product Selectivities					
Temp. (° C.)	Elapsed Time at Temp (min)	Diammonium Succinate Conversion (%)	Selectivity to Succinamic Acid	Selectivity to Succinimide	Selectivity to succindiamide
200° C.	90	93.3	0.1	98.5	n/d
160° C.	480	91.7	0.1	97.8	n/d
220° C.	30	93.2	2.5	101.5	n/d

n/d = not detected

This method forms succinimide with a release approximately half the original ammonia as the DAS cyclizes to form succinimide. The ammonia is removed in the vapor phase along with water. Accordingly, the process produces a nearly 1:1 ammonia to succinate ratio. However, the process can alternatively be stopped at any ratio between 1:1 to 2:1. This process forms mostly succinimide with some succinamic acid present, each of which can be favorable intermediates for converting to N-methyl succinimide.

#### Example 5

#### Formation of N-Methyl Succinimide from Succinimide

Succinimide is provided to a reactor at 23% by weight in water. Methanol is provided to the reactor at a 1.5:1 methanol to succinimide ratio in an absence of added ammonia. The ammonia integrated within the succinimide provides a 1:1 ammonia to succinate species ratio. The reactor is pressurized with nitrogen and sealed. The reactor is heated to 300° C. and is maintained at temperature for 5 hours. Samples are collected at least every hour during the reaction. Product analysis is conducted to determine conversion and product selectivity. Analysis of the 4 hour sample indicates a succinimide conversion of greater than or equal to 96%. The yield of N-methyl succinimide (NMS) is greater than or equal to 80%.

#### Example 6

#### N-Methyl Succinimide Hydrogenation

Approximately 5.0 grams (g) of the specified catalyst is charged into a reactor equipped with a magnetic stirrer. Approximately 50.0 g of solid NMS is utilized a feedstock and is provided to the reactor. The reaction is conducted under 1500 psig constant H<sub>2</sub> pressure at a stir rate of about 1000 rpm. After 4 hrs, the resulting gas and liquid components are analyzed for determination of NMS conversion and product selectivity. The results of the determinations are indicated in Table 5 for each of the indicated catalysts and reaction temperatures.

TABLE 5

Catalyst Based Hydrogenation Selectivities				
Catalyst No. (from Table 2)	Temp. (° C.)	% of NMS Converted	molar % (of theoretical) Yield of NMP	NMP/2-pyrrolidinone (Mole Ratio)
1	200	<1	0.6	n/d
2	200	7	6.8	25
3	200	3	3	10
4	200	65	55.9	65

TABLE 5-continued

Catalyst Based Hydrogenation Selectivities				
Catalyst No. (from Table 2)	Temp. (° C.)	% of NMS Converted	molar % (of theoretical) Yield of NMP	NMP/2-pyrrolidinone (Mole Ratio)
6757-09-1	200	84	69.3	10
ESCAT-268	200	26	25.7	>90
ESCAT-340	200	45	41.8	149
ESCAT-140	200	15	12.4	48
25 ESCAT-440	200	96	34.3	1.5
ESCAT-440	150	75	42.2	6.5
ESCAT-440	120	39	19	n/d
ESCAT-340	220	50.2	50.2	70
ESCAT-268	220	35.5	35.5	n/d
30 Co-0138 E 1/16 3F	200	58.6	32.0	18
G 106 B/W 5% Rh	220	95.8	90.8	142
* ESCAT-340	200	40.4	38.0	n/d
G 106 B/W 5% Rh	220	93.6	89.4	134

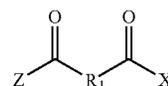
2Py = 2-pyrrolidinone;  
n/d = not detected;  
\* reaction was conducted at 2000 psig.

In compliance with the statute, the invention has been described in language more or less specific as to structural and methodical features. It is to be understood, however, that the invention is not limited to the specific features shown and described, since the means herein disclosed comprise preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted in accordance with the doctrine of equivalents.

The invention claimed is:

1. A method of processing an initial compound having a formula (A)

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(A)

60 wherein R<sub>1</sub> comprises a saturated or unsaturated, branched or un-branched group containing from 1 to 10 carbon atoms, and wherein Z and X independently comprise one or more of C, H, O, N, S, a halide, and a counter-ion, the method comprising:

65 converting the initial compound to a cyclic compound having a formula (B)