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Academic Torrents

**“ Violation of Thermodynamic Laws By Heat Evolution**

**In Exothermic Reactions”**

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*Abstract:* *In this paper,extensive thought assumptions are reflected out on violation of thermodynamic laws where exothermic reaction are mainly dealt in which heat is evolved or liberated into atmosphere. Thermodynamics* *mostly deals with heat and energy interactions in various phases and transformations. As heat is Energy-in-transit it cannot be liberated out without certain means of vector directions and eventually cannot be stored. Heat only manifest during a change of state of a system where temperature differs during phase change. In contradiction to this some final assumptions and opinions are framed as conclusion which addresses “violation of two laws(1st & 2nd ) of thermodynamic for stating of HEAT LIBERATION IN Exothermic Reactions.”*

***Keyword:*** *Thermodynamic laws,Exothermic,Endothermic Reaction,Heat Evolution,Entropy,Convection,Radiation.*

**INTRODUCTION**

**Thermodynamics** is a branch of physics concerned with the

heat and temperature and to their relation to energy,heat and

work . It states that the behaviour of those of the variables is

subject to constraints, that are common to all the materials,

beyond the peculiar properties of particular materials and

these general constraints are expressed in the four laws of

of the thermodynamics. Thermodynamics as describes the

bulk behaviour of the body, not the microscopic behaviour

of the very large numbers of its microscopic constituents,

such molecules. Thermodynamics, as applied to heat and the

engines, was concerned with the thermal properties of their

'working materials', such as steam, in an effort to increase the efficiency and power output of engines. Thermodynamics was later expanded to the study of energy transfers in chemical processes. Thermodynamic equilibrium is one of the most important concepts for thermodynamics. The temperature of a thermodynamic system is well defined, and is perhaps the most characteristic quantity of thermodynamics. As the systems and processes of interest are taken further from thermodynamic equilibrium, their exact thermodynamically.

The zerothlaw of thermodynamics states that if two thermodynamic systems are each in thermal equilibrium with the third, then they are in thermal equilibrium with each other.Two systems are said to be in the relation of thermal equilibrium if they are linked by a wall permeable only to heat and they do not change over time. The law is important for the mathematical formulation of thermodynamics, which needs

the assertion that the relation of thermal equilibrium is an equivalence relation. If it is defined that a thermodynamic

system is in thermal equilibrium with itself.

*If a body* A*, be in thermal equilibrium with two other bodies,* B *and* C*, then* B *and* C *are in thermal equilibrium with one another.*

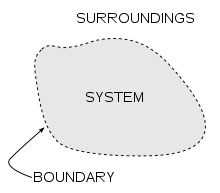
The first law of thermodynamics is a version of the law of conservation of energy, adapted for thermodynamic systems. The law of conservation of energy states that energy can be transformed from one form to another, but cannot be created or destroyed. The first law is often formulated by stating that the change in the internal energy of a closed system is equal to the amount of heat supplied to the system, minus the amount of work done by the system on its surroundings.

*The change of internal energy is the same as that for a reference adiabatic work process that links those two states. This is so regardless of the path of the process of interest, and regardless of whether it is an adiabatic or a non-adiabatic process.*

physical statement is restricted neither to closed systems nor to systems with states that are strictly defined only for thermodynamic equilibrium, it has meaning also for open systems and for systems with states that are not in thermodynamic equilibrium.

Second Law of Thermodynamics states It is impossible to extract an amount of heat QH from a hot reservoir and use it all to do work W. Some amount of heat QC must be exhausted to a cold reservoir.

The third law of thermodynamics is sometimes stated as follows, regarding the properties of systems in equilibrium at absolute zero temperature.*The entropy of a system at absolute zero is exactly equal to zero.*

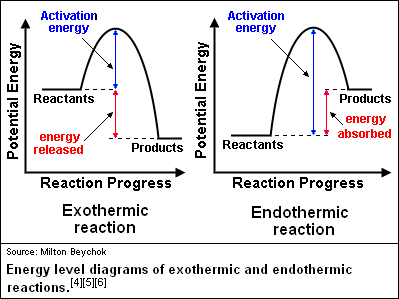


Thermodynamics distinguishes classes of systems by their boundary sectors.

* An open system has a boundary sector that is permeable to matter also to energy .Open system boundaries may be either actually restrictive, or else non-restrictive.
* A closed system has no boundary sector that is permeable to matter, but in general its boundary is permeable to energy. For closed systems, boundaries are totally prohibitive of matter transfer.
* An isolated system has only isolating boundary sectors. Nothing can be transferred into or out of it.

