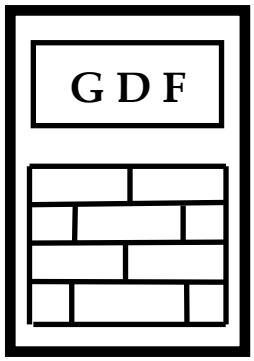
GDF DATA BANKS BULLETIN



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Content

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Isothermal gradient calorimeter. I. Basic principles.

Calorimetry is the analytic system based on measurement of heat associated to a transforming process. Due the fact that any transformation process is associated with a caloric effect, calorimetry has a universal value among analytic techniques. In addition, calorimetry evidences the so-called polarity of transforming processes, namely their endothermal (endo) or exothermal (exo) property. The time-evolution of the heat absorbed (endo) and/or released (exo) by the specimen under test, reveals the kinetics of transforming process essentially characterized by its nature and amplitude. There are a lot of calorimetric systems most of them adapted to particular transforming processes, but they are classified in two important categories: isothermal and non-isothermal depending on the imposed temperature regime to the specimen under test. Adiabatic calorimetry is a particular system belonging to the non-isothermal ones [1,2]. In general the overall external surface of the tested specimen is considered as being always having the same temperature in every point of it in all calorimetric systems. This surface is called as equipotential like in electric circuits because temperature is considered also a thermodynamic potential like electric potential. The shape and dimensions of specimen holder is adapted for each particular case and designed in view to realize this equipotential condition.

Isothermal Gradient Calorimeter (IGC) intentionally violates this rule in view to evidence the variation of process kinetics connected to non-uniformity in structure of the specimen resulted in particular operating and/or processing conditions imposed to the tested sample. Concrete mixtures were the main examples imposing IGC as analytic technique because during their hardening as a result of cement hydration some of ingredients separate in the gravitational field, so the overall kinetics differs more or less along the specimen height and this can be directly correlated with the final structure and properties. It results that IGC can be used as an important technique for optimization sample structure, processing and/or operating conditions of the initial sample receipt/composition.

Thorough studies carried out also by isothermal calorimetry on cement hydration evidenced the nature of cement and water [3], but these are not completely useful for practical purposes. IGC can reproduce the operating and processing conditions of the concrete mixtures.

Cone trunk and cone as specimen shapes are considered in the following able to evidence the differences of process kinetics along their height.

Figure 1 shows the main geometry parameters defining the final dimensions of the cone trunk of specimen holder.

Figure 2 shows the main geometry parameters of the initial plane sheet of metal for design of cone trunk.

Figure 3 shows the particular shape, geometry parameters and dimensions for complete cone as specimen holder with the top angle of 60 degrees.

Figure 4 shows the main assembly of the specimen holder described in Figure 3. There are marked the eight positions of calorimetric sensors along the height of the specimens denoted as A to H.

References

[1] G. Dragan, Adiabatic calorimetry–summary description of the demo prototype, GDF Databanks. Bull., 12(3), 2008.

[2] G. Dragan, Adiabatic calorimeter as high accuracy T-calibrator, GDF Databanks. Bull., 18(1), 2014.

[3] G. Dragan, Studies on cement hydration by High Resolution Mixing Calorimetry (HRMC), GDF Databanks. Bull., 14(1), 2010.

