ISASINDIA Newsletter

Volume 19, No 6 *June 2019*

EDITORIAL

ISASINDIA Newsletter **is an electronic newsletter brought out by Indian Society of Analytical Scientists and aims at providing a news and events roundup on analytical science and technology from across India . This newsletter will appear three times a year, and will aim to cover items of interest to the analytical scientists , members of ISAS and far beyond.**

News items relevant to analytical scientists, from across the world , reports on the various activities of ISAS, articles on analytical science written by experts in various analytical techniques, environmental monitoring, etc. will be covered in this e-newsletter which aims to showcase the wide range of analytical science activities being run across the country.

We hope this information will encourage even greater involvement by our members in the activities across the country and help in promoting R&D in Analytical Science and Technology to the benefit of science and technology in general and analytical science in particular.

We would welcome any feedback you may have on this newsletter and its content. Please contact the Editor with any comments.

Editorial Committee

Message from President-ISAS

As a very useful and practical measure, to promote regular interactive communications, with and amidst the Members of ISAS, and as a forum for dissemination of useful information, the EC of ISAS has embarked on this ISAS News Letter, thanks to the vision of Dr VR Nair, Past President, Patron and Chief Technical and Organisational Advisor to ISAS.

I wish that all the Members of ISAS will find it very interesting, and regular contributions to the News Letter are invited, which will be considered for inclusion in the News Letter, based on their Content, Quality and Purpose as decided by the Editor.

I wish a great level of acceptance and popularity for the ISAS News Letter.

(Sd)

(Dr. P. P. Chandrachoodan)

Mumbai

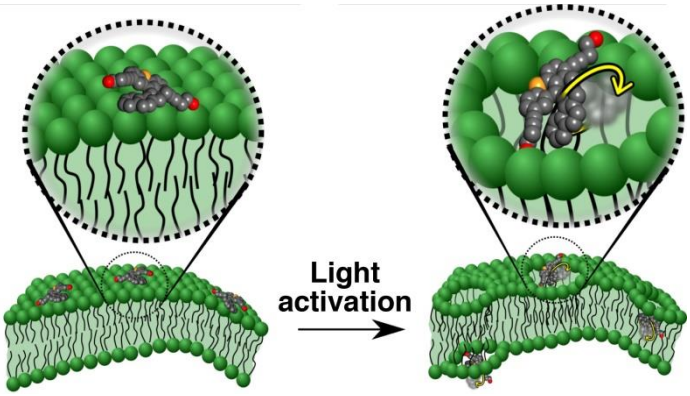
24/06/2019

About ISAS

The Indian Society of Analytical Scientists (ISAS), was established in1983 at Bhabha Atomic Research Centre, Mumbai with the aim of dissemination of scientific information in the field of Analytical Sciences. This professional body of analytical scientists in India is engaged in assessing and analysing the impact of measurement sciences on industry, academy, R&D and community. ISAS has more than 2500 life members and 13 chapters spread all over India. Over the years, ISAS has organized more than 35 national and international conferences on various topics of interest to the scientific community, which were all very well attended by leading professionals from India and abroad. ISAS is committed to raise the level of knowledge and expertise of the entire community of analytical scientists in our country. In conformity with its mission to strengthen analytical sciences through an integrated strategic agenda of research and development(R&D), human capital and infrastructure, ISAS has been organizing conferences / workshops / seminars, etc. and promoting analytical science education in India.

LATEST NEWS

Motorized molecules driven by light have been used to drill holes in the membranes of individual cells and show promise for either bringing therapeutic agents into the cells or directly inducing the cells to die.



New Executive Committee of ISAS

Results of the Election held for electing new office bearers of ISAS for the period 2019-22 was declared in April 2019 by the Chairman of Election Committee ,Dr K K A Rashid as per details given below:.

INDIAN SOCIETY OF ANALYTICAL SCIENTISTS

(*Registration No.Bom/213/83 with GBBSD under Societies Regn. Act 1860*
Bom/F/8521/83 under Bombay Public Trust Act 1950)

Website: www.isasindia.com/ email:isaskerala@gmail.com

ISAS ELECTION 2019-2022- RESULTS

List of elected office bearers of ISAS HQ for the period 2019-2022

Post	Name	LM No
President 1 post	Dr P.P.Chandrachoodan	2288
Vice President 4 posts	Dr Raghaw Saran	0503
	Dr Pradeepkumar	1328
	Dr Daisy Joseph	0531
	Dr Rajeev Raghavan	2187
Hon.Secretary 1 post	Dr D.K.Singh	0890
Joint Secretary 2 posts	Shri S.Arun Kumar	2291
	Dr V.Babu	1919
Treasurer 1 post	Dr P.Unnikrishnan	1929
Joint Treasurer 1 post	Dr P.K.Sharma	0442
Committee Members 11 posts	Dr Sara Khalid	1068
(Only 5 valid nominations Received)	Smt. Bhuvaneswari	1067
	Dr Roopa Bose	0811
	Dr M. Anitha	0889
	Prof(Dr) P.V.Joseph	2278

Dr K K A Rashid

Chairman-ISAS Election Committee 2019

E mail: isaselection2019@gmail.com;Phone:08848216195

Aluva

1st April 2019

The new EC under the presidentship of Dr P.P. Chandrachoodan took over charge on June 15th,2019 at ,4.00 PM in a function held at IMA House, Kochi.

