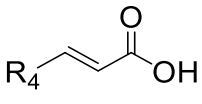
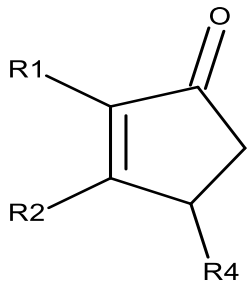
CLAIMS

1. A method of synthesizing a cyclic organic compound, the method comprising (A) contacting a compound of formula (1) ("compound (1)"): R1(H)C=C(H)R2 (1), wherein each R1 and R2 is independently H or (C_1-C_6) alkyl or substituted (C_1-C_6) alkyl, or the R1 and R2 are bonded together as –R-R- to form a (C_1-C_4) alkylene or substituted alkylene, with a compound of formula (2) ("compound (2)"):  (2), wherein R4 is H or (C1-C4)alkyl, in the presence of an effective amount of a sulfonic acid reagent and under reaction conditions sufficient to make a compound of formula (3) ("compound (3)"):



(3);

and/or its oxo/R4 regioisomer, wherein R1, R2, and R4 are as defined above.

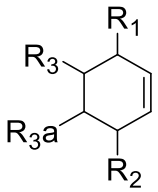
2. The method of claim 1 wherein the sulfonic acid reagent comprises a (C_1-C_6)alkylsulfonic acid.

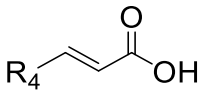
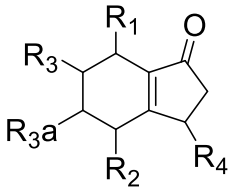
3. The method of claim 1 wherein the sulfonic acid reagent comprises a mixture of P_2O_5 and a (C_1-C_6)alkylsulfonic acid, or a reaction product thereof.

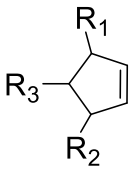
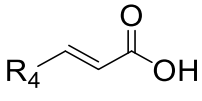
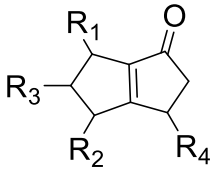
4. The method of claim 1 wherein the sulfonic acid reagent comprises a mixture of P_2O_5 and methanesulfonic acid, or a reaction product thereof.

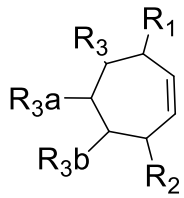
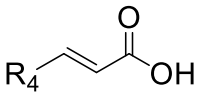
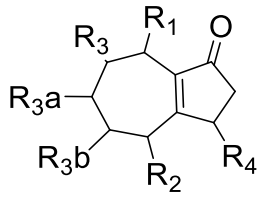
5. The method of claim 1 wherein the sulfonic acid reagent comprises a mixture of 0.1 weight parts P_2O_5 and 1 weight part methanesulfonic acid, or a reaction product thereof.

6. The method of claim 1 wherein the sulfonic acid reagent consists essentially of methanesulfonic acid.

7. The method of claim 1 comprising (A) contacting a compound of formula (1a) ("compound (1a)"):  (1a), wherein R1, R2, R3, and R3a are independently H or

(C_1-C_4)alkyl, or any two adjacent R1 to R3a groups are bonded together to form a (C_1-C_4)alkylene and the remaining two R1 to R3a groups independently are H or (C_1-C_4)alkyl, with a compound of formula (2) ("compound (2)"):  (2), wherein R4 is H or (C_1-C_4)alkyl, in the presence of an effective amount of a sulfonic acid reagent and under reaction conditions sufficient to make a compound of formula (3a) ("compound (3a)"):  (3a) and/or its oxo/R4 regioisomer; wherein R1 to R4 are as defined above.

8. The method of claim 1 comprising (A) contacting a compound of formula (1b) ("compound (1b)"):  (1b), wherein R1, R2, and R3 are independently H or (C1-C4)alkyl, or any two adjacent R1 to R3 groups are bonded together to form a (C_1-C_4)alkylene and the remaining one of the R1 to R3 groups is H or (C_1-C_4)alkyl, with a compound of formula (2) ("compound (2)"):  (2), wherein R4 is H or (C1-C4)alkyl, or any two adjacent R1 to R3 groups are bonded together to form a (C_1-C_4)alkylene and the remaining R1 to R3 group independently is H or (C_1-C_4)alkyl, in the presence of an effective amount of a sulfonic acid reagent and under reaction conditions sufficient to make a compound of formula (3b) ("compound (3b)"):  (3b) and/or its oxo/R4 regioisomer; wherein R1 to R4 are as defined above.

9. The method of claim 1 comprising (A) contacting a compound of formula (1c) ("compound (1c)"):  (1c), wherein R1, R2, R3, R3a, and R3b are independently H or (C1-C4)alkyl, or any two adjacent R1 to R3b groups are bonded together to form a (C_1-C_4)alkylene and the remaining three R1 to R3b groups independently are H or (C_1-C_4)alkyl, with a compound of formula (2) ("compound (2)"):  (2), wherein R4 is H or (C1-C4)alkyl, in the presence of an effective amount of a sulfonic acid reagent and under reaction conditions sufficient to make a compound of formula (3c) ("compound (3c)"):  (3c) and/or its oxo/R4 regioisomer; wherein R1 to R4 are as defined above.

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