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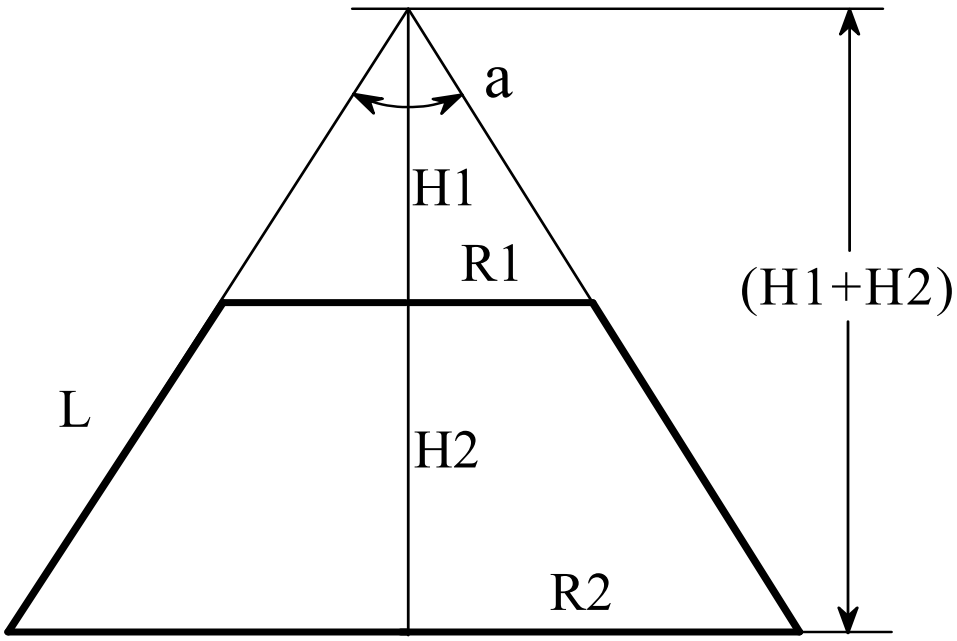
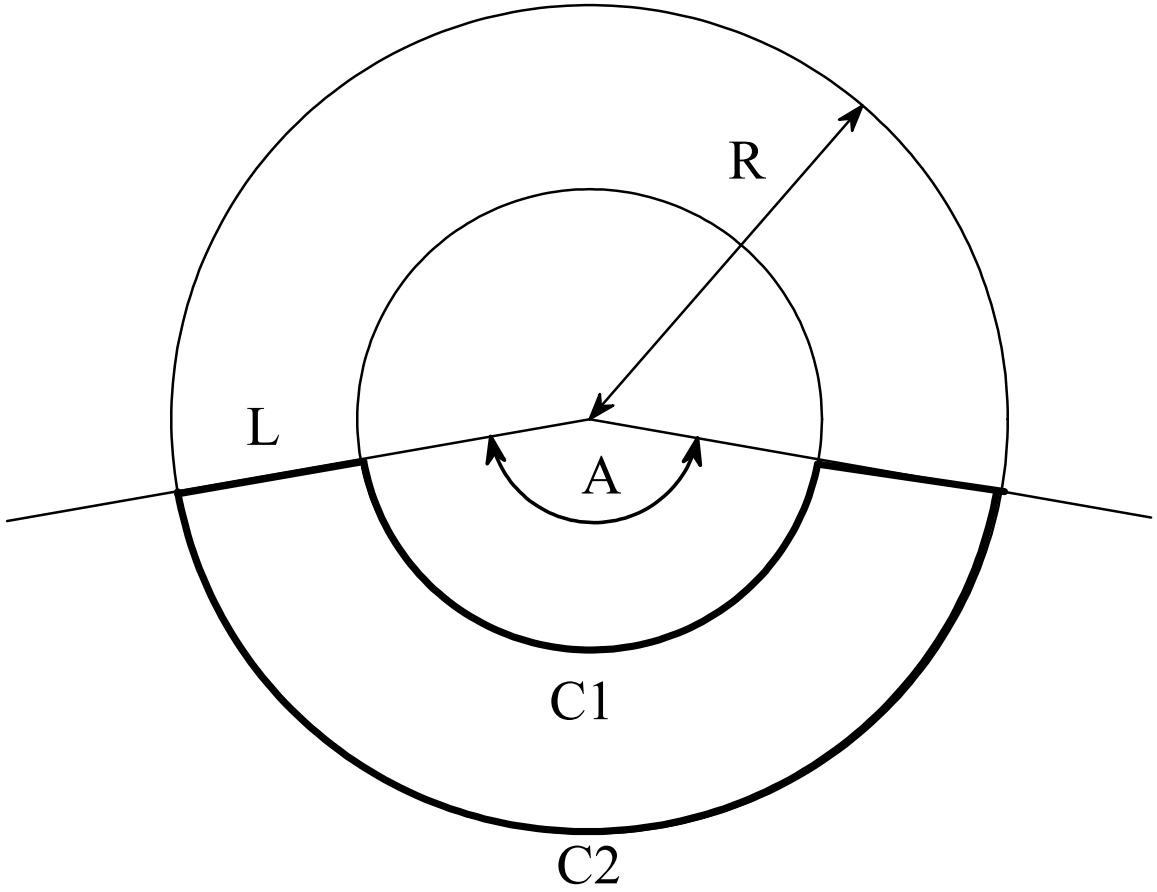