The following members were co-opted to the EC by the new committee.

1.Dr Vijayalaxmi Adya LM 1023

2.Dr Suneetkumar Yadav LM 2152

3.Prof. S.Sriman Narayan LM 0128

4.Prof K. M. Veerabhadran LM 0496

5.Shri N. Kalyan LM 0321

6.Dr Suresh Bahadur Singh LM 0546.

Handing over Charge to new president

EC Meeting in Progress

NEW EC MEMBERS

Dr. P P Chandrachoodan- President

Dr Raghaw Saran
Vice President

Dr Pradeep Kumar
Vice President

Dr Daisy Joseph
Vice President

Dr R Rajeev
Vice President

Dr D K Singh
Hon. Secretary

Shri Arun Kumar
Joint Secretary I

Dr V Babu
Joint Secretary II

Dr.P Unnikrishnan
Treasurer

Dr P K Sharma
Joint Treasurer

DR VIJAYALAXMI ADYA

EC MEMBER

PROF(DR) P.V.JOSEPH

EC MEMBER

DR S.B.SINGH

EC MEMBER

PROF(DR) SRIMAN NARAYANAN

EC MEMBER

PROF(DR) K M VEERABADRAN

EC MEMBER

DR S.K.YADAV

EC MEMBER

SMT BHUVANESWARI

EC MEMBER

DR ROOPA BOSE

EC MEMBER

SHRI N KALYAN

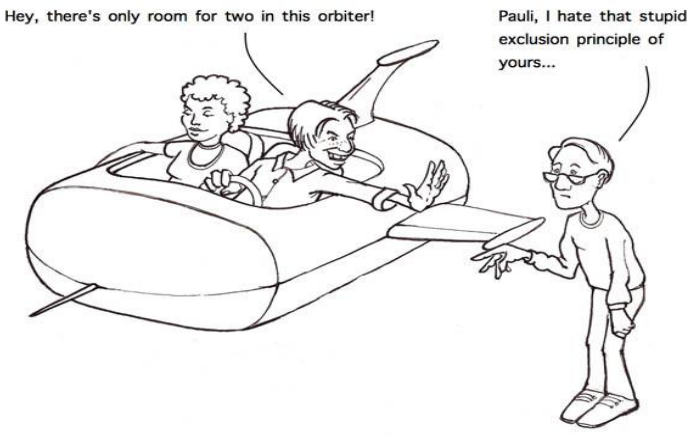
EC MEMBER

DR SARA KHALID

EC MEMBER

DR M ANITHA

EC MEMBER



EVENTS

SEMINAR ON ANALYTICAL TECHNIQUES FOR ENVIRONMENTAL MONITORING AND MEASUREMENTS

A Seminar on analytical techniques for environmental monitoring and measurements was organized at the Seminar Hall of the School of Environmental Studies , Cochin University of Science and Technology, Kochi 682022 on 15th June 2019 at 09.00 Hours. Dr K. N. Mahusoodanan, Vice Chancellor, CUSAT inaugurated the seminar. Dr K K A Rashid ,Chairman, ISAS Kerala Chapter presided over the inaugural function. Prof V.Sivanandan Achari, Director, School of Environmental studies welcomed the participants and Prof(Dr) P.V. Joseph, Vice Chairman-ISAS Kerala Chapter proposed vote of Thanks. Shri S.K. Malhotra-President ISAS , Dr P.P. Chandrachoodan - President Elect-ISAS and Dr Daisy Joseph – Secretary addressed the participants. Talks were delivered by Shri S.K. Malhotra, Dr A.N. Rajan and Dr R. Rajeev. Around 100 delegates participated in the seminar.

Prof(Dr) K. N. Madhusodanan VC, CUSAT Inaugurating the seminar

A view of the audience

PRESENTING A MEMENTO TO THE CHIEF GUEST

NEW EVENTS

INDIAN ANALYTICAL SCIENCE CONGRESS 2019 (IASC 2019)

