Claims

1. A method of fabricating a mercury-based compound, wherein the mercury-based compound is paramagnetic and is present in an excited state, the method comprising the steps of:

- providing a pure mineral acid or a solution of mineral acid in a container;
- adding liquid mercury to the container;
- reacting the mercury and the mineral acid to form a mixture; and
- drying the mixture to form the mercury-based compound in powder form at a room temperature and environmental pressures,

wherein a ratio of the mineral acid to the liquid mercury is in a range of 0.1:1 to 10:1, wherein the mineral acid is based on ml and the liquid mercury is based on gram, and
wherein the step of drying is carried out at a temperature of 80° to 150°C for 30 mins to 10 hours.

2. The method according to claim 1, wherein the mineral acid is formed in the container before, after or during the step of adding the liquid mercury.

3. The method according to claim 1 or claim 2, wherein the mineral acid comprises at least one acid selected from the group of acids consisting of aqua regia, HNO_3, HCl, H_2SO_4.

4. The method according to any one of the preceding claims, wherein the ratio of the mineral acid to the liquid mercury is in a range of 1:1 to 2:1, wherein the mineral acid is based on ml and the liquid mercury is based on gram.

5. The method according to any one of the preceding claims, wherein the step of drying is carried out at a temperature of 90° to 140° C for 30 mins to 10 hours.

6. The method according to any one of the preceding claims, further comprising the step of adding a solvent, with the solvent being selected from the group of solvents consisting of a polar solvent, e.g. formic acid, ethanol, acetone, ammonia, acetic acid, a non-polar solvent, e.g. toluene or benzene and combinations thereof.

7. The method according to any one of the preceding claims, the method further comprising the step of:

- separating residual liquid from the mixture prior to drying the mixture.

8. The method according to any one of the preceding claims, further comprising at least one of the following steps:

- maintaining an initial temperature of the mixture at room temperature;

- heating the mixture, optionally wherein the step of heating the mixture is carried out up to a temperature at which the mineral acid is evaporated to dry the mercury-based compound;

- isolating compounds that do not contain liquid mercury from the mixture, and/or wherein the step of adding the liquid mercury to the container takes place before the mineral acid is added to the container.

9. A mercury-based compound in powder form at room temperature having the general chemical formula:

$M^1{}_aX_b$

where M^1 is selected from the group of compounds consisting of Hg, $M^x{}_cM^y{}_d$ and a combination thereof, with M^x being Hg and M^y being one or more element other than Hg; where X is one of a chloride, bromide, fluoride, iodide, sulphate nitrate and a combination thereof; and where a, b, c and d are numbers selected between 0.1 and 10,
wherein particles of the powder have a minimum average dimension of width of at least 50 nm and a maximum average dimension of width of at most 20 um and wherein the mercury-based compound is paramagnetic and is present in an excited state.

10. The mercury-based compound according to claim 9, wherein an XRD spectrum of the mercury-based compound includes peaks corresponding to Di-mercury sulphate (Hg2O4 S1) and Calomel (CI2Hg2), more specifically the peaks present in the XRD spectrum show mercury-based compounds that include at least one of C, N, O, CI, and S.

11. A method of producing metal compounds and metal elements in an endothermic reaction, the method comprising the steps of:

- providing a metal target material in the molten state, with the metal target material having a proton number of greater than or equal to 26,

- adding a mercury-based compound fabricated by the method comprising the following steps (a) to (d) and/or a mercury-based compound in powder form having the following general chemical formula to the metal target material:

(a) providing a pure mineral acid or a solution of mineral acid, in a container;

(b) adding liquid mercury to the container;

(c) reacting the mercury and the mineral acid to form a mixture; and

(d) drying the mixture to form the mercury-based compound in powder form

- the general chemical formula: $M^1_aX_b$

where M^1 is selected from the group of compounds consisting of Hg, $M^x_cM^y_d$ and a combination thereof, with M^x being Hg and M^y being an arbitrary element; where X is one of halide, sulphate, nitrate and a combination thereof; and where a, b, c and d are numbers selected between 0.1 and 10; and

wherein the mercury-based compound reacts with the metal target material to transmute elements to produce low mass elements, such as hydrocarbons, and heavier elements.

12. The method according to claim 11, wherein a bath of the molten metal target material includes between 10 g and 1000000 Kg of the molten metal target material; and/or wherein a range of between 1 mg to 100 kg of the mercury-based compound are added to the metal target material that can in particular be present in a liquid phase, a gaseous phase or a solid phase of matter; and/or wherein the ratio of mass between the mercury-based compound and the metal target material is selected from a range of 1 :100000 to 1 :100; and/or wherein the mercury-based compound comprises energy and is employed as a source of energy with the energy reacting with nuclei of the metal target material in order to create elements having a higher proton number and/or neutron number.

13. A method of producing metal compounds and metal elements in an exothermic reaction in a container such as a crucible, the method comprising the steps of:

- providing target material with the target material having a proton number of less than or equal to 28,

- adding a mercury-based compound fabricated by the method comprising the following steps (a) to (d) and/or a mercury-based compound in powder form having the following general chemical formula to the metal target material:

- (a) providing a pure mineral acid or a solution of mineral acid, in a container;

- (b) adding liquid mercury to the container;

- (c) reacting the mercury and the mineral acid to form a mixture; and

- (d) drying the mixture to form the mercury-based compound in powder form,

- the general chemical formula: $M^1_aX_b$

where M^1 is selected from the group of compounds consisting of Hg, $M^x_cM^y_d$ and a combination thereof, with M^x being Hg and M^y being an arbitrary element; where X is one of halide, sulphate, nitrate and a combination thereof; and where a, b, c and d are numbers selected between 0.1 and 10; and

wherein the mercury-based compound reacts with metal target material to release energy and transmute the elements to produce low mass elements, such as hydrocarbons, and heavier elements.

14. The method according to claim 13, wherein the target material is present in at least one of a gaseous phase, a liquid phase or a solid phase of matter; and/or wherein the ratio of mass between the mercury-based compound to the target material is selected from a range of 1:100000 to 1:100; and/or wherein the mercury-based compound is added in a powder form or in the form of a slurry.

15. Mercury-based compound obtained by a method in accordance with any one of the claims 1 to 8 and/or of a mercury-based compound in accordance with claim 9 or 10 for at least one of the following, namely the production of energy, the transmutation of elements, application relating to energy, the formation of organometallic compounds for industrial and medical applications, the production of high density elements, such as Ag, Au and PGMs, the production of rare earth elements and the production of heavier elements.