$$V2 = V-V1$$

$$V = (Pi/3)*(R2)^2*(H1+H2)$$
$$V1 = (Pi/3)*(R1)^2*H1$$
$$tg(a/2) = R1/H1 = (R2-R1)/H2$$
$$H1/R1 = (H1+H2)/R2$$
$$H1 = H2*R1/(R2-R1)$$

$$V2 = (Pi/3)*(R2*(H1+H2)^2-R1*H1^2) =$$
$$= (Pi/3)*(H2^2)*(R2^3-R1^3)/(R2-R1) =$$
$$= (Pi/3)*(H2^2)*(R2^2+R1*R2+R1^2)$$

Figure 1. Cross section of the original cone and the resulted cone trunk as the general specimen holder of Isothermal Gradient Calorimeter.



C1 = 2*Pi*R1
C2 = 2*Pi*R2
A = 360*C2/(2*Pi*R)
= 360*R2/R; [deg]
R = R2*(360/A)
L = (R2-R1)/sin(a/2)
a = 2*arcsin((R2-R1)/L)

Figure 2. Planar design of cone trunk (see Figure 1 for symbol significances).

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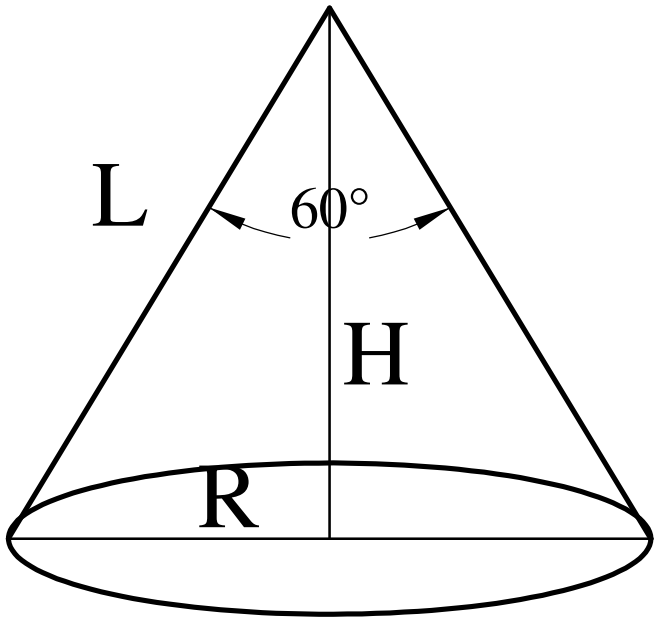
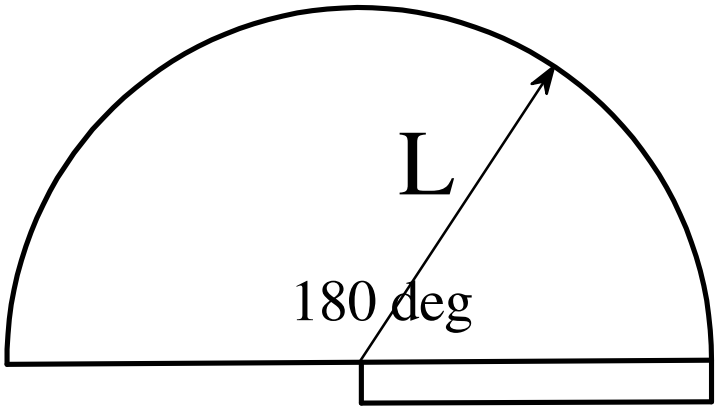


a

L = H/cos(30 deg) = 1.155*H
H = 400 mm, L = 462 mm
R = L*cos(60 deg) = L/2 = 231 mm
Volume = 3.14*(R^2)*H/3 =
= 3.14*(tan(30 deg))^2*H^3 = 22.34 liters



b

Figure 3. Particular dimensions of cone specimen holder (a) and its initial plane design on the sheet of metal (b).

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Figure 4. Main assembly of particular cone specimen holder.
Details in Figure 3 and described in text.

