



(51) International Patent Classification:

G01N 30/88 (2006.01) *G01N 33/28* (2006.01)
B01D 15/18 (2006.01)

(21) International Application Number:

PCT/US2013/073996

(22) International Filing Date:

10 December 2013 (10.12.2013)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

13/718,064 18 December 2012 (18.12.2012) US

(71) Applicant: EXXONMOBIL RESEARCH AND ENGINEERING COMPANY [US/US]; 1545 Route 22 East, P.O. Box 900, Annandale, NJ 08801-0900 (US).

(72) Inventor: CHAWLA, Birbal; 16 Apley Drive, Cherry Hill, NJ 08003 (US).

(74) Agents: BARRETT, Glenn, T. et al.; ExxonMobil Research and Engineering Company, 1545 Route 22 East, P.O. Box 900, Annandale, NJ 08801-0900 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: PREPARATORY HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC (HPLC) SEPARATION SYSTEM AND TECHNIQUE FOR QUANTITATIVE FRACTIONATION OF TOTAL VACUUM RESID

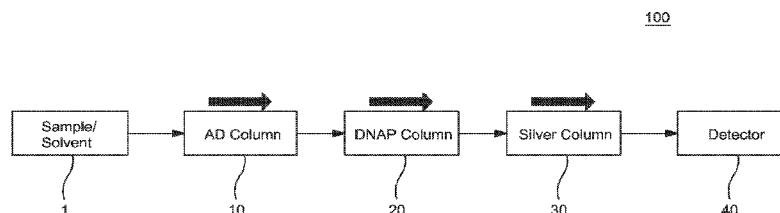


FIG. 1

(57) Abstract: A method and apparatus for conducting chromatographic analysis of a total vacuum resid sample to provide quantification of eight classes of compounds (i.e., asphaltenes, saturates, 1-4- ring aromatics, sulfides, and polars) contained within the total vacuum resid without prior de-asphalting are disclosed (in a first operating mode comprising columns 10, 20, 30). The apparatus is also capable of conducting chromatographic analysis of vacuum gas oils and de-asphalted oils to provide quantification of seven classes of compounds (i.e., saturates, 1-4+ ring aromatics, sulfides, and polars) (in a second operating mode comprising columns 20 and 30). The apparatus is also capable of conducting chromatographic analysis of a resid to identify the presence of and provide quantification of asphaltenes (in a third operating mode comprising column 10).

