

(II);

[0015] wherein each of X^2 and X^3 is selected from the group of hydrogen and hydroxyl; by converting a carbohydrate source to a furfural substrate; and, reacting at least a portion of the furfural substrate with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt to produce the compound of formula II. In some examples, the catalyst further comprises W. In other examples, the catalyst further comprises at least one metal selected from the group consisting of Mo, La, Sm, Y, W, and Re.

[0015a] In a first aspect, the present disclosure refers to a process for preparing 1,6-hexanediol comprising reacting 1,2,6-hexanetriol with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt.

[0015b] In a second aspect, the present disclosure refers to a process for preparing hexamethylenediamine comprising: reacting 1,2,6-hexanetriol with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt to prepare 1,6-hexanediol; and aminating the 1,6-hexanediol to hexamethylenediamine.

DETAILED DESCRIPTION

[0016] The following description sets forth exemplary methods, parameters and the like. It should be recognized, however, that such description is not intended as a limitation on the scope of the present invention.

[0017] In accordance with the present invention, applicants disclose processes for the chemocatalytic conversion of a furfural substrate, which may be derived from a carbohydrate source (e.g., glucose or fructose) to hexamethylenediamine, and intermediate processes and products along the pathway. In some embodiments, the processes are carried out by converting a carbohydrate source to a furfural substrate; reacting at least a portion of the furfural substrate with hydrogen in the presence of a heterogeneous reduction catalyst to produce 1,6-hexanediol; and, converting at least a portion of the 1,6-hexanediol to hexamethylenediamine. In other embodiments, the processes are carried out by converting a carbohydrate source to a furfural substrate; reacting at least a portion of the furfural substrate with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt to produce a reaction product comprising 1,2,6-hexanetriol; converting at least a portion of the 1,2,6-hexanetriol to 1,6-hexanediol; and converting at least a portion of the 1,6-hexanediol to hexamethylenediamine. In some embodiments, the processes are carried out by converting the carbohydrate source to a furfural substrate; and, reacting at least a portion of the furfural substrate with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt to produce 1,6-hexanediol. In other embodiments, the processes are carried out by converting

CLAIMS

We claim:

1. A process for preparing 1,6-hexanediol comprising reacting 1,2,6-hexanetriol with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt.

2. The process of claim 1, wherein the heterogeneous reduction catalyst further comprises at least one metal selected from the group consisting of Mo, La, Sm, Y, W, and Re.

3. The process of claim 2, wherein the molar ratio of Pt to the at least one metal selected from the group consisting of Mo, La, Sm, Y, W, and Re is from 20:1 to 1:10.

4. The process of claim 1 or 2, wherein the heterogeneous reduction catalyst is a supported heterogeneous reduction catalyst.

5. The process of claim 4, wherein the heterogeneous reduction catalyst is on the surface of the support.

6. The process of claim 4, wherein the supported heterogeneous reduction catalyst comprises a support selected from the group consisting of acidic ion-exchange resin, gamma alumina, fluorinated alumina, sulfate or tungsten promoted zirconia, titania, silica, silica promoted alumina, aluminum phosphate, tungsten oxide supported on silica-alumina, acidic clay, supported mineral acid and zeolites.

7. The process of claim 4, wherein the supported heterogeneous reduction catalyst comprises a support selected from the group consisting of metal-doped titania, metal-doped zirconia, metal-doped ceria and metal-modified niobia.

8. The process of claim 4, wherein the supported heterogeneous reduction catalyst comprises a zirconia, silica or zeolite support.

9. The process of claim 1, wherein 1,2,6-hexanetriol is reacted with hydrogen in the presence of the heterogeneous reduction catalyst at a temperature in the range of 80°C to 200°C and at a pressure in the range of 200 psig to 2000 psig.

10. The process of claim 1, wherein the process is conducted in the presence of a solvent selected from the group consisting of water, alcohols, esters, ethers, ketones, and mixtures thereof.

11. The process of claim 10, wherein the solvent is water.

12. A process for preparing hexamethylenediamine comprising:

reacting 1,2,6-hexanetriol with hydrogen in the presence of a heterogeneous reduction catalyst comprising Pt to prepare 1,6-hexanediol; and

aminating the 1,6-hexanediol to hexamethylenediamine.