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Water – review of some particular properties

Thorough studies on water and aqueous solutions revealed their composite structure even in liquid state [1], namely the co-existence of amorphous phase responsible for solution processes strongly connected with a crystalline phase remaining unaffected. The linkage of the two phases was established to be similar as in organic polymers involving an inductive element responsible for mutual coupling [2] and with human mind [3]. Several original analytical techniques were used in these studies, but calorimetric systems brought basic structural information, especially high resolution mixing calorimetry [4]. Calorimetry appears as a universal measuring system because all transformation processes are associated with heat effects. In particular, adiabatic calorimetry evidences important structural data for equilibrium and non-equilibrium (phase transitions) conditions. Unfortunately, experimental difficulties limit its applications and "easy going" attitude is more and more evidenced in actual scientific communities. Specific heat of liquid water (Figure 1) reveals a strange dependence on temperature with minimum values around 34.5 ^{o}C corresponding to the human body temperature and for almost all mammalians. At first sight specific heat is proportional with degrees of freedom of kinetic units, but it is pretty difficult to make this correlation taking into consideration water composite structure. It would be useful to compare the data banks of Cp(T) for different aqueous solutions of electrolytes and their analysis according to the topoenergetic principles. For the moment, solubility data of a series of relative electrolytes in water gathered in the IUPAC series [5] are useful. Figures 2-6 show selections of five alkali chlorides from which the specific transition temperatures To can be estimated. This transition is connected to the structuring effect of alkali metals in water [1]. Figure 7 shows the linear dependence of To on their ionic and atomic radius. These results must be further analyzed by more accurate experiments in view to establish exact structural details of water and aqueous solutions.

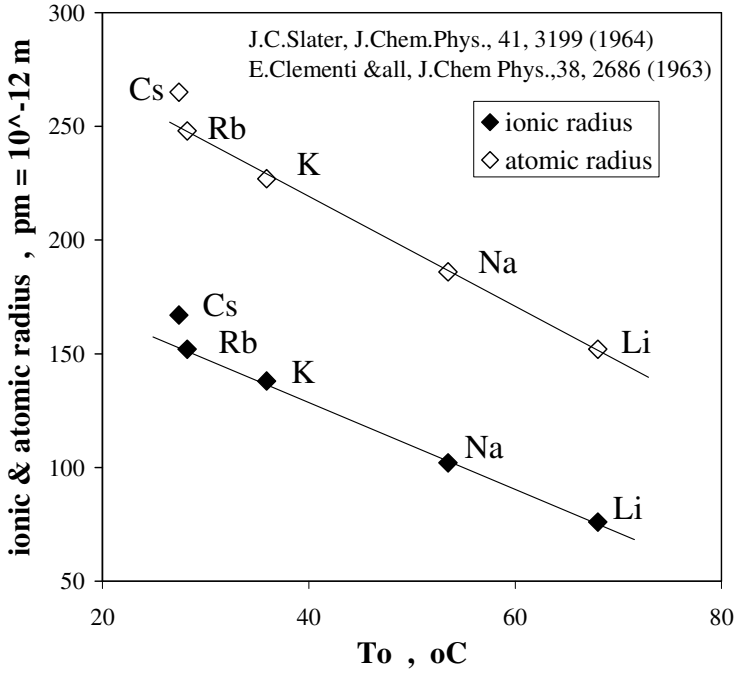

Figure 7.

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[2] G. Dragan, Amorphous-crystalline coupling in polyethylene. IX. Study of the transforming branches by step calorimetric system, Rev. Roumaine Chim., 26(9,10) , 1315-1326 (1981).

[3] G. Dragan, Evidence of human mental field by ac-electric conductivity in electrolyte solutions. 1. Bio-energy, GDF Databanks Bull., 19 (6), 2015, and papers cited therein.

[4] G. Dragan, High resolution mixing calorimetry redivivus. IV. Specific heat of crystalline phase of water, GDF Databanks Bull., 19 (7), 2015, and papers cited therein.

[5] IUPAC Solubiliy Data Series, vol.47, J.W.Lorimer editor-in-chief, Pergamon Press, 1991.

