What is claimed is:

1. A method for preparing a 1,2,3-triazole comprising contacting an alkyne and an organic azide compound in a solvent with a ruthenium-based catalyst for a period of time sufficient to form a 1,2,3-triazole compound from the alkyne and the azide, wherein the ruthenium-based catalyst comprises Ru(II) bearing a cyclopentadienylic ligand.

2. The method of claim 1 wherein the cyclopentadienylic ligand is pentamethylcyclopentadienyl.

3. The method of claim 1 wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethyl cyclopentadienyl ruthenium (II) chloride.

4. The method of claim 1 wherein the catalyst comprises cyclopentadienyl bis-triphenylphosphino ruthenium (II) chloride.

5. The method of claim 1 wherein the solvent is an aprotic solvent.

6. The method of claim 5 wherein the aprotic solvent comprises at least one solvent selected from the group consisting of benzene, toluene, tetrahydrofuran, and dioxane.

7. The method of claim 1 wherein the alkyne and the organic azide are each present in the solvent at a concentration in the range of about 0.01 M to 1 M.

8. The method of claim 1 wherein the ruthenium-based catalyst is present in the solvent at a concentration in the range of about 1 to about 5 mol% based on the moles of alkyne or azide present.

9. The method of claim I wherein the solvent is maintained at a temperature in the range of about ambient room temperature to reflux temperature.

10. The method of claim 1 wherein the catalyst comprises a pentamethylcyclopentadienyl ruthenium (II) compound bearing a substituent selected from the group consisting of halide, alkylsulfonate, arylsulfonate, and cyanide.

11. The method of claim 1 wherein the alkyne is bonded to a radical selected from the group consisting of hydrogen, alkyl, alkenyl, aryl, heteroaryl, benzyl, propargyl, cycloalkyl, trialkylsilyl, alkyldiarylsilyl, dialkyiarylsilyl, trialkylstannyl, triarylsilyl, and cycloalkenyl.

12. The method of claim 1 wherein the organic azide is an aliphatic azide.

13. The method of claim 12 wherein the aliphatic azide is selected from the group consisting of a primary aliphatic azide, a tertiary azide, a benzylic azide and mixtures thereof.

14. The method of claim 1 wherein the 1,2,3-triazole is a 1,5-disubstituted- 1,2,3-triazole and the alkyne is a terminal alkyne.

15. The method of claim 14 wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethylcyclopentadienyl ruthenium (II) chloride.

16. The method of claim 14 wherein the azide is a primary aliphatic azide, a tertiary azide or a benzylic azide.

17. The method of claim 14 wherein the solvent is an aprotic solvent.

18. The method of claim 14 wherein the terminal alkyne and the organic azide are each present in the solvent at a concentration in the range of about 0.01 M to 1 M.

19. The method of claim 14 wherein the ruthenium-based catalyst is present in the solvent at a concentration in the range of about 1 to about 5 mol% based on the moles of alkyne or azide present.

20. The method of claim 14 wherein the solvent is maintained at a temperature in the range of about ambient room temperature to reflux temperature.

21. The method of claim 1 wherein the 1,2,3-triazole is a 1,4,5-trisubstituted-1,2,3-triazole and the alkyne is an internal alkyne.

22. The method of claim 21 wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethylcyclopentadienyl ruthenium (II) chloride.

23. The method of claim 21 wherein the organic azide is a primary aliphatic azide, a tertiary azide or a benzylic azide.

24. The method of claim 21 wherein the solvent is an aprotic solvent.

25. The method of claim 21 wherein the alkyne and the organic azide are each present in the solvent at a concentration in the range of about 0.01 M to 1 M.

26. The method of claim 21 wherein the ruthenium-based catalyst is present in the solvent at a concentration in the range of about 1 to about 5 mol% based on the moles of alkyne or azide present.

27. The method of claim 21 wherein the solvent is maintained at a temperature in the range of about ambient room temperature to reflux temperature.

28. The method of claim 1 comprising first admixing the alkyne and organic azide to form a reaction mixture, and then contacting the reaction mixture with a quantity of the ruthenium-based catalyst sufficient for catalyzing the formation of a 1,5-disubstituted 1,2,3-triazole or a 1,4,5-trisubstituted 1,2,3-triazole;

with the following provisos:

if the first compound is a terminal alkyne, then the product will be a 1,5-disubstituted 1,2,3-triazole; and

if the first compound is an internal alkyne, then the product will be a 1,4,5-trisubstituted 1,2,3-triazole.

29. The method of claim 28 wherein the ruthenium-based catalyst is selected from the group consisting of $Cp^*RuCl(PPh_3)_2$, $[Cp^*RuCl_2]_2$, Cp*RuCl(NBD), and Cp*RuCl(COD), wherein Cp* is pentamethylcyclopentadienyl, NBD is norbornadienyl, and COD is cyclooctadienyl.

What is claimed is:

1. A process for the formation of a 1,5-disubstituted 1,2,3-triazole or 1,4,5-trisubstituted 1,2,3-triazole, the process comprising the following steps:

Step A: admixing a first compound having an acetylene group with a second compound having an azide group in a solvent for forming a reaction mixture wherein the azide group is bonded to an aliphatic carbon in the second compound; and then

Step B: contacting the reaction mixture of said Step A with a quantity of ruthenium catalyst sufficient for catalyzing the formation of the 1,5-disubstituted 1,2,3-triazole or the 1,4,5-trisubstituted 1,2,3-triazole, wherein the ruthenium catalyst comprises Ru(II) bearing a cyclopentadienylic ligand;

with the following provisos:

if the first compound is a terminal acetylene, then the product will be a 1,5-disubstituted 1,2,3-triazole; and

if the first compound is an internal acetylene, then the product will be a 1,4,5-trisubstituted 1,2,3-triazole.