THEME : RECENT ADVANCES IN ANALYTICAL,

BIO-ANALYTICAL AND SEPARATION TECHNIQUES

ORGANIZED BY: ISAS HQ & ISAS KERALA CHAPTER

VENUE: HOTEL APOLLO DIMORA,THIRUVANANTHAPURAM ,KERALA

DATE: 19-21, SEPTEMBER 2019

Indian Society of Analytical Scientists(ISAS) is organizing **Indian Analytical Science Congress 2019** *(iASC-2019)* during **September 19-21st, 2019** at **Thiruvananthapuram, Kerala State, India**. We cordially welcome researchers, academicians, students and business professionals in the field of Analytical , Bio-analytical and related areas from different part of India to participate in the upcoming conference. .thus relaying the most cutting edge findings in the field of Analytical and Bio-analytical Research

iASC-2019 will be an excellent knowledge building event in the field of Analytical & Bio-analytical and Separation Techniques. It will provide a platform for the presentations and exposures of recent trends and advances of the research work and will bring together leading academicians, scientists, technologists, researchers and research scholars and enable them to exchange and share their experiences and research results on all aspects of Analytical & Bio-analytical and separation techniques. Furthermore, it is an opportunity to join the national

community in your field of interest and experience. This year the conference will be highlighting the theme "***Recent Advances in Analytical, Bioanalytical and Separation Techniques".***

Organizers of iASC-2019 invites you to take this opportunity to join us in this conference to be held at Hotel Apollo Dimora, at Thiruvananthapuram, Kerala State, India.

We look forward to seeing you in Thiruvananthapuram, Kerala State, India.

TOPICS

- Chromatography
- Spectroscopic Techniques
- Thermal analysis
- Microscopic techniques
- Hyphenated Techniques
- Crystallography
- Catalysis and Adsorbents
- Environmental Analytical Chemistry
- Analytical Biotechnology
- Separation Techniques
- Regulatory Issues and Biosafety Challenges in Bioanalysis
- Electrophoresis
- Proteomics
- Forensic Analysis
- Pharmaceutical Analysis
- New Instrumentation and Equipment
- Green Analytical Chemistry
- Novel Approaches to Analytical and Bioanalytical Methods
- Analytical Methodologies
- Bioanalytical Methodologies
- Process Analytical Chemistry
- Analytical technique for Clinical Applications
- Analytical techniques for Space Science and Technology
- Analysis of nanomaterials
- Analysis of polymer and polymer composites
- Radioanalytical Chemistry
- Nuclear Analytical methods
- Applications of Laser and Plasma Techniques

An electronic version of the abstract should be e-mailed to the Chairman, IASC 2019 before August 1st, 2019. E-mail:isascongress2019@gmail.com / isaskerala@gmail.com

Chairman Local Organizing Committee

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Convener - Local Organizing Committee

Shri. Rakesh Ranjan, Scientist

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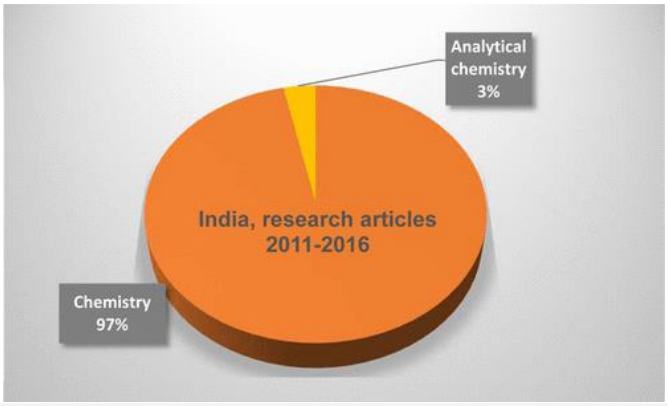
Conference Website: www.isasc2019.in

ANALYTICAL CHEMISTRY IN INDIA



Relative to many other areas in chemistry, analytical chemistry appears singularly lagging behind in India despite the commendable growth it had shown in the past both in teaching and research. Certain presumptions in policy making and current educational practices are believed to be the crux of the problem.

LEADING BY EXAMPLE: GOING GREEN IN THE LAB

03 Jun 2019

Taken from the June 2019 issue of *Physics World*.

With so much research focused on creating technologies that reduce our collective carbon footprint, the embarrassing realization that research labs themselves are some of the worst environmental offenders is only now starting to sink in. Benjamin Skuse examines the problem and what is being done to solve it

(Courtesy: Clockwise from top left: Harvard University; University of Cambridge; University of Bristol; My Green Lab; UBC)

Walk into the clean, sterile environment of a typical laboratory, with equipment neatly arranged and work spaces clearly delineated, you would be forgiven for thinking it is the model of efficiency. But look closer and you might be surprised.

Take the fume hood, which is used to suck hazardous fumes away. If left open, as is common, it can consume as much energy as 3.5 homes over the same period. What about that line of ultralow-temperature freezers across the wall? Many of these are unnecessarily cold, often storing only a few or even expired samples, and each one uses as much energy every day as an average home over the same time.

"Research labs consume 10 times more energy and at least four times more water [per unit area] than office spaces," says Allison Paradise, founder of the Californian non-profit organization, My Green Lab. "And they are estimated to throw away around 5.5 billion kilograms of plastic annually worldwide, which is enough to cover an area 23 times the size of Manhattan [59.1 km^2] ankle-deep."
At least part of this is a necessary evil. Many labs require air-conditioned environments running 24/7, and contain specialist equipment that is unavoidably energy- and water-hungry. And with experiments often producing hazardous or contaminated waste, single-use plastic remains key to maintain safety. Even theorists shouldn't feel smug: supercomputers may be key to doing calculations and simulations that were previously impossible, but they consume a lot of energy and resources, with the world's current fastest device – Summit in the US – requiring 17,000 litres of water a minute to keep it cool.

