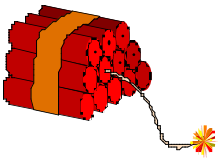


SEKTIONEN FÖR DETONIK OCH FÖRBRÄNNING
www.sdfsweden.se
The Swedish Section for Detonics and Combustion
affiliated with *The Combustion Institute*
(www.combustioninstitute.org)

NEWSLETTER 3/2017
2017-11-08

Fredsteknik/Peace Technology

Säker hantering och lagring av vapen och ammunition

Hans Wallin

Det är ett obligatoriskt åtagande att förvara vapen och ammunition, så att de inte kommer i händerna på obehöriga. FN:s medlemsstater har rätten att själva bestämma den storlek på sina lager av ammunition och vapen som bäst passar för landets nationella försvar och säkerhetsändamål. Varje nation har vidare rätten att själv utforma den lagstiftning och det regelverk som skall tillämpas inom landet.

Handel av vapen och ammunition regleras av FN:s Arms Trade Treaty, ATT.

Ett annat obligatoriskt åtagande är att under lagrens hela livslängd förvara vapen och ammunition på ett sätt som förhindrar att de stjäls eller förskingras. Det är också nödvändigt att ha ett reviderbart system samt att upprätthålla ett system för spårbarhet under lagrets hela livstid. Vidare är det också obligatoriskt att bevara tekniska data och tekniska specifikationer tills det att ammunitionen förstörts. Slutligen åligger det staterna att demilitarisera överskott av vapen och ammunition medelst miljömässigt korrekta och långsiktigt hållbara metoder.

IATG:s internationella riktlinjer för ammunition (IATG) ger grundläggande kunskaper om hur man hanterar och administrerar lagren med ett reviderbart och transparent system.

Medlemsstaterna måste också engagera sig i att undvika nationella och gränsöverskridande konsekvenser på grund av stöld eller förskingring ur dåligt förvaltade lager av ammunition och vapen.

Arms Trade Treaty

Arms Trade Treaty (ATT), som reglerar den internationella handeln med konventionella vapen från handeldvapen till stridsvagnar, stridsflygplan och krigsskepp trädde i kraft den 24 december 2014.

Ansvarig för utveckling och publicering av ATT och International Ammunition Technical Guidelines (IATG) är FN:s kontor för nedrustning av konventionella vapen (UNODA).
All information, riktlinjer och utbildningsmaterial kan nås via Internet och är redan översatt till många språk och antalet språk växer ständigt.

Situationen i Sverige

Också Sverige påverkas idag av insmugglade automatiska vapen och handgranater som kommer från dåligt förvaltade ammunitionsförråd i främst före detta Jugoslavien.

För närvarande används vapnen för inre gängkrig, men en eskalering av användningen medför ökande risker för civila och för polispersonal. Skjutningar mot en villa, som ägs av en

polisman, har nyligen inträffat och rubriceras som mordförsök. Sverige måste snabbt vända utvecklingen innan våldet eskalerar ytterligare.

Ett internationellt problem

Dagens problem med terrorister och avancerade brottslingar som använder militära vapen understryker behovet av förbättrade lagringsutrymmen och förbättrad inbrottstålighet, kombinerat med avancerat parameterskydd. Militära vapen och ammunition måste förvaras på sådant sätt, att de inte kommer i orätta händer eller kan förskingras.

Förutom risken för okontrollerad spridning av vapen och ammunition finns en påtaglig .....

Risk för massdetonation i ammunitionslager

Ur ett globalt perspektiv inträffar årligen flera massdetonationer, ofta med katastrofala konsekvenser för anställda och kringboende. Orsaken till explosionerna är oftast sönderfall av nitrocellulosakrut när stabilisatorerna förbrukats. Risken för självantändning ökar vid högre utomhustemperatur.

Skyddsteknisk kontroll av ammunition nödvändig

Varje stat bör fastlägga rutiner för skyddsteknisk kontroll av ammunitionslager för att minska risken för självantändning och felaktig funktion hos den lagrade ammunitionen.

Cesium AB levererar inbrottssäkra förråd och transportcontainers för vapen och ammunition

Cesium AB, som grundats och ägs av uppfinnaren Jack Gustavsson, erbjuder olika patenterade lösningar som bidrar till att skapa en säkrare värld. Mobile Safety Vault-systemet,(MSV), som består av en serie inbrottsskyddade produkter, erbjuder en serie stora och små förråd, transportcontainer och dörrar för säker förvaring.

