WHAT IS CLAIMED IS:

1. A process of making [1.1.1]propellane, comprising reacting 1,1-dibromo-2,2-bis(chloromethyl)cyclopropane with an effective amount of solid magnesium under substantially anhydrous reaction conditions that are selected to produce [1.1.1]propellane.

2. The process of claim 1, wherein the substantially anhydrous reaction conditions comprise reacting 1,1-dibromo-2,2-bis(chloromethyl)cyclopropane with the solid magnesium in the presence of an aprotic ether solvent that comprises tetrahydrofuran.

3. The process of claim 2, wherein the aprotic ether solvent further comprises an ether selected from diethylether, diethoxymethane, dibutylether, methyl tert-butyl ether, dioxane, 2-methyltetrahydrofuran, cyclopentyl methyl ether, and mixtures thereof.

4. The process of claim 2 or 3, wherein the aprotic ether solvent further comprises a hydrocarbon solvent for the 1,1-dibromo-2,2-bis(chloromethyl)cyclopropane and the [1.1.1]propellane.

5. The process of claim 4, wherein the hydrocarbon solvent is selected from toluene and heptane.

6. The process of claim 4 or 5, further comprising filtering a reaction mixture resulting from the reacting to thereby at least partially remove at least one insoluble salt.

7. The process of any one of claims 1 to 6, wherein the effective amount of the solid magnesium is a molar excess that is at least 2x with respect to 1,1-dibromo-2,2-bis(chloromethyl)cyclopropane.

8. The process of any one of claims 1 to 7, wherein the substantially anhydrous reaction conditions are further selected to produce a yield of the produced [1.1.1]propellane that is ~~about~~ 10% or higher.

9. The process of claim 8, wherein the yield is ~~about~~ 20% or higher.

10. The process of claim 8, wherein the yield is ~~about~~ 30% or higher.

11. The process of claim 8, wherein the yield is ~~about~~ 40% or higher.

12. The process of claim 8, wherein the yield is ~~about~~ 50% or higher.

13. The process of any one of claims 1 to 12, wherein the substantially anhydrous reaction conditions comprise a reaction temperature in the range of ~~about~~ 0 ºC to ~~about~~ 85 ºC.

14. The process of any one of claims 1 to 13, wherein the substantially anhydrous reaction conditions comprise a reaction time in the range of ~~about~~ 30 minutes to ~~about~~ 10 hours.

15. The process of any one of claims 1 to 14, further comprising separating at least a portion of the produced [1.1.1]propellane from a reaction mixture containing the 1,1-dibromo-2,2-bis(chloromethyl)cyclopropane and the solid magnesium.

16. The process of any one of claims 1 to 15, comprising contacting at least one kilogram of 1,1-dibromo-2,2-bis(chloromethyl)cyclopropane with the effective amount of solid magnesium.

17. The process of any one of claims 1 to 16, further comprising purifying the produced [1.1.1]propellane to provide a purified [1.1.1]propellane that has a purity of ~~about~~ 90% or higher.

18. The process of claim 17, wherein the purity is ~~about~~ 95% or higher.

19. The process of claim 18, wherein the purity is ~~about~~ 99% or higher.

20. The process of any one of claims 1 to 19, wherein the substantially anhydrous reaction conditions comprise a batch condition.

21. The process of any one of claims 1 to 19, wherein the substantially anhydrous reaction conditions comprise a continuous flow reaction condition conducted in a continuous flow reactor.