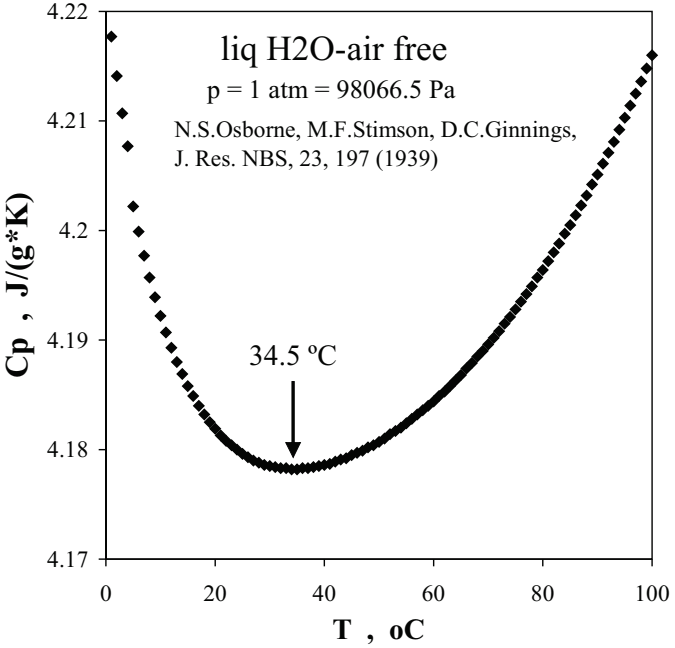

Figure 1`.

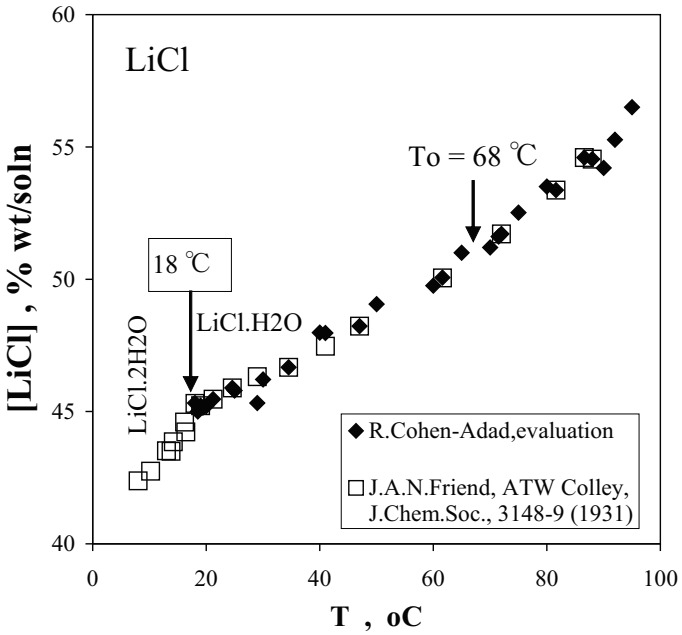

Figure 2.

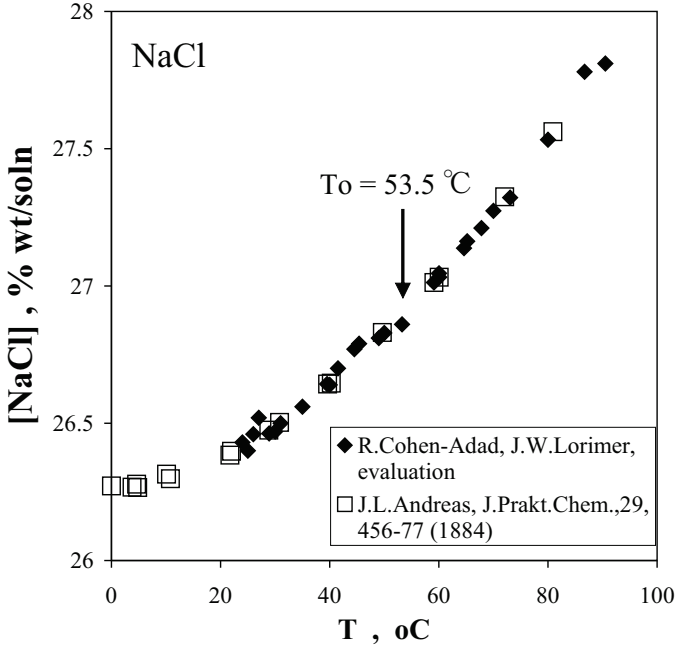

Figure 3.