But this doesn't mean nothing can be done. Paradise set up her lab-sustainability organization in 2013 after an epiphany about her time working in a biomedical research lab. "I was taught to leave equipment on all the time 'just in case'," she recalls. "I never once questioned this at the time, and it wasn't until years later, after I'd already left the lab, that it occurred to me that leaving equipment on overnight can be wasteful and is largely an unnecessary use of resources."

Having since dedicated her career to improving the sustainability of research, Paradise aims to change scientists' attitudes towards energy, water and waste through My Green Lab. This means looking at every aspect of how research is conducted: from retiring old, inefficient freezers to considering different ways to commute to campus, such as carpooling.

My Green Lab offers three main solutions for science to be more green. One is a recognized standard for laboratory sustainability, to which more than 200 labs across North America have signed up. There's an eco-label for laboratory products like a food nutrition label that provides clear, transparent information about environmental impact. Finally, it offers an energy star rating for one of the worst carbon offenders in the lab – those ultralow-temperature freezers.

Upgrading labs and attitudes

But the effort to support labs becoming more environmentally friendly is not just a North American endeavour. One of the most active institutions is the University of Bristol in the UK. In reaction to its students' concerns about their future, Bristol recently declared a "climate emergency" and pledged to become carbon neutral by 2030. Key to achieving this goal will be the efforts of Bristol's labs, which occupy only 6% of the university's space yet account for 40% of the total energy, water and waste. They will be encouraged to upgrade buildings and use smart technologies to improve energy efficiency, such as automatically turning off lights when nobody is in a room. Researchers will also have to change how they behave when they are in the lab. "There is no point in having efficient lab equipment and waste-management processes if lab users aren't on board," says Anna Lewis, the university's sustainable labs officer.

Key culprit: Fume hoods that are left open can use the same amount of energy over a given period as 3.5 homes. (Courtesy: iStock/gevende)

The most striking example of these efforts occurred last year, when the university's entire Biomedical Sciences Building – consisting of 25 teams and more than 170 individual labs – gained a 100% Green Lab Accreditation, a UK-recognized badge of sustainability achievement. The award was earned through a range of actions, including replacing energy-inefficient laboratory kit, introducing a lab-equipment sharing system, and implementing lab plastic recycling and reuse schemes. All told, these efforts resulted in a £85,000 cut in the university's energy bill over two years.

Bristol is now working with other UK universities to develop a successor to the Green Lab Accreditation called the Laboratory Efficiency Assessment Framework (LEAF). Much like the Green Lab Certification in North America, or the UK's own S-Lab Awards – which has been honouring international labs for green laboratory design, management and operation since 2012 – the LEAF accreditation will be given based on various lab sustainability criteria, such as procurement, waste, equipment and ventilation. Crucially, however, the programme also produces metrics on savings – in terms of both carbon and cash – to allow baselines, targets and measures to be developed. With LEAF being piloted in 16 UK universities this year, Lewis says, "The government and the public expect greater transparency and responsible spending from universities – LEAF provides a tool and a means to do this." While the School of Physics at Bristol had previously not applied for any green lab awards, it has signed up for LEAF.

Other global initiatives are also helping by "gamifying" lab sustainability. For example, in the Freezer Challenge, labs are awarded points for reducing their freezer energy demands, while Shut the Sash is a competition that started in 2005 to combat the high energy consumption of fume hoods.

Yet this burst of voluntary challenges, accreditations and incentives raises the question: why are many labs still averse to going green? Unsurprisingly, the answer is complicated, but boils down to ingrained preconceptions and a lack of motivation.

Plastic laboratory waste can end up in landfill when it should be recycled. (Courtesy: iStock/Eplisterra)

A common belief is that green lab practices can hamper research quality or even be bad for health and safety. "The truth is actually the opposite," says Lewis. "For example, efficient ultralow-temperature freezers that are maintained correctly have longer lifespans and are less likely to break down, improving sample security and long-term equipment costs." Paradise agrees. "In many cases the more environmentally sustainable approach is also the safer, more economical approach as well," she says.

For Lewis, motivating researchers to focus on sustainability has been the hardest nut to crack. With their priority being high-quality research, many scientists simply don't have the time to think about green practices. That is why the University of Bristol is offering students a chance to volunteer in research labs to help work through the sustainability criteria. "This benefits the students by allowing them

access to research labs that they wouldn't ordinarily have, as well as gain a knowledge of the underbelly and workings of the university," says Lewis.

