CLAIMS

1. Cold gas thruster comprising:

- a tank (1) suitable for containing a solid propellant, and
- a tank heating device (4) suitable for sublimating said solid propellant and forming gaseous propellant,

wherein the tank (1) has an aperture (7) for transferring said gaseous propellant outside said tank (1),

characterized in that the cold gas thruster comprises means for measuring an amount of remaining solid propellant in the tank (1),

- said means comprising at least one tank temperature sensor (11), said means being adapted for calculating an enthalpy change when heating the tank from a temperature T1 to a temperature T2 and for comparing the obtained enthalpy value with enthalpy values in a pre-established ΔH vs mass table,
- or alternatively said means comprising a shock generator (19) configured to generate a shock, a displacement or acoustic sensor (20) in contact with the tank (1) and a frequency filter (21), said means being configured for measuring a frequency response with the displacement or acoustic sensor (20) and comparing the obtained frequency response with the frequency values in a pre-established mass vs oscillation frequency response table.

2. Cold gas thruster according to claim 1, wherein the solid propellant is selected from the group consisting of iodine (I_2), bismuth (Bi), cesium (Ce), cadmium (Cd), tin (Sn), indium (In), gallium (Ga), germanium (Ge), lithium (Li), mercury (Hg), adamantane, ferrocene, arsenic, polyvinyl chloride, polyimide, and polytetrafluoroethylene.

3. Cold gas thruster according to claim 2, wherein the solid propellant is iodine (I_2).

4. Cold gas thruster according to anyone of claims 1 to 3, wherein said tank (1) comprises a plurality of divisions (33, 37), each division (33, 37) being suitable for storing at least part of said solid propellant.

5. Cold gas thruster according to claim 4, wherein at least one division (33, 37) is at least partially filled with a binder preventing separation of propellant fractions and/or their free motion in the tank (1).

6. Cold gas thruster according to claim 5, wherein the binder preventing

separation of propellant fractions and/or their free motion in the tank (1) is made of chemically inert fibers.

7. Cold gas thruster according to anyone of claims 4 to 6, comprising at least one insert of a porous material (32) arranged within the tank (1).

8. Cold gas thruster according to claim 7, wherein the porous material is made of ceramics or metal, preferably alumina or tungsten.

9. Cold gas thruster according to anyone of claims 4 to 6, wherein each division (33) is delimited by the outer wall (30) and/or inner walls (31) of the tank (1) and wherein at least one of the walls (30, 31) defining each division (33) is in direct or indirect thermal contact with at least one tank heating device (4).

10. Cold gas thruster according to anyone of claims 1 to 9, wherein the thruster comprises a storage sealing system (40).

11. Cold gas thruster according to claim 10, wherein the storage sealing system (40) comprises a protective film (17) and an infrared emitter (16), wherein the protective film (17) is positioned in front of the aperture (7) for transferring the gaseous propellant outside the tank (1), and wherein the infrared emitter (16) is suitable for sublimating at least part of the protective film (17).

12. Cold gas thruster according to anyone of claims 1 to 11, wherein the thruster comprises an on-off valve (10) for controlling the transfer of gaseous propellant outside the thruster.

13. Cold gas thruster according to anyone of claims 1 to 12, wherein the thruster further comprises an electronic control board (12), and wherein the tank (1) is fixed directly onto said electronic control board (12).

14. Process for determining the amount of remaining propellant in the propellant tank (1) of a cold gas thruster according to anyone of claims 1 to 14, comprising the steps consisting of:

(a) Pre-heating the tank (1) at a temperature T1, wherein T1 is significantly higher than the expected temperature of the spacecraft environment,

(b) Maintaining the tank (1) at the temperature T1 for a time sufficient for the thermal inertia of the system to be compensated,

(c) Heating the tank at a temperature T2, wherein T2>T1,

(d) Calculating the enthalpy change during the heating from T1 to T2,

(e) Comparing the obtained enthalpy value with the enthalpy values in a pre-established ΔH vs mass table, and

(f) Determining the amount of remaining propellant in the propellant tank (1).

15. Process for determining the amount of remaining propellant in the propellant tank (1) of a thruster according to anyone of claims 1 to 14, comprising the steps consisting of:

(a') Disposing a shock generator (19) and a displacement or acoustic sensor (20) in contact with the tank,

(b') Generating a shock with the shock generator (19),

(c') Measuring a frequency response with the displacement or acoustic sensor (20),

(d') Comparing the obtained frequency response with the frequency values in a pre-established mass vs oscillation frequency response table, and

(e') Determining the amount of remaining propellant in the propellant tank (1).