An exothermicreaction is a chemical or physical reaction that releases heat. It gives net energy to its surroundings. That is, the energy needed to initiate the reaction is less than the energy that is subsequently released. The absolute amount of energy in a chemical system is difficult to measure or calculate. A bomb calorimeter is very suitable for measuring the energy change,of a combustion reaction.

ΔH = energy used in bond breaking reactions − energy released in bond making products.



The term endothermic process describes a process or reaction in which the system absorbs energy from its surroundings .A chemical bond requires energy (just as stretching a spring until it breaks requires energy). Forming a chemical bond will release energy. So in a reaction that releases heat (called an exothermic reaction), there must be net bond formation. If you look at the equation for dissolving a strong acid like HCl in water,

|  |  |  |
| --- | --- | --- |
| HCl(conc) | H2O http://antoine.frostburg.edu/chem/senese/images/longrightarrow.gif | H+ (aq) + Cl-(aq) |

Exothermic refers to a transformation in which a system releases energy (heat) to the surroundings, expressed by

*Delta(s)> 0*.

Exothermic reactions may occur spontaneously and result in higher randomness or entropy of the system. They are denoted by a negative heat flow (heat is lost to the surroundings) .

**Limitations:**

**1.**As explained by 1st law of thermodynamics ,Heat is one form of energy which can only be transformed from one to other which needs a medium to get transfer.When it transfers from one to other it needs to be similar to Conduction,if it is transferred from ie.Solid to Atmosphere which are at nearly same temperature then liberation of heat can’t be possible.So to get heat evolution there must be a far more temperature difference in both bodies.

If the above statement is not true ,then it is violating 1st law of thermodynamics as it says heat can only change from one form to other but can’t be destroyed.

2. Heat is energy in transit (ie.Only observed when it is transformed) if in that case heat as an form of energy must not be liberated in exothermic reactions which violates the statement of transits state.

3.Heat is a path function ,in such a case it is generally considered as vector function having both direction and magnitude which can be measured .According to exothermic reaction ,when heat is released then it should have a direction in which it is liberated and total heat liberated must be accurately calculated without losses. But this can’t be done because there is no such a device which can calculate heat released when open in atmosphere generally.

4. Heat is a form of energy that can’t be stored but if it gets liberated freely during exothermic reactions then it can be captured and stored.But the sensible heat content can’t be preserved and if there is no sensible heat there is no transfer of heat .Then in exothermic reaction according to this there is no liberation of heat.

5. If we assume heat is liberated while exothermic reaction into the atmosphere ,and if the atmospheric temperature is more than the temperature of heat which is liberated then according to the principles of heat flow the flow of heat must be from higher temperature gradient to lower temperature gradient then exothermic reaction heat liberation can’t be predicted.

6. In the case of heat liberation from Sun,let us consider exothermic reactions are taking place and but the transfer of that heat is by radiation.But in exothermic reaction in different phases there must be evaluation of heat by convection.In plasma the heat is transferred and delivered in the form of radiation.This also stated the heat liberation in exothermic reactions are questionable.

7. According to the existence of thermodynamics the foundation of 1st law and 2nd law came into existence where the relation of zeroth law was founded far after the two laws which relates the temperature relationships in various thermal equilibriums.

8. First law of Thermodynamics drawbacks:

In first law of thermodynamics, it doesn’t indicate direction of heat through which when a exothermic reaction takes place it is not possible to tell the way liberation of heat taken place.

While heat is converted to work from an exothermic reactions there is no specific data of different parameters like temperature, pressure, any composition changes.

9. In the case of work when converted to heat ,it can totally converted with careful design of different parameters.But if heat is to be treated to convert completely into work like(ie. Perpetual motion machine) is not possible as some heat must be dislodged to atmosphere as loss,same as in exothermic heat liberation heat can’t be evolved or liberated which is governed by above statement.

**Conclusion:**

Depending on the various aspects of thermodynamic relations and assumption we came to a assumption that there may be need to revieve in the statement of Exothermic heat liberation where heat is liberated when exothermic reaction takes place as it may violates many laws of thermodynamics especially and severely the path and discussion on energy in transits are the two cases where exothermic heat liberation is not qualified or not governed according to the laws that are contributing in various .In the case of Endothermic reactions the flow of heat is know and when the heat is needed then it is supplied from external means but in the case of exothermic reactions heat liberated can’t be depicted as we don’t know nothing about the coordinates of heat liberation if both temperatures are same.

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