Big issues for big labs

At a different scale, making large scientific experiments and facilities – which necessarily consume vast amounts of resources and energy – more sustainable requires an even more holistic approach. The new £700m Francis Crick Institute – a huge biomedical research laboratory in central London – does this by incorporating sustainability principles into the entire design of the building. For instance, the institute uses an on-site combined heat and power system with 1700 m^2 of solar panels installed on its south-facing roof. It also incorporates "plug-and-play" laboratories that ensure facilities can be shared and readily adapted to future needs, while a third of the floor area is given over to plant space. There are even roof gardens to attract wildlife.

"Our BREEAM Excellent rating was a great achievement for the design and build of the Crick," says Rajnika Hirani, head of sustainability and business, referring to the Building Research Establishment Environmental Assessment Method – an internationally recognized certification of a building's sustainability. "We are now going for the BREEAM In Use accreditation, which should really make a difference to the individual labs," she adds, talking about another BREEAM rating that measures sustainable improvements through operational efficiency.

A long journey ahead

Over in Sweden all waste heat from the European Spallation Source, which is currently being built in Lund, will eventually be connected to the local heating system rather than being vented into the atmosphere. But for many big-physics labs, sustainability cannot be ingrained in the design. Take the CERN particle-physics lab near Geneva. Largely built years before sustainability was even a consideration, the thousands of huge, helium-cooled superconducting magnets and countless other components in the Large Hadron Collider (LHC) and other particle accelerators on site consume vast amounts of energy.

CERN uses around one third of the energy consumption of the canton of Geneva – equivalent to about 300,000 UK homes

Over the course of a year, the whole of CERN uses 1.3 TWh of electric energy when in operation. "We are around one third of the energy consumption of the canton of Geneva, or 0.2% of the total electrical consumption in France," explains Frédérick Bordry, CERN's director of accelerators and technology. This is equivalent to about 300,000 UK homes for a year. "In terms of accelerators, CERN is the biggest and therefore most energy-hungry facility in the world." Even the magnets' superconducting cables require as much energy to be cooled to their operating temperature (1.9 K) as they save in carrying current without resistance.

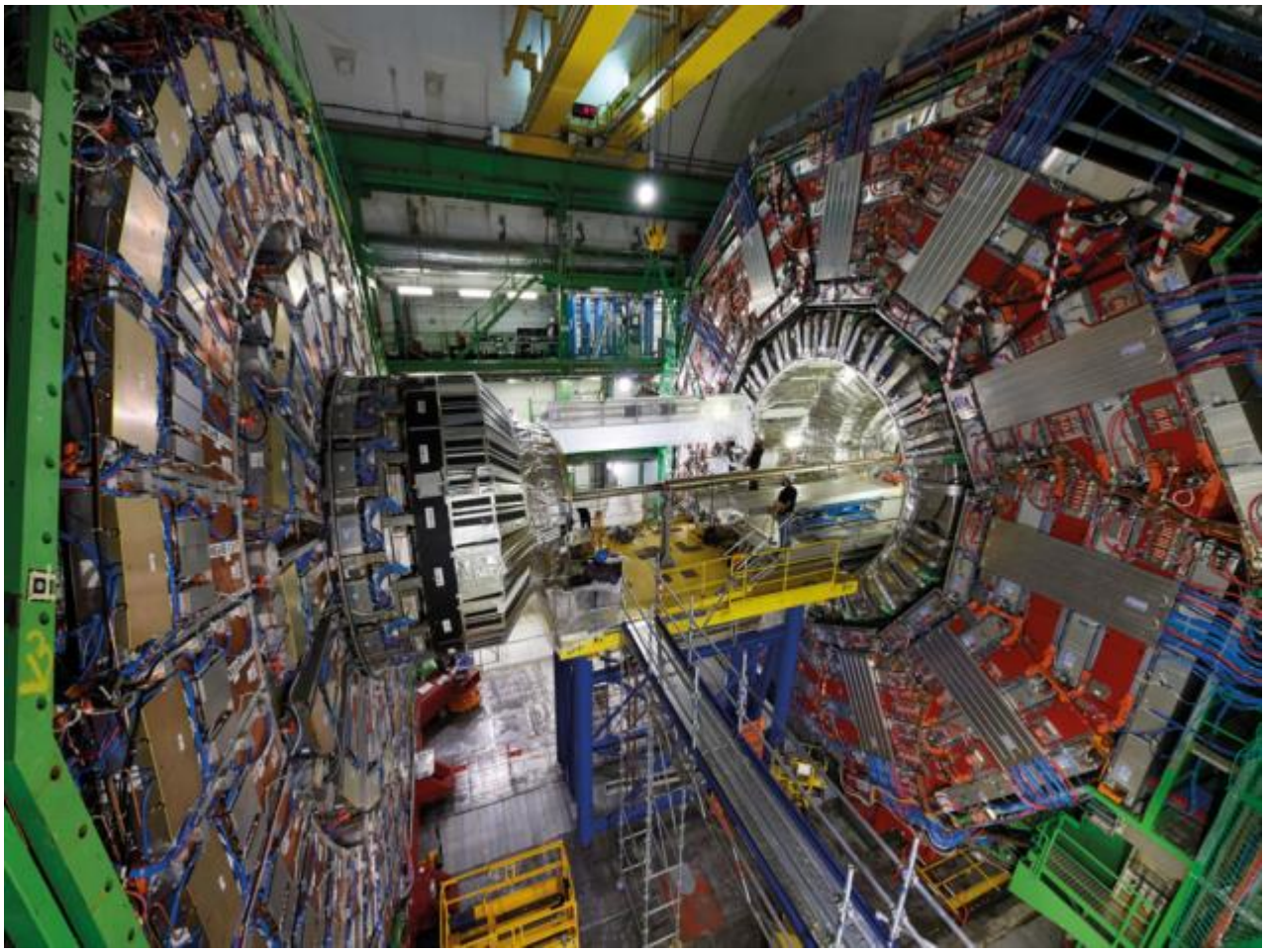
To improve CERN's energy efficiency on a limited budget, Bordry has had to prioritize sustainability improvements. "Every time I have people come in they say, 'Why are you not doing photovoltaics (PV) on the buildings?'" he says. "Our new buildings do have PV on the roofs and a lot of insulation, but if I have one or two million euros to spend, obviously it is better to inject it into the 90% of energy consumption [used by the machines, detectors and computing] rather than the 10% [the buildings use]."

