stripping agent hydrocarbon vapor can be used, benzene vapor is particularly useful since, for example, the hydroalkylation reaction effluent contains significant quantities (typically up to 60 wt%) of unreacted benzene.

[0044] In one embodiment of the present process, after separation from the hydroalkylation reaction effluent, the polycyclohexylbenzenes are mixed with benzene and transalkylated to produce additional monocyclohexylbenzene. Transalkylation is typically effected in a transalkylation reactor, separate from the hydroalkylation reactor, over a suitable transalkylation catalyst, such as a molecular sieve of the MCM-22 family, zeolite beta, MCM-68 (see U.S. Patent No. ~~6,014,018~~ 6,049,018), zeolite Y and mordenite. The transalkylation reaction is typically conducted under at least partial liquid phase conditions, which suitably include a temperature of about 100°C to about 300°C, a pressure of about 800 kPa to about 3500 kPa, a weight hourly space velocity of about 1 hr^{-1} to about 10 hr^{-1} on total feed, and a benzene/dicyclohexylbenzene weight ratio about of 1:1 to about 5:1.

[0045] In another embodiment of the present process, conversion of the polycyclohexylbenzenes to additional monocyclohexylbenzene is effected by dealkylation. Dealkylation or cracking is also typically effected in a reactor separate from the hydroalkylation reactor, such as a reactive distillation unit, at a temperature of about 150°C to about 500°C and a pressure of 15 psig to 500 psig (200 kPa to 3550 kPa) over an acid catalyst such as an aluminosilicate, an aluminophosphate, a silicoaluminphosphate, amorphous silica-alumina, an acidic clay, a mixed metal oxide, such as WO_x/ZrO_2, phosphoric acid, sulfated zirconia and mixtures thereof. Generally, the acid catalyst includes at least one aluminosilicate, aluminophosphate or silicoaluminphosphate. Dealkylation can be conducted in the absence of added benzene, although it may be desirable to add benzene to the dealkylation reaction to reduce coke formation. In this case, the weight ratio of benzene to poly-alkylated aromatic compounds in the feed to the dealkylation reaction is typically is from 0 to about 0.9, such as from about 0.01 to about 0.5. Similarly, although the dealkylation reaction can be conducted in the absence of added hydrogen, hydrogen is generally introduced into the dealkylation reactor to assist in coke reduction. Suitable hydrogen addition rates are such that the molar ratio of hydrogen to poly-alkylated aromatic compound in the total feed to the dealkylation reactor is from about 0.01 to about 10. Various dealkylation processes are described in more detail in co-pending Application No. PCT/2010/031029.

[0046] Another significant by-product of the hydroalkylation reaction is cyclohexane. Although a C_6-rich stream comprising cyclohexane and unreacted benzene can be readily