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SHORT COMMUNICATION

ANTI GRAVITY - IS IT ALREADY UNDER OUR NOSE?

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ABSTRACT

Particles which undergo a change of state or phase transition to gaseous form by acquiring latent heat have shown a movement against the gravitational field. In this regard, upward mobility of iodine molecules under different conditions and geometries has been studied. No adequate explanation to this observation can be given with conventional laws in physics and hence a novel way of thinking is needed to explicate the behavior.

Keywords: Gravity, anti-gravity, latent heat.

INTRODUCTION

Newton (1687) was the first to realize that the force of attraction, gravity is exerted by all objects in the universe. He then showed how these objects, small or big behave under gravity and came to the conclusion that any two objects in the Universe exert gravitational attraction on each other, with the force, $F_{gravity}$ having a universal form

$$F_{gravity} = G m_1 m_2/r^2$$

where m_1 and m_2 are masses and r is the distance between two objects. The proportionality constant G is known as universal gravitational constant. The force acting between two particles in space in both electric (E) and magnetic (H) fields have the similar form of expression as the one describing the gravitational field. There is one fundamental difference existing in gravity compared to the electromagnetic field properties: there are two types of properties existing in both E and M fields, called positive and negative or north and south respectively. These entities (charge particles/magnetic poles) also behave in a similar manner: likes repel each other and unlikes attract each other; but such a dual property is not seen in gravity or in the other two fundamental forces of weak and strong interactions.

General relativity (Einstein, 1920) does not specifically recognize anti gravity as a concept. However, both general relativity and Newtonian gravity appear to predict that negative mass would produce a repulsive gravitational field. From the inception, several efforts have been underway in studying potential situations that subscribed to anti gravity type effects. From the past, scientists have been searching for a possible clue, hypothetically known as negative mass that would result in anti gravity.

There have been several attempts at interpreting the cause of gravity (Einstein, 1916; Einstein, 1920; Hawking and Israel, 1989; flandern, 1996; Qyvind and Sigbjorn, 2007) but no successful attempt has yet been made to show the opposite, the existence of anti-gravity. The object of this paper is not an interpretation of anti gravity but to demonstrate an experiment that could provide some information about particle behavior against the gravitational pull when they undergo a change of state or phase transition to gaseous form by acquiring latent heat.

We generally observe that particles move against the direction of gravitational attraction such as water vapor rising to form clouds. Although Archimedes law can be conveniently used in explaining the buoyancy of water vapor, one could ask a plausible question as to whether the Archimedes principle could strictly govern the rising of water vapor or the motion against the gravitational field. Could this be due to the motion created by a repulsive force originating at the molecules with expense of its internal energy that absorbed at the change of phase as latent heat?

This experiment was designed in order to investigate the rising of particles of a similar situation as water vapor in air but having excluded factors which were are generally believed to be the reason for the upward movement of particles: viz – buoyancy and the convection lift.

EXPERIMENTAL

A layer of iodine (126.9 amu) was slowly heat-evaporated in a vacuum ~ 10^{-5} mbar so that the evaporated iodine should be projected downwards. Then the pattern of iodine vapor deposited on a roll of paper surrounding the iodine source was observed (Fig. 1a,b).