One example of this spending in action is the ongoing renovation of the PS East Experiment Area, one of the oldest and largest structures at CERN, housing multiple beam lines. "We will install new special software, and new magnets and power converters that will run in pulsed mode instead of DC mode," says Bordry. "These will save 90% of the energy."

CERN has also introduced design criteria for new accelerators and equipment that focus on sustainability, including the 10-year cost instead of simply the purchase price. This means that when people are upgrading or buying new equipment, they see "the consequences of their spending to inform their consciences" in the form of a "virtual invoice".

Of course, CERN is limited in what it can do to go green. For example, the four huge and expensive detectors installed in the LHC were intended to last for the life

of the facility, but only one – CMS – took account of energy consumption in its design. CERN will have to wait until the LHC's successor – whatever that may be – is installed in the 2040s and 2050s before it can claim its flagship accelerator has any meaningful green credentials.



Power hungry: The detectors at CERN are not only enormous, but consume vast amounts of energy too – and only CMS took account of energy consumption in its design. (Courtesy: CERN)

Equally, upgrading or replacing the other energy-hungry CERN accelerators will take time, given that some are as old as the organization itself. But with energy efficiency and sustainability now hardwired into every new purchase and decision made at CERN, it too is showing that science, however energy intensive, is taking its responsibility seriously in leading efforts to reduce our collective carbon footprint.

Top five tips to go green in the lab

(Courtesy: iStock/guruXOOX)

- **Turn off equipment when not in use. "Use outlet timers for equipment that has heating/cooling elements so that the equipment reaches the correct temperature before you arrive in the lab," advises Allison Paradise, founder of My Green Lab in the US.**
- **Use glassware whenever possible and take advantage of plastic and other recycling and take-back programmes. Gloves, Styrofoam coolers, water purification cartridges, packaging, pipette tips and many more items don't have to go to landfill.**
- **Get your lab organized. Creating and maintaining a decent inventory system allows you to remove broken equipment and expired samples, avoid replicating purchases and frees up space, meaning some equipment can be switched off.**
- **Set up an equipment sharing, donating or renting system. "We ask lab users to share their space and equipment and check that they aren't purchasing something that they could borrow or use from elsewhere in the university," explains Anna Lewis, sustainable labs officer at the University of Bristol, UK.**
- **Exchange ideas. Joining schemes such as My Green Lab, S-Lab and LEAF allows you to see what other labs and institutions are doing to improve their sustainability. "There is so much going on that we are all happy to share to collectively reduce**

our impact on the environment," says Rajnika Hirani, head of sustainability and business at the Francis Crick Institute in the UK.

HOW DOES PLASTIC IN THE OCEAN AFFECT THE AIR?

Jun 13 2019

The dangerous problem of microplastic pollution is a well-documented one; with as many as 12 million tonnes of plastic entering the ocean every year, its impact on marine flora and fauna is monumental. It can damage coral and disrupt habitats, deface beaches and entangle marine animals or, worse still, become ingested by them and cause their premature deaths.

But while most people are well aware of the adverse effects of plastic pollution on life under the waves, its effect above them is less publicised. However, a new study suggests that underwater plastic could be killing off the organisms which create a significant part of the oxygen released into the air. Given that both humans and animals require that oxygen to survive, the findings are very concerning indeed.

