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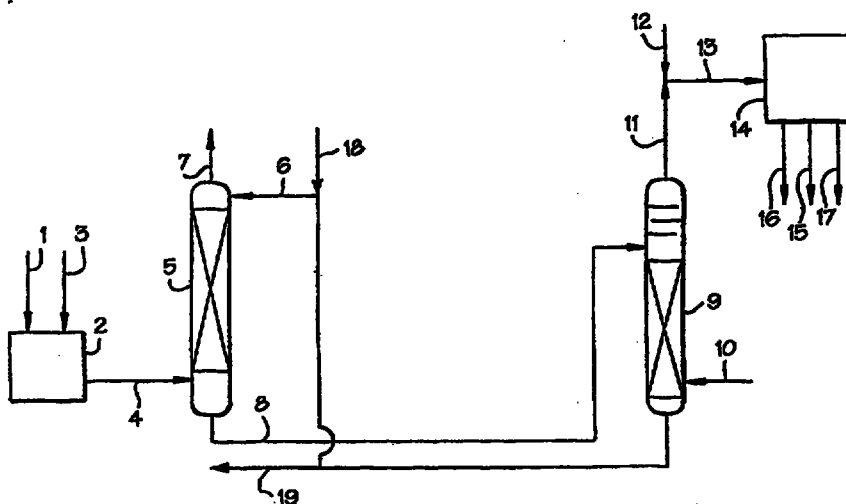
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| (21) International Application Number: PCT/GB98/03257 ✓<br>(22) International Filing Date: 2 November 1998 (02.11.98) ✓<br>(30) Priority Data: ✓<br>① 9724195.4 ✓ 14 November 1997 (14.11.97) ✓ GB ✓<br>(71) Applicant (for all designated States except US): KVAERNER<br>PROCESS TECHNOLOGY LIMITED [GB/GB]; 20 East-<br>bourne Terrace, London W2 6LE (GB).<br>(72) Inventors; and<br>(75) Inventors/Applicants (for US only): TUCK, Michael, William,<br>Marshall [GB/GB]; 5 Riggindale Road, London SW16<br>1QL [GB] WOOD, Michael, Anthony [GB/GB]; 9 Watch-<br>gate, Nunthorpe, Middlesbrough, Cleveland TS7 0QS (GB). ✓<br>③ HILES, Andrew, George [GB/GB]; Monaltrie, Chiltem<br>Road, Chesham Bois, Buckinghamshire HP6 5PH (GB). ✓<br>(74) Agent: EYLES, Christopher, Thomas; W.P. Thompson & Co.,<br>Celcon House, 289-293 High Holborn, London WC1V 7HU<br>(GB). |  | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR,<br>BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD,<br>GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR,<br>KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN,<br>MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK,<br>SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW,<br>ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW),<br>Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),<br>European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,<br>GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF,<br>BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN,<br>TD, TG).<br><br>Published<br>With international search report.<br><br>1 PD,<br>1 app'n. (see 13/306)<br>3 INVS.<br>IPC = C07C 29/149<br>IPER 14/6/99 |                                                                                                                           |

(54) Title: PROCESS FOR THE PREPARATION OF BUTANE-1,4-DIOL, GAMMA-BUTYROLACTONE AND TETRAHYDROFU-  
RAN ✓



(57) Abstract

A process is described for the production of butane-1,4-diol,  $\gamma$ -butyrolactone and/or tetrahydrofuran. A vaporous stream containing maleic anhydride, water, and carbon oxides is contacted in an absorption zone with a high boiling ester as solvent to form a solution of maleic anhydride in the high boiling ester which has a boiling point at the atmospheric pressure at least about 30 °C higher than that of maleic anhydride and is selected from di-(C<sub>1</sub> to C<sub>4</sub> alkyl) esters of alkyl dicarboxylic acids containing up to 13 carbon atoms, mono- and di-(C<sub>10</sub> to C<sub>18</sub> alkyl) esters of maleic acid, fumaric acid, succinic acid, and mixtures thereof, (C<sub>1</sub> to C<sub>4</sub> alkyl) esters of naphthalene-monocarboxylic acids, tri-(C<sub>1</sub> to C<sub>4</sub> alkyl) esters of aromatic tricarboxylic acids, and di-(C<sub>1</sub> to C<sub>4</sub> alkyl) esters of isophthalic acid. The maleic anhydride in the solution is stripped with a gaseous stream containing hydrogen thereby forming a vaporous stream comprising hydrogen and maleic anhydride, which is contacted in a hydrogenation zone with a heterogeneous hydrogenation catalyst to convert maleic anhydride to at least one C<sub>4</sub> compound selected from butane-1,4-diol,  $\gamma$ -butyrolactone and tetrahydrofuran.