Claims

1. A method for nucleic acid amplification, comprising:

(a) providing a reagent in a reaction volume, wherein the reagent comprises a first component coupled to a second component through a reducible linkage, and wherein the reaction volume includes a template nucleic acid molecule and a stabilized reducing agent;

(b) cleaving the reducible linkage with the aid of the stabilized reducing agent to decouple the first component from the second component; and

(c) subjecting the template nucleic acid molecule to an amplification reaction, using the first component, to yield nucleic acid molecules as amplification products of the template nucleic acid molecule,

wherein prior to (c), a reducing activity of the stabilized reducing agent with respect to the reducible linkage varies by at most 20%.

2. The method of Claim 1, wherein the subjecting includes cycling a temperature of the reaction volume.

3. The method of Claim 1, wherein the stabilized reducing agent comprises a stabilized thiol containing compound.

4. The method of Claim 1, wherein the second component comprises a bead.

5. The method of Claim 1, wherein the first component comprises a nucleic acid molecule and the second component comprises a polymer matrix.

6. The method of Claim 5, wherein the polymer matrix comprises a hydrogel.

7. The method of Claim 5, wherein the reducible linkage comprises a disulfide linkage linking the nucleic acid molecule to the polymer matrix.

8. The method of Claim 5, wherein the nucleic acid molecule comprises a barcode sequence, and wherein in (a), the nucleic acid molecule comprises a primer that participates in the amplification reaction.

9. The method of Claim 8, wherein, in (c), the amplification products comprise the barcode sequence.

10. The method of Claim 1, wherein the reaction volume is provided in the aqueous interior of a droplet in a water-in-oil emulsion.

11. A method for conducting a reduction reaction, comprising:

(a) providing a reagent in a reaction volume, wherein the reagent comprises a first component coupled to a second component through a reducible linkage, and wherein the reaction volume includes a reducing agent that is in an inactive state such that the reducing agent is substantially unreactive with the reducible linkage;

(b) subjecting the reducing agent to an activation condition such that the reducing agent becomes reactive with the reducible linkage; and

(c) permitting the reducing agent to react with the reducible linkage to decouple the first component from the second component.

12. The method of Claim 11, wherein, in (a), the reaction volume includes a template nucleic acid molecule.

13. The method of Claim 12, further comprising, after (c), subjecting the template nucleic acid molecule to an amplification reaction, using the first component, to yield nucleic acid molecules as amplification products of the template nucleic acid molecule.

14. The method of Claim 11, wherein the activation condition (i) comprises an addition of thermal energy to the reaction volume and/or (ii) cleaves a covalent bond of the reducing agent.

15. The method of Claim 11, wherein the reducing agent, in its inactive state, is a stabilized reducing agent, which stabilized reducing agent comprises a stabilized thiol containing compound.

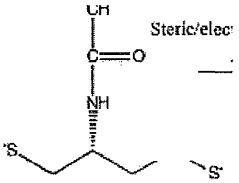
16. The method of Claim 11, wherein the first component comprises a nucleic acid molecule, which nucleic acid molecule comprises a barcode sequence, and the second component comprises a polymer matrix.

17. The method of Claim 16, wherein the polymer matrix comprises a hydrogel.

18. The method of Claim 16, wherein the reducible linkage comprises a disulfide linkage linking the nucleic acid molecule to the polymer matrix.

19. The method of Claim 11, wherein the reaction volume is provided in the aqueous interior of a droplet in a water-in-oil emulsion.

20. A reducing agent, comprising:



Hot-Start DTBA