Friendly bacteria

The word "bacteria" often immediately conjures up negative connotations - and with good reason. Bacteria can not only be responsible for infections and illnesses, certain strains can even contribute to global warming! However, there are also benign forms of the organism which actually perform tasks that are vital to the human race, including the unsung heroes known as *Prochlorococcus.*

As the most abundant organisms capable of photosynthesis on the planet, there are approximately three octillion (~10^{27}) of the little blighters in our seas and oceans. Indeed, cumulatively these helpful bacteria are responsible for 10% of all oxygen found on planet Earth. As a result, their ongoing survival is key to our own.

Breaking new ground

In the first study of its kind, researchers from Macquarie University in Australia investigated the effect that plastic pollution might have on the vital functions of *Prochlorococcus* bacteria. To do so, they exposed two different strains of the bacteria (from different depths of the ocean) to two different groups of chemicals commonly leaked by high-density polyethylene (used to make single-use shopping bags) and PVC matting.

The results were not encouraging. Exposure to both kinds of chemical groups had adverse effects not just on the growth capabilities of both kinds of bacteria, but also their ability to photosynthesise. This, in turn, translates into a reduction in the amount of oxygen they are capable of producing, meaning any threat to their species could signify a threat to our own.

Taking the next step

While the initial results of the Macquarie University study were concerning, further work is needed to find out if the bacteria are similarly affected in real-world

conditions. It's an area of research that demands urgent attention because it is one that has flown relatively under the radar until now.

"Our data shows that plastic pollution may have widespread ecosystem impacts beyond the known effects on macro-organisms, such as seabirds and turtles," explained Dr Sasha Tetu, lead author on the paper. "If we truly want to understand the full impact of plastic pollution in the marine environment and find ways to mitigate it, we need to consider its impact on key microbial groups, including photosynthetic microbe. (Source Environmental Technology)

FIVE AIR POLLUTION RISKS CAUSED BY NATURAL DISASTERS

Jun 19 2019

Air pollution is often regarded as a purely manmade phenomenon. While it's true that the Industrial Revolution and all the of anthropogenic activity that has followed have greatly accentuated the abysmal quality of air all over the world, natural phenomena can also play their part in creating air pollution.

Unfortunately, it's when these events combine with the emissions produced from human activity that the situation really begins to spiral out of control. With our own activities contributing to climate change and increasing the incidence of

natural disasters and extreme weather events, it becomes something of a vicious cycle that feeds on itself. In any case, here are five of the ways in which air pollution can be exacerbated by natural events.

1. Sudden release of accumulated contaminants

Normally, pollutants and toxins are released into the atmosphere through natural cycles that take place across air, land and water, until finally they end up buried at the bottom of the waves in oceanic or lake sediments. However, extreme phenomena such as volcanic eruptions, tsunamis or earthquakes can release these accumulated pollutants in a single surge of activity. One such example of this behaviour is the May 2018 eruption of the Hawaiian volcano Kilauea, which still plagues the vicinity with poor air quality today as a result of the emission of substantial amounts of dust and dangerous gases.

2. Release of hazardous materials

Sometimes, natural disasters can trigger much bigger industrial ones by damaging or interfering with storage centres, transitional pipelines and technological capabilities. In 2011, a 15m-high tsunami hit the now-notorious nuclear reactor in Fukushima, disabling three of its cooling towers and knocking out its power supply. This led to three separate nuclear meltdowns, various explosions and the release of radioactive substances for three days straight.

3. Forest fire haze

Forest fires can have both natural and manmade causes. If they are allowed to ravage unattended, they can not only destroy vast swathes of forested areas, thus indirectly contributing to climate change by removing a chief absorber of carbon dioxide, but also diminish air quality in a more direct manner via the release of harmful contaminants. Australia, for example, suffers from a climate that is prone to spontaneous combustion among its forested areas and is constantly struggling to prevent and contain bush fires. One of the most serious incidents occurred in 1994 in New South Wales, when almost a million acres of land were razed to the ground and the city of Sydney was covered in a cloud of ash for several days.

4. Droughts = dust

While our ability to predicted prolonged periods of dry weather and drought is increasing, that doesn't make it any easier to deal with the consequences. In parts of the world that are particularly prone to reduced rainfall for months at a time, there is a higher risk of sandstorms occurring – not to mention the accumulation of dust and contaminants in the air. The Great Plains in the southern part of the United States are colloquially known as "the Dust Bowl" for this exact reason.

5. Floodwater breeds bacteria

Standing water attracts microbial bacteria and other unwanted activity. When floods affect residential areas where people are exposed to the air around them, the bacteria can be dispersed by the wind and inhaled by those living in the vicinity. Similarly, when floodwater penetrates buildings, the damp caused by it can persist in walls and furniture, increasing the likelihood that people will suffer from respiratory conditions such as asthma, allergies, difficulty breathing and hypersensitive pneumonitis.

(Source Environmental Technology)

WHICH 100 COMPANIES ARE RESPONSIBLE FOR 71% OF GREENHOUSE GAS EMISSIONS?