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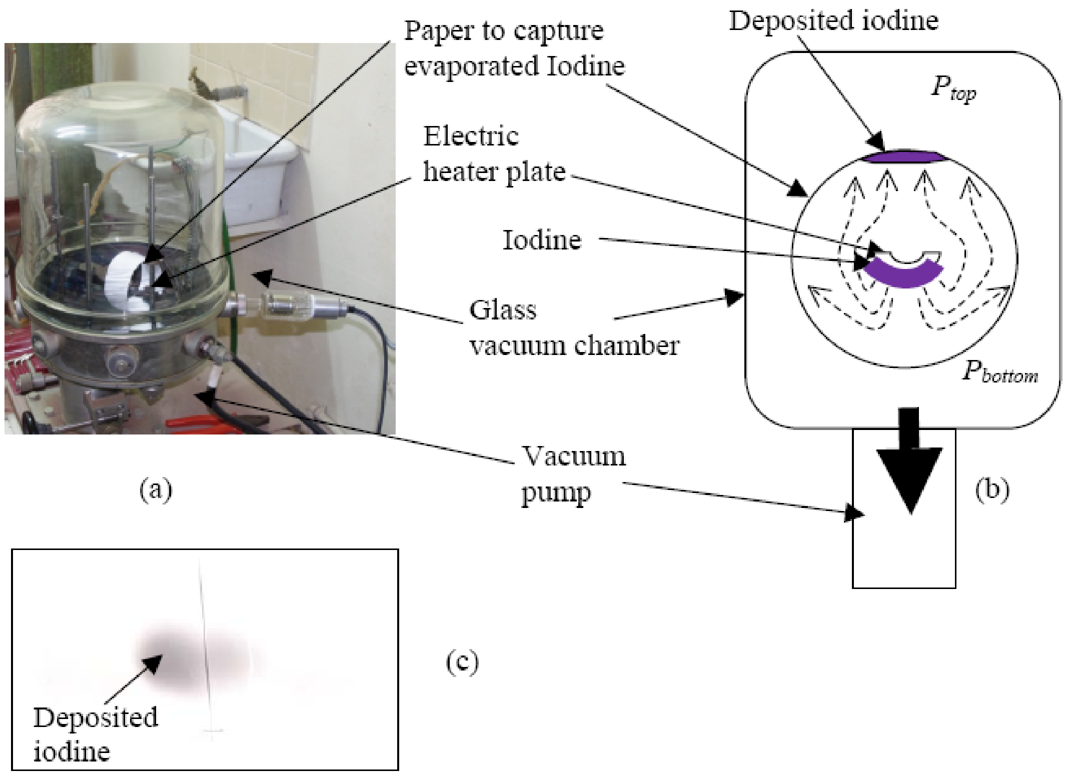

Fig. 1. Experimental set-up to observe movement of heat-evaporated iodine vapor in vacuum. (a). Vacuum deposition chamber (b). A layer of iodine was slowly heat evaporated in downward direction inside the vacuum chamber. A paper was surrounded along the iodine source in order to capture the deposition geometry of iodine. The paper was placed 50 mm radially away from the iodine source. Pressure in the chamber was ~ $1x10^{-5}$ mbar, average mean free path of an air molecule is greater than 6.6 m and air density is approximately 12.6ng m^{-3}. Pressure at the top (P_{top}) of the chamber is higher than the bottom (P_{bottom}), $P_{top} > P_{bottom}$ (c) Photograph of deposited iodine on inner top part of the paper.

OBSERVATION

Though the vaporized iodine molecules were ejected downward with a certain initial kinetic energy, interestingly, it is found that the molecules have moved upward and deposited on top surface of the encircled paper (see Fig. 1b,c). We expect gravity to act on the molecules and pull them downwards (and not up), especially as the molecules are in a vacuum, which should make the molecules deposit themselves on the lower part of the encircled paper. However, when rapid heating/evaporation of the iodine was attempted, a deposition of iodine on the lower part of the paper was observed. This could be explained by the fact that the blast heating results in a much higher kinetic energy/initial velocity of molecules and hence the downward projection and deposition.

The above experiment was performed under several geometries for further clarification.

Viz: Evaporation of iodine (a) projecting the vapor upward, (b) projecting the vapor downward under atmospheric pressure, (c) projecting vapor downward within a grounded mu-metal shield

However, the altered geometries did not affect the direction of the upward thrust (movement) of iodine molecules.

DISCUSSION

The buoyancy force causing the upward drift of iodine vapor has to be discarded due to: -
At the pressure 1×10^{-5}mbar, the system is in molecular flow region where Knudson number, Kn>1. At this region only gas – wall collisions dominate and molecules move independently of one another

The average mean free path of an air molecule (at 28^{0}C) is ~ 6.6 m and air density is approximately 12.6 ng m^{-3}; the probability of an air molecule encountering an iodine molecule is far remote. The density of iodine molecule