2. The process according to claim **1** wherein the ruthenium catalyst is selected from the group consisting of Cp*RuCl $(PPh_3)_2$, $[Cp^*RuCl_2]_2$, Cp*RuCl(NBD), and Cp*RuCl (COD), wherein Cp* is pentamethylcyclopentadienyl, NBD is norbornadienyl, and COD is cyclooctadienyl.

3. The process according to claim **1** wherein the solvent is selected from the group consisting of: benzene, toluene, tetrahydrofuran, and dioxane.

4. A method for preparing a 1,2,3-triazole comprising contacting an alkyne and an organic azide compound in a solvent with a ruthenium-based catalyst for a period of time sufficient to form a 1,2,3-triazole compound from the alkyne and the azide; wherein the ruthenium-based catalyst comprises Ru(II) bearing a cyclopentadienylic ligand.

5. The method of claim **4** wherein the cyclopentadienylic ligand is pentamethylcyclopentadienyl.

6. The method of claim **5** wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethylcyclopentadienyl ruthenium (II) chloride.

7. The method of claim 4 wherein the catalyst comprises cyclopentadienyl bis-triphenylphosphino ruthenium (II) chloride.

8. The method of claim 4 wherein the solvent is an aprotic solvent.

9. The method of claim 8 wherein the aprotic solvent comprises at least one solvent selected from the group consisting of benzene, toluene, tetrahydrofuxan, and dioxane.

10. The method of claim 4 wherein the alkyne and the organic azide are each present in the solvent at a concentration in the range of about 0.01 M to 1 M.

11. The method of claim 4 wherein the ruthenium-based catalyst is present in the solvent at a concentration in the range of about 1 to about 5 mol % based on the moles of alkyne or azide present.

12. The method of claim 4 wherein the solvent is maintained at a temperature in the range of about ambient room temperature to reflux temperature.

13. The method of claim 4 wherein the catalyst comprises a pentamethylcyclopentadienyl ruthenium (II) compound bearing a substituent selected from the group consisting of halide, alkylsulfonate, arylsulfonate, and cyanide.

14. The method of claim 4 wherein the alkyne is bonded to a radical selected from the group consisting of hydrogen, alkyl, alkenyl, aryl, heteroaryl, benzyl, propargyl, cycloalkyl, trialkylsilyl, alkyldiarylsilyl, dialkyiarylsilyl, trialkylstannyl, triarylsilyl, and cycloalkenyl.

15. The method of claim 4 wherein the organic azide is an aliphatic azide.

16. The method of claim 15 wherein the aliphatic azide is selected from the group consisting of a primary aliphatic azide, a tertiary azide, a benzylic azide and mixtures thereof.

17. A method for preparing a 1,5-disubstituted-1,2,3-triazole comprising contacting a terminal alkyne and an organic azide compound in a solvent with a ruthenium-based catalyst for a period of time sufficient to form a 1,5-disubstituted-1, 2,3-triazole compound from the alkyne and the azide; wherein the ruthenium-based catalyst comprises Ru(II) bearing a pentamethylcyclopentadienyl ligand.

18. The method of claim **17** wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethylcyclopentadienyl ruthenium (II) chloride.

19. The method of claim **17** wherein the organic azide is a primary aliphatic azide, a tertiary azide or a benzylic azide.

20. The method of claim **17** wherein the solvent is an aprotic solvent.

21. The method of claim **17** wherein the alkyne and the organic azide are each present in the solvent at a concentration in the range of about 0.01 M to 1 M.

22. The method of claim **17** wherein the ruthenium-based catalyst is present in the solvent at a concentration in the range of about 1 to about 5 mol % based on the moles of alkyne or azide present.

23. A method for preparing a 1,4,5-trisubstituted-1,2,3-triazole comprising contacting an internal alkyne and an organic azide compound in a solvent with a ruthenium-based catalyst for a period of time sufficient to form a 1,4,5-trisubstituted-1,2,3-triazole compound from the alkyne and the azide; wherein the ruthenium-based catalyst comprises Ru(II) bearing a pentamethylcyclopentadienyl ligand.

24. The method of claim **23** wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethylcyclopentadienyl ruthenium (II) chloride.

24. The method of claim **23** wherein the ruthenium-based catalyst is selected from the group consisting of bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride, bis-[pentamethylcyclopentadienyl ruthenium (II) chloride], norbornadienyl pentamethylcyclopentadienyl ruthenium (II) chloride, and cyclooctadienyl pentamethylcyclopentadienyl ruthenium (II) chloride.

25. The method of claim **23** wherein the organic azide is a primary aliphatic azide, a tertiary azide or a benzylic azide.

26. The method of claim **23** wherein the solvent is an aprotic solvent.

27. The method of claim **23** wherein the alkyne and the organic azide are each present in the solvent at a concentration in the range of about 0.01 M to 1 M.

28. The method of claim **23** wherein the ruthenium-based catalyst is present in the solvent at a concentration in the range of about 1 to about 5 mol % based on the moles of alkyne or azide present.

29. The method of claim **23** wherein the solvent is maintained at a temperature in the range of about ambient room temperature to reflux temperature.

30. The method according to claim **23** wherein the ruthenium catalyst is bis-triphenylphosphino pentamethylcyclopentadienyl ruthenium (II) chloride.