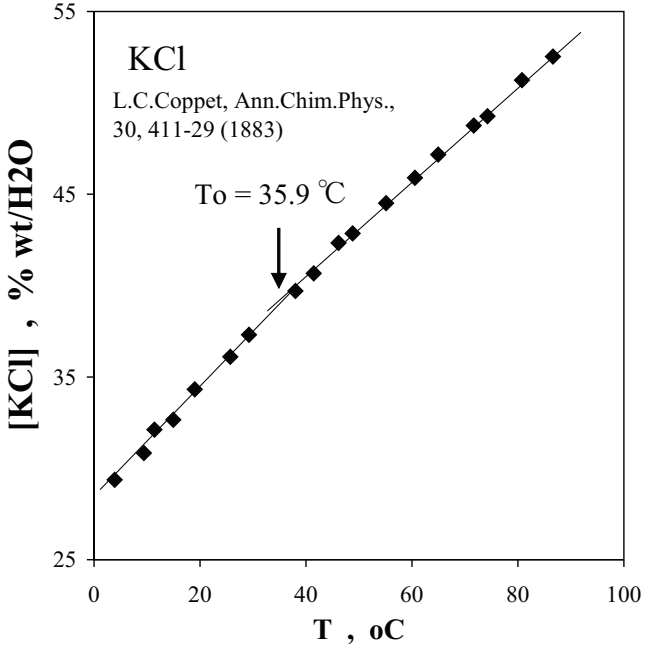

Figure 4.

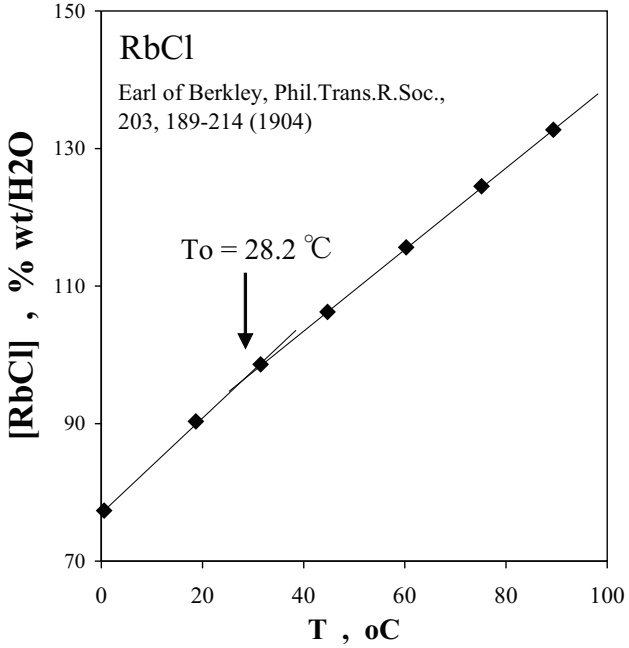

Figure 5.

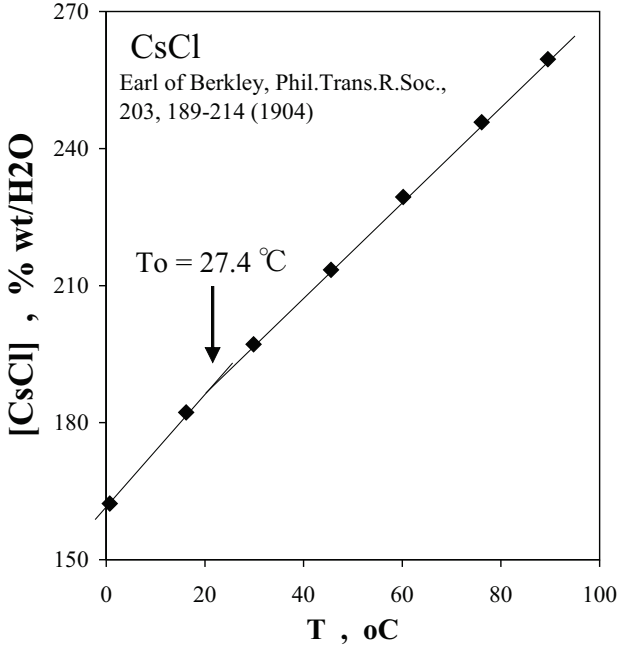

Figure 6.