Example of a well-protected, modern weapon storage.

Referenser

For information in English, visit http://www.cesium.se/local/site/files/Cesium-eng.pdf

ATT Arms Trade Treaty
https://www.un.org/disarmament/convarms/att

IATG International Ammunition Technical Guidelines
https://www.un.org/disarmament/un-saferguard/guide-lines/

Kontakter

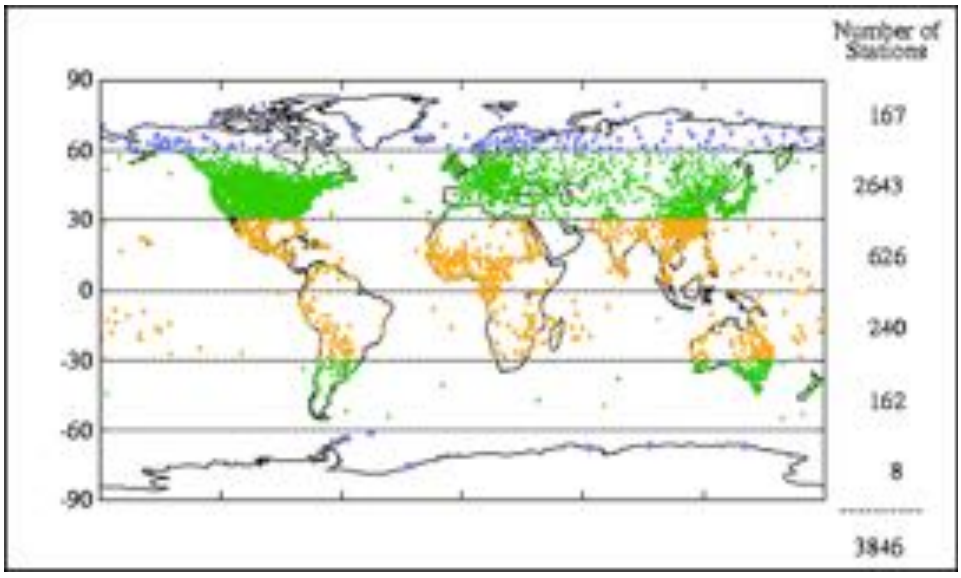
Peter.Adolfsson@cesium.se, tel +46 78337138. Hans.Wallin@cesium.se, tel +46 725863884

Climatology

Editor: Dr T. Lindblom

(Changing the title of this series from AGW – *Antropogenic Global Warming* – to *Climatology*, we want to emphasize that SCIENCE has to rein and that "A" as well as "GW" may be conclusions but not immutable facts to be considered in truly scientific search for efficient and usable effect-and-cause hypotheses and models.)

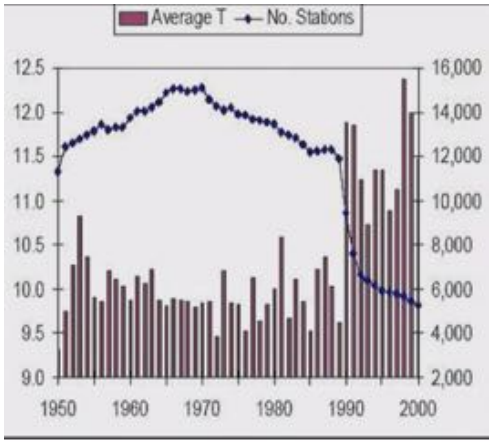
A central quantity in the climatology work is *temperature*, T, wich is a global average temperature from 3846 measuring stations (the diagram shows a higher number; date difference unknown, but the downward trend must have been continued):



That the measuring task is not that simple is pointed out on the website *www.appinsys.com/GlobalWarming*:

"*Average surface air temperatures are calculated at a given station location based on the following procedure: record the minimum and maximum temperature for each day; calculate the average of the minimum and maximum. Calculate the averages for the month from the daily data. Calculate the annual averages by averaging the monthly data. (Various adjustments are also made, so it is not actually that simple.),*

In addition to the extensive problem of sparseness, the network has also been historically constantly changing – the number of available temperature reporting stations changes with time. The so-called "global" measurements are not really global at all. The coverage by land surface thermometers slowly increased from less than 10% of the globe in the 1880s to about 40% in the 1960's, but has decreased rapidly in recent years."