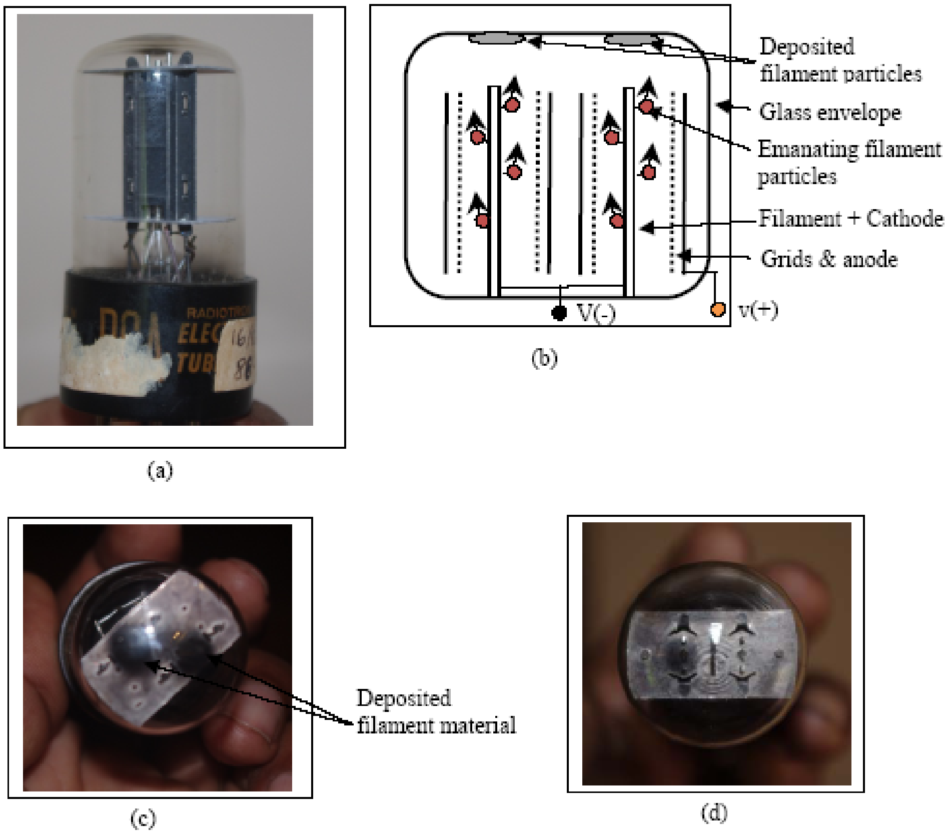

Fig. 2. Thermionic valve (a). Side view of an old thermionic valve 6SN7GTB Duo triode with two filaments (b) basic components and their placement inside the thermionic valve (c). Top view of the same old valve. The valve has been mounted in a tube audio amplifier (EICO Model HF 87) vertically as in Fig. a. It is clearly seen that thin two circular patches have been observed on top inside the glass body above the filaments. The valve was used from 26/01/71 to 16/01/88. (d) Top view of a similar type of valve. This valve is fairly new, it has only been used for several months. A mild deposit of filament material is seen on top of the left hand side filament.

(126.9 amu with atomic radius 1.4 Å) is greater than the density of average air molecule (28.57 amu with atomic radius ~1.5Å). Any lift force due to convection of moving air-molecules on iodine vapor too has to be discredited, due to the fact that no convection current could exist on such low-pressure air.

Pressure gradient (P_{top}>P_{bottom}) inside the vacuum chamber also doesn't support this upward movement because the vacuum pump is situated under the chamber and hence the lowest pressure occurs at the bottom as shown in figure 1.

We also considered the effect of ionization and space charge formation. These effects could be expected to have an influence on the net movement of iodine molecules due to the possible barrier formation. But such a barrier-effect could be ruled out as the upward mobility of iodine was observed in both geometries of upward and downwardly projected evaporation.

A thermionic valve (see Fig. 2a) in use affords us further evidence of molecules moving upward in a pressure around 10^{-7}mbar – 10^{-9}mbar. There are valves with clear glass tops in which the gutter (material which is used to keep the vacuum inside) is placed at the bottom. In such valves, when the valve is in use for a period of time, we could observe detached filament particles (Fonda, 1926) (usually tungsten/thorium, 183.84/232.04 amu respectively) on the upper region of the glass envelope (Figs. 2c and 2d). Convection currents cannot exist in such a low pressure and hence cannot be expected to carry the metal particles upward (Fig. 2b) in a valve filament placed in a vacuum. If such convection currents occur, the operation of the valve would be erratic due to the noise which is created by the bombardment of gas particles on electrodes. Furthermore the thin electron cloud surrounding the filament too cannot provide a buoyancy effect for the metal atom to move upwards. The electric field (Fig. 2b) existing between the filament and the other electrodes (anode) being perpendicular to the filament axis, cannot drift metal particles (even if the particles are ionized) upwards. Hence the electric field is also not responsible for the observed effect.

It has to be emphasized that this upward mobility of particles against gravity has been observed by us only in situations (Figs. 1b and 2b) where a change of state of the particles or phase transition to gaseous form by acquiring heat of evaporation (latent heat) in question is involved.

CONCLUSION

Now that the buoyancy force and convection force are untenable, we have to speculate the driving force behind the upward movement of particles against the gravity under vacuum conditions.

Buoyancy force and convection force being ruled out the cause of the upward mobility in the particles observed strongly suggest an unknown force, it could be Antigravity: perhaps, an avenue for further research.

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