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Chapter 1

Foreword

Miguel de Cervantes Saavedras:
„*Experience is the mother of all sciences”*

My deep concern is that the present book will not affect in any way human society, although I tried to point out arguments about the next imminent nuclear conflict mainly caused by continuous and accelerated degradation of human mind in direct correlation with uncontrolled growth of population. Survivors will be only ones with properly prepared minds. These two facts are striking evidences for any one, no matter education and place on the planet Earth. The solution I propose is to permanently testing and improving our mind. Its name is HuPoTest I experienced and developed continuously for more than 50 years. Human mind is our “crazy horse” which no individual succeed to completely master during entire life. The main problem is not that there are bad guys and good guys, but it is practically impossible to know them. The only solution is to take care of our own mind. After a long and intense experience face-to-face on a large variety of individuals with HuPoTest, I established that there are 4 main categories: (i) dominating; (ii) dominated; (iii) independent and (iv) not able to perform HuPoTest. The results are not available for ever, because they can transform instantly between them (flip-flop character). The first two are dependent each other, permanently involved in conflicts up to crime and suicide. The independent ones avoid any conflict and live in honest conditions. People not able to perform HuPoTest have their minds dominated by destructive emotions. Human mind is in permanent activity, so that conscious activity is perturbed by emotions. This is the main point of the present book: to reveal the composite structure of human mind by the existence of the active component involved in coherent thinking and an inert one perturbing the conscious activity.

I invite any one who will decide to try HuPoTest to contact me for help without any obligation.

Bucharest, February 2019

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1997	1	2	Guide of good practice in metrology (Romanian)	AFI
1998	2	1	Editorial: socio-psychological implications in creation and utilization of a databank (Ioan-Bradu Iamandescu); Behavior in vapor-liquid equilibria (VLE): I. Structural aspects; Behavior in vapor-liquid equilibria: II. Several structures in databanks; Symposium on VDC-4 held on 30 October 1997 at Lubrifin-SA, Brasov (Romania).	F
1998	2	2	Practical course of metrology (Romanian)	AFI
1998	2	3	DIFFUTOR-01: Thermally driven diffusion in pure metals	AFI
1998	2	4	VAPORSAT-01: Databanks of thermally driven VLE. The first 100 simple molecules	AFI
1999	3	1	Editorial: New trends in material science: nanostructures (Dan Donescu) DIFFUTOR: Databanks of diffusion kinetics. VAPORSAT: Databanks of vapor-liquid separation kinetics.	F
1999	3	2	Discussions on Applied Metrology	AFI
2000	4	1	Editorial: Laboratory accreditation and inter-laboratory comparisons (Virgil Badescu) Doctoral Theses – important data banks. GDF intends to open new series of experiments on thermo-physical properties. Some comments on uncertainty: global budget and DFT analysis. Events: The 9th International Metrology Congress, Bordeaux, France, 18-21 October 1999.	F
2000	4	2	Measurement and Calibration.	AFI
2001	5	1	Editorial: Metrology ensures moral and technological progress. Topoenergetic aspects of amorphous-crystalline coupling. I. Composite behavior of water and aqueous solutions (paper presented at nanotubes and Nanostructures 2001, LNF, Frascati, Rome Italy, 17-27 October 2001). Events: Nanotubes and nanostructures 2000.School and workshop, 24 September – 4 October 2000, Cagliari, Italy.	F
2001	5	2	Editorial: Viscosity – a symptomatic problem of actual metrology. Visco-Dens Calorimeter: general features on density and viscosity measurements. New vision on the calibration of thermometers: ISOCALT® MOSATOR: Topoenergetic databanks on molten salts properties driven by temperature and composition.	F
2002	6	1	MOSATOR-01: Topoenergetic databanks for one component molten salts; thermally driven viscosity and electrical conductance.	AFI
2002	6	2	Editorial: HuPoTest - Operator calibration or temporal scale psychic test. MOSATOR: topoenergetic databanks of one component molten salts; thermally driven viscosity and electrical conductance.	F
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2003	7	1	Editorial: Time – an instrument of the selfish thinking. 1st NOTE: Homoeopathy: upon some efficient physical tests revealing structural modifications of water and aqueous solutions. I. Mixing experiments.	F
2004	8	1	Metrological verification and calibration of thermometers using thermostats type ISOCALT® 21/70/2. Metrological verification and calibration of thermometers using thermostats type ISOCALT® 2.2R.	F
2004	8	2	Aspects of correct measurements of temperature. I. measurement of a fixed point according to ITS-90. Physics and Homoeopathy: some physical requirements for homoeopathic	F