June 16,2019

There is no doubt that climate change is a global problem that affects us all of us - and which we must all take responsibility for when it comes to limiting our own greenhouse gas (GHG) emissions. However, there are undoubtedly some amongst us who wield greater power than others and a new map has been causing controversy by naming and shaming those who can but choose not to make a larger contribution.

Created by The Decolonial Atlas, the map lists not only the top 100 GHG-producing companies in the world, but also the names of their CEOs and the cities in which they reside. It is an attempt to strip away some of the anonymity with

which these people shroud themselves and guilt them into taking action to curb the irrevocable damage their companies are doing to the planet.

A roll call of pollution

According to the map's creator, the companies named have been responsible for over two-thirds (71%) of all GHG emissions in the period between 1988 and 2015. Unsurprisingly, fossil fuel companies dominate the list, with the Chinese state-owned coal business top of the pile. They were responsible for a whopping 14.32% of the global total over that time period, far ahead of their nearest competitors.

Silver medal on the list went to Saudi Aramco, who contributed 4.5% of the global total, just ahead of third-placed Gazprom with 3.9%. Other household names further down the field of candidates include Exxon Mobil (fifth place, 2.0%), Shell (ninth place, 1.7%) and BP (eleventh place, 1.5%). The full list of contaminating candidates can be viewed on The Decolonial Map's website. Meanwhile, the city which plays host to the most CEOs of those companies is Houston, with seven, while Jakarta (five), Beijing, Calgary and Moscow (all four) follow.

Collective responsibility?

Those playing devil's advocate (as well as the companies themselves) may well argue that they only exist to meet a demand, and that their GHG-emitting activities would not take place at all if not for the global populace which depends on them for all of its energy-consuming habits. However, the disproportionately negative impacts of fossil fuels like coal as a fuel source - including its ability to influence extreme weather phenomena – is now almost universally accepted as fact.

With that in mind, it's high time that energy companies began the difficult but desperately needed transition from fossil fuels to cleaner, renewable sources of energy. The Decolonial Atlas map is an attempt to shame those entities into doing so, but thankfully such confrontational tactics might not be necessary for too much longer. With renewables fast overtaking traditional forms of energy

generation in terms of affordability, it should soon make economic as well as environmental sense to leave fossil fuels in the ground, once and for all.
(Source Environmental Technology)

CARBON EQUATIONS FOR SUSTAINABLE CHEMISTRY

BY MATTHEW BUTLER

Laboratories are energy-hungry places with demands for ventilation, power and water — all of which have environmental and cost implications. But by using thoughtful design and working with users, it is possible to design future laboratories to be more efficient, significantly reducing their energy and water use and environmental impact, writes Matthew Butler.

Laboratory buildings often require high ventilation rates to provide a safe working environment for users through the use of containment equipment that that assists scientists with their analysis.

The energy required to provide motive power and environmental control means these facilities generally consume a lot of energy leading to high net carbon emissions. At the same time, however, laboratories also provide the spaces, technical equipment and support scientists require to produce the sustainable technologies needed to secure a successful low carbon future.

The GlaxoSmithKline (GSK) Carbon Neutral Laboratories for Sustainable Chemistry building, owned by the University of Nottingham, was developed to enable this low-carbon ambition. The design of the building itself facilitated the development of low-energy strategies for its operation, with ongoing monitoring of its performance providing valuable lessons to improve the way it and other future buildings

operate. Possibly most importantly, the work of the scientists who both use and are inspired by the building, is helping to make our low carbon future a reality.

To achieve the very low energy consumption necessary to target Net Zero Carbon status, the GSK Carbon Neutral Laboratories for Sustainable Chemistry had to be designed to save energy wherever possible.

Drawing on our experience and knowledge of how laboratory buildings actually work, we reviewed all of the building services systems and identified where we could improve them from conventional practice to provide greater energy efficiency.

The building has now been in use for three years. AECOM has been monitoring the actual power and water consumption as well as obtaining feedback from the users about how the building performs for them. This process has generated valuable insights into how future laboratories can be designed to be more efficient.

In all types of buildings, especially large energy consumers such as laboratories, the most significant opportunities for savings are found by identifying where energy is being consumed unnecessarily.

Five ways to save energy

1/ Off means off

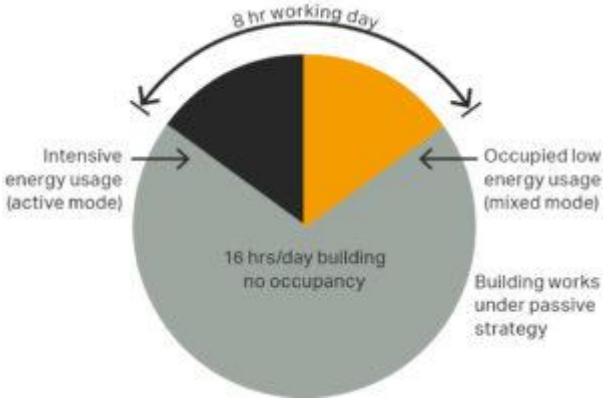
Normal working hours only occupy one-