CLAIMS

1. A dehydrogenation process, the process comprising:

(1A) providing a catalyst precursor comprising (i) an inorganic support, and (ii) 0.01 wt% to 10.0 wt% of a first metal selected from the Groups 6 to 10 metals of the Periodic Table of Elements based on the total weight of the catalyst precursor;

(1B) obtaining an activated dehydrogenation catalyst by treating the catalyst precursor at a temperature in a range ~~from 300°C~~ of greater than 450°C to 600°C for a period of at least 15 minutes in a H_2-containing atmosphere; and

(1C) contacting a first composition comprising cyclohexane with the activated dehydrogenation catalyst in a dehydrogenation reactor under a dehydrogenation condition to convert at least a portion of the cyclohexane to benzene and obtain a dehydrogenation reaction product.

2. The process of claim 1, wherein the temperature of step (1B) is in a range from ~~420°C~~ 450°C to 550°C.

3. The process of claim 1 or claim 2, wherein the first composition in step (1C) is obtained by:

(1Ba) contacting benzene and hydrogen with a hydroalkylation catalyst under a hydroalkylation condition to form a hydroalkylation reaction mixture comprising cyclohexylbenzene, cyclohexane, methylcyclopentane, and benzene; and

(1Bb) obtaining from at least a portion of the hydroalkylation reaction mixture (i) a first composition that has a higher concentration of at least one of benzene and cyclohexane than cyclohexylbenzene; and (ii) a second composition that has a higher concentration of cyclohexylbenzene than benzene and cyclohexane.

4. The process of claim 3, further comprising:

(1D) recycling at least a portion of the benzene in the dehydrogenation reaction product to step (1Ba).

5. The process of any of the preceding claims, wherein the first metal comprises Pt and/or Pd.