			practice.(Plenary lecture at the 19th SRH National Congress, 21-22 September 2004, Bucharest, Romania)	
2005	9	1	AWARD for ISOCALT® at the International Fair TIB-2004, October 2004, Bucharest. ISOCALT® 3/70/21 was awarded in a selection of 20 products by a commission of experts from the Polytechnic University of Bucharest. Upon some aspects of temperature measurements. (12th International Metrology Congress, 20-23 June 2005, Lyon, France)	F
2005	9	2	A new technique for temperature measurement and calibration. National Society of Measurements (NSM). Important warning for T-calibrator users: MSA has chose metrology well calibrators from Fluke (Hart Scientific).	F
2005	9	3	Universal representation of Cancer Diseases. 1. First sight on NSW-2003 report. Universal representation of Cancer Diseases. 2. UK cancer registrations on 1999-2002. Vital Potential can estimate our predisposition for cancer diseases.	F
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2018	22	4	Definition and assignment of some global uncertainties of measurements, 9th International Metrology Congress, Bordeaux, France, 18-21 October 1999, pp. 353-356. HuPoTest - errors originating from software HuPoTest – seven week mental training during Ortodox Easter Fasting. I. New rules for more realistic and efficient measurements.	F
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2019	23	1	HuPoTest – up to date history HuPoTest – operating instructions HuPoTest – significance of calculated parameters HuPoTest – composite structure of mind	F
2019	23	2	Estimation of global warming by differential calorimetric procedure. II. Experimental results over 2018	F

2019	23	3	Composite structure of human mind. HuPoTest results on 5 weeks of fasting before Christmas 2018	F
2019	23	4	Interaction of unpolarized capacitors with Human Mental Field and Bio-Fields. XI. Results obtained over 2018. Book launch: Composite Structure of Human Mind	F
2019	23	5	Interaction of unpolarized capacitors with Human Mental Field and Bio-Fields. XII. New results obtained over 2018. Book launch: Composite Structure of Human Mind	F
2019	23	6	Composite structure of human mind. HuPoTest results on 7 weeks of fasting before Orthodox Easter 2019 Book launch: Composite Structure of Human Mind	F
2019	23	7	Eurovision song contest, Tel Aviv, Israel, 18 May 2019 Book launch: Composite Structure of Human Mind	F
2019	23	8	HuPoTest – 4 weeks of self evaluation, training and additional instructions Book launch: Composite Structure of Human Mind	F
2019	23	9	Composite human mind and composite human society (43rd Congress of American Romanian Academy of Arts and Sciences, ASILOMAR Conference Grounds, Pacific Grove, CA, USA, 15-17 November 2019) Book launch: Composite Structure of Human Mind	F
2020	24	1	Left-Right Bio-Balance: Calorimetric approach of human mental state I. Introductory principles and experimental details. Book launch: Composite Structure of Human Mind	F
2020	24	2	Composite structure of human mind. HuPoTest results on 5 weeks of fasting before Christmas 2019 Global warming and human mentality Book launch: Composite Structure of Human Mind	F
2020	24	3	Left-Right Bio-Balance: Calorimetric approach of human mental state II. Results on male persons under test. Book launch: Composite Structure of Human Mind	F
2020	24	4	Interaction of unpolarized capacitors with Human Mental Field and Bio-Fields. XIII. Results obtained over 2019. Book launch: Composite Structure of Human Mind	F
2020	24	5	Estimation of global warming by differential calorimetric procedure. III. Experimental results over 2019 Book launch: Composite Structure of Human Mind	F
2020	24	6	Structural aspects of temperature phase transition in PTC-thermistors. I. DC electric measurements Book launch: Composite Structure of Human Mind	F
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2021	25	1	Structural aspects of temperature phase transition in PTC-thermistors. II. Combined DTA and electric measurements Book launch: Composite Structure of Human Mind	F
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2021	25	4	Structural aspects of temperature phase transition in PTC-thermistors. IV. Topoenergetic structure of hysteresis behavior Book launch: Composite Structure of Human Mind	F

*) F=free, AFI=ask for invoice.

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ERRATUM:

VOL.	NO.	place	CORRECT
15	2	Figure 5	P-
15	3	page 5, row 7 down-to-up	x = 0.2
22	3	Figures 4-6	Values of dTc and exchanged heat must be divided by 10
22	6	Figure 4	-N^2/M values are negative; See Figure 8 and comments in issue 23(3)
23	1	Figure 5	
23	1	HuPoTest-significance of calculated parameters	(yo, Δb)<0, Δa>0: slow reaction (yo, Δb)>0, Δa<0: impulsive reaction

I encourage readers to advice me any observation.

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