A diagram that invites to the interpretation that T depends on the number of stations rather than on "global warming".

Among unbiased facts relating to the central quantity of T – which on one hand is an effect of a cause to be found, and on the other a cause of climate changes, a cause the details of which also has to be found – the following are given in "Contemporary World Atlas, Rand McNally, 1978, p. 95 ("*Extremes of temperature and rainfall of the Earth*"):

Highest temperature ever recorded (*n.b.*, up to 1978): 58.0 °C, Libya, Africa ,14 September 1922.

Lowest temperature ever recorded: -52.7 °C, Vostok, Antarctica, 24 August 1960.

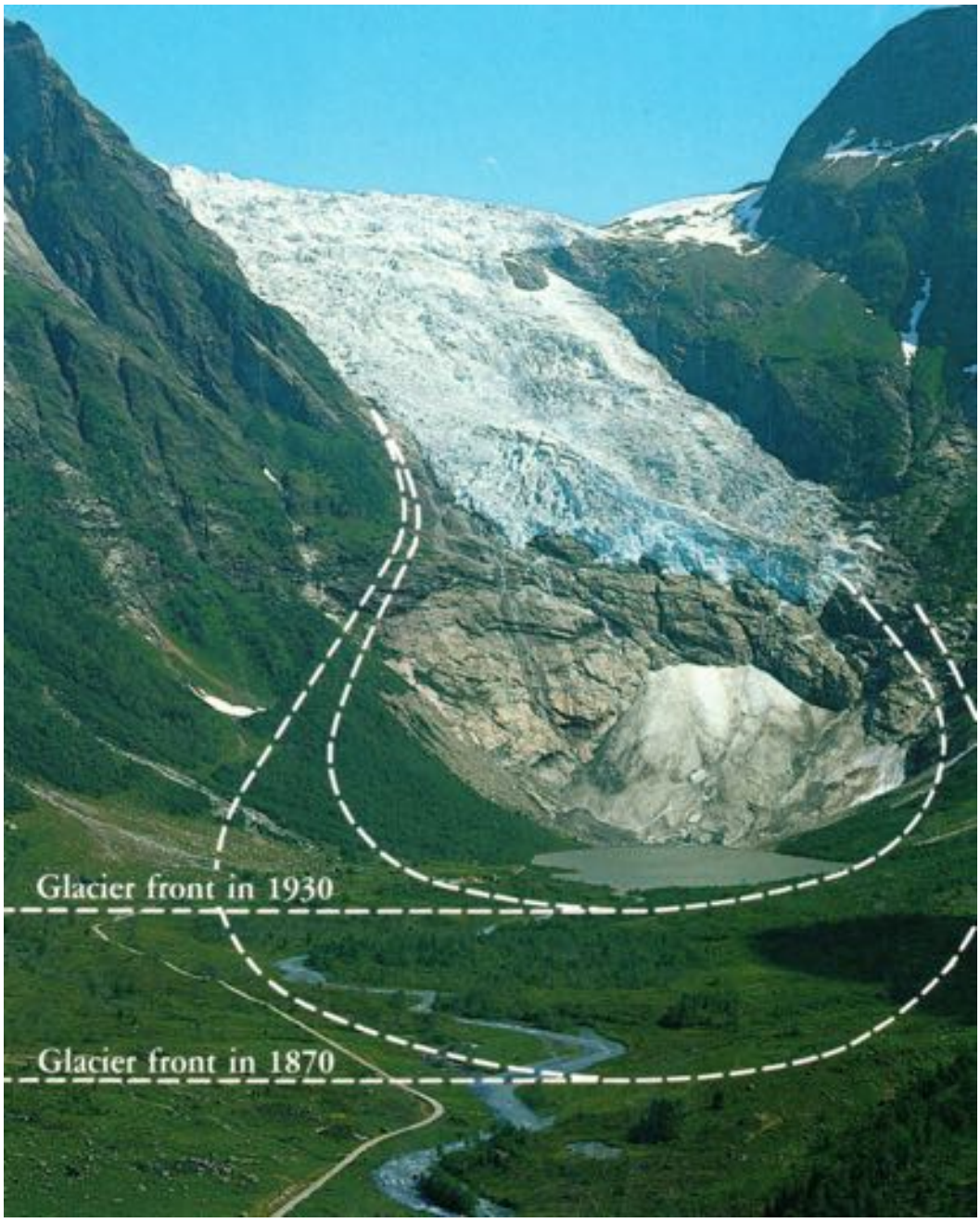
Highest mean annual temperature: 31 °C, Lugh Ferrandi, Somalia.

Lowest mean annual temperature: -19 °C, Vostok, Antarctica.

The world's record for a 24-hour rainfall: 76 in = 1.9 meters, Réunion Island, Indian Ocean, 15-16 March 1952.

A 1 month rainfall of 366 in = 9.35 meters was recorded for July 1861 at Cherrapunji, India, and 131 in = 3.35 m fell during 7 consecutive days in June 1931. The average annual rainfall at Cherrapunji is 450 in = 11.5 m.

A lucid and graphic "effect" of what T can "cause" is past time glacier area variation. The photograph below shows how the Bøyabreen glacier in Fjærland Sogn, Norway, has continually shrinked from 1870 to 1930 and to present time. This time span, Δt, indicates that the T *vs*. t relation involved has been going on for a long time. A hypothetical cause of the temperature increase since the unusually cold seventeenth century – the Little Iceage – is continuous rewarming, the cause(s) of which are not fully established.



PEP-history. 5.

Turning metals into gold was, according to the alchemists, an easy task. All one needed for the purpose was a special stone, but it was a stone no one had seen nor been able to lay hands on. It was hypothetical, or "philosophical" as the term ran in those days, and accordingly named Philosophers' Stone.

If anyone could come by this stone, gold would, of course, be of little value. But in the hands of alchemists only, "know how" kept secret can be as precious. Sovereigns financed gladly alchemists and alchemistry labs, hoping to win the arms race – mercenary troops were expensive.

It appears that the alchemists believed that the precious stone they were looking for concealed itself in urine. (It would be interesting to learn where this curious idea came from!)

In the 12th century, the Arab alchemist Alchid Bechir discovered phosphorus when he distilled urine together with clay, chalk and carbon. He named it *carbunculus*. Four centuries later, Paracelsus got the same result and called it "the element of fire".

The final discovery was made in 1674 or 1675 by Henni(n)g Brand(t) (which accidentally happens to mean "fire" in English) of Hamburg in Germany, referred to as the last alchemist. He used the same method as Bechir and distilled large amounts of urine from cows in a well-filled cow-shed nearby. He called the substance "light bearer", *i.e.*, *phosphorus*, but also at times "my fire".

Thus, Brand was not the first discoverer of phosphorus, only the first to name it, nor, probably, the last alchemist. However, it was due to him that the "philosophers' stone" became a commercial "gold maker" – not least as far as matches are concerned –, but in a truly chemical way: pyrotechnics.

As to "the last alchemist", one reads in a 2015 Prague tourist booklet: "*The Viennese professor Uhde lived on Golden Lane around 1830 and was known for being slightly off center. He would wear a long black coat and had a long white beard. He was constantly trying to develop a stone of wisdom and one night his lab suffered an explosion and created a fire. The professor suffered a stroke and he died with a smile while holding a nugget of pure gold.*"

An alchemy laboratory in the 17th century. Oil painting by Thomas Wijck.

"The Alchemist in search of the Philosophers' Stone" (1771) by Joseph Wright depicting Hennig Brand discovering phosphorus (the glow shown is exaggerated).

Chemical Mathematics. No. 22.

Continuing the theme of No. 21, here follows another reaction formula study to illustrate that even such a fundamental – and apparently uncomplicated – method as the one for reaction formula writing may help us notice not that apparent details of a chemical system. In addition to a possible better understanding of what is going on, communicating the work may gain in clarity.

At the *12th International Pyrotechnics Seminar* 1987, a thorough study of the boron/potassium dichromate was presented. DTA curves showed two exothermic reactions, the first occurring at 440 °C, a second at 700 °C.

The first reaction was supposed to be:

$$2\ B + 2\ K_2Cr_2O_7 \xrightarrow{440\ ^\circ C} 2\ K_2CrO_4 + Cr_2O_3 + B_2O_3 \qquad \text{R 1a}$$

(or with "physical-world" information added:

$$2\ B(s) + 2\ K_2Cr_2O_7(s) \xrightarrow{440\ ^\circ C} 2\ K_2CrO_4(s) + Cr_2O_3(s) + B_2O_3(s). \qquad \text{R 1b.}$$

The melting point of B_2O_3 is 460 °C. At 242 °C, the following transition occurs:

$K_2Cr_2O_7(tricl) \rightarrow K_2Cr_2O_7(monocl)$,

which perhaps may be of interest to consider in view of the Hedvall Rule stating increased reactivity at transition points.)

The initial-state composition of R 1 is 3.5 % (mass fraction most likely), which means stoichiometric equivalence (3.50 m-% gives the mole fraction 0.324:0.328 – one should be observant of the number of significant digits).

In order to check whether R 1 is Grand Rule obedient or not (*cf*. No. 1 in M 1/2003 – or Chapter 1 in "*Elementary Chemical Mathematics*" talked about in N 3/2016), the "*donac"* method provides the answer:

$$K_2Cr_2O_7 \rightarrow K_2CrO_4 + Çr + 3\ O \qquad \text{R 2}$$

$$2\ B \rightarrow 3\ O \rightarrow B_2O_3 \qquad \text{R 3}$$

$$2\ Cr + 3\ O \rightarrow Cr_2O_3 \qquad \text{R 4;}$$

$2 \cdot$ R 2 + R 3 + R 4 gives R 1 and nothing more (stoichiometric coupling; one Cr^{+6} remains in that state, the other is reduced to Cr^{+3} after having oxidized B(0) to B^{+3}).

In the second and consecutive process (not "reaction" yet!), the chromate formed at 440 °C reacts with excess boron, if any: "*The products of ignition of 5 % mixture were found to be potassium chromate and chromic oxide*". Thus, "ignition" must be R 1. But with excess boron, there must be more products and "the second reaction stage" could be a poly-process: "*analysis of the ignition products from higher boron content mixes indicated borates and borides*".

Assuming *meta*borate, $K_2B_2O_4$, and potassium boride, K_3B, the second, high-temperature process becomes B, $K_2CrO_4 \xrightarrow{700\ ^\circ C} Cr_2O_3, K_2B_2O_4, K_3B$ P 1.

The donac method helps us get the reaction(s) into order:

$$2\ K_2CrO_4 \rightarrow Cr_2O_3 + 4\ K + 5\ O \qquad \text{R 5}$$

$$2\ K + 2\ B + 4\ O \rightarrow K_2B_2O_4 \qquad \text{R 6.}$$

Cancelling K gives:

$$2\ K_2CrO_4 + 4\ B + 3\ O \rightarrow Cr_2O_3 + 2\ K_2B_2O_4 \qquad \text{R 7.}$$

Similarly we get:

$$6\ K_2CrO_4 + 4\ B \rightarrow 3\ Cr_2O_3 + 4\ K_3B + 15\ O \qquad \text{R 8.}$$

Finally, cancelling O gives the P 1 mono-reaction:

$$8\ K_2CrO_4 + 12\ B \xrightarrow{700\ ^\circ C} 4\ Cr_2O_3 + 5\ K_2B_2O_4 + 2\ K_3B \qquad \text{R 9.}$$

The *total* process from the initial 440 °C state, S_0, through the final 440 °C state, S_1, and ending in the final 700° C state, S_∞:

B, $K_2Cr_2O_7 \rightarrow Cr_2O_3, B_2O_3, K_2B_2O_4, K_3B$ P 2,

is a process best described by two *consecutive* mono-reactions, R 1 and R 9.

(If you wish to learn about structured reaction formula writing, proceed to the "Literature" section below.)

Explosives and Pyrotechnics Market Forecast

The following piece of information was received from *Grand View Research, Inc*., San Francisco, CA, U.S.A.:

"The global explosives market is expected to reach USD 31.95 billion by 2024. The global explosives and pyrotechnics market is expected to grow significantly over the forecast period on account of increasing use of the product in construction and mining activities.

Further key findings from the report suggest:

- Coal mining was the largest application within the mining sector accounting for 49.8% of the volume in 2015.
- Consumer pyrotechnics accounted for 36.2% of the global volume in 2015 and is expected to grow on account of increasing demand for recreational fireworks, model rocket motors, and powder-actuated nail guns."

The Combustion Institute

Important Announcements

Started in 2016, the **Hiroshi Tsuji Early Career Researcher Award** is given every year to recognize an early career researcher who has made a significant contribution to advance their field of research, which should fall under the broad umbrella of fundamental or applied combustion or combustion-related fields. Download the **Call for Nominations** for more information regarding nominations and applications.

The **Call for Nominations** for the **2018 Board of Directors** election has been released. Every two years, The Combustion Institute membership has the opportunity to nominate and elect new directors for six-year terms from a slate of candidates assembled by the Board of Directors Nomination Committee and approved by the CI President. The **Call for Nominations** provides instructions for submitting complete nomination packages. CI Section organizations and individual members are encouraged to self-nominate or nominate qualified colleagues to play a key role in guiding the future of The Combustion Institute. Nominations of combustion industry candidates are particularly encouraged.

Additionally, the Elsevier website is open to accept submissions. The deadline is 23:59 PST 30 November. The submission url is ees.elsevier.com/proci. Authors will need to login using their existing Elsevier account details or create an Elsevier account. They can contact the CI Office if they have any difficulties. It is best to create accounts early and not wait until the very end as the system will slow down as submissions arrive in the last 24 hours.

2018

01-13--15 International Conference on Thermology (ICT 2018).
Sanya, China. phy.feb@engii.org. Tel: 86 132 6470 2250.

Among the topics to be covered are:
Thermodynamic process , Thermodynamic system, Engineering thermodynamics,
Chemical thermodynamics, Atmospheric thermodynamics, Thermal properties,
Heat transfer specific, Thermal fluids machinery, Heat exchangers, Thermal management,

Power plants and power generation, Computational heat transfer, Environmental heat transfer, Fire and combustion heat transfer.

01-28--31	44th Annual Conference on Explosives & Blasting Technique. San Antonio, Texas USA.
04-18--20	New Trends in Research of Energetic Materials (NITREM 2018). Pardubice, Czeck Republic. www@ntrem.com.
06-26--29	49th International Conference of the Fraunhofer ICT. Karlsruhe, Germany. www.ict.fraunhofer.de.
07-08--13	43rd International Pyrotechnics Seminar. Fort Collins, Colorado, USA. www.ipsusa-seminars.org.
07-14	Workshop on Pyrotechnic Combustion Mechanisms. Fort Collins, Colorado, USA.
07-29--08-03	37th International Symposium on Combustion. . Dublin, Ireland. Further details: CombustionSymposia.org.

Education and Training

Sverige

KCEM. För aktuella konferenser och kurser, se www.kcem.se.

FOI. Grundkurs i explosivämneskunskap. http://www.foi.se.

Del 1: Nynäsgården 2018-03-19--23. Föreläsningar, grupparbeten, räkneövningar.

Del 2: 2018-04-09--12. FOI Grindsjön. Praktiska moment på skjutfält.

Anmälan senast 31 januari till sofia.sandstrom@foi.se.

Kursavgift SEK 44 000.

U.K.

University of Leeds. www.leeds.ac.uk.

The Royal Military College of Science. www.rmcs.cranfield.ac.uk.

U.S.A.

(Message from) **Franklin Applied Physics.** info@franklinphysics.com.

"Electro Explosive Devices – Functioning, Reliability and Hazards." Dates are January 22-26. The place will be Oaks, Pennsylvania, U.S.A.
Topics covered will include explosions, explosive trains, safe-and-arm mechanisms, EED construction, EED applications, EED firing, inadvertent ignition, electrostatic discharge (ESD) accidents, lightning, radio frequency (RF) hazard, testing EEDs, test statistics, explosive chemistry, detonation, applications of detonation, propellants, pyrotechnics, storage/shipment, history, and resources."

International Society of Explosives Engineers. Visit https://www.isee.org/ for the society's newsletter *Explosives Industry News*.

Literature

A 2nd edition of "*Elementary Chemical Mathematics*" (*cf.* N 3/2016) has been published by AuthorHouse (no slip of the pen slip required so far!). The book can be ordered at Amazon and Bokus websites. Remaining copies of the DanagårdLITHO edition (SEK 275 + mail) are donated to The Section, so purchases will mean financial support to our so far fee-less organisation. Orders by e-mail are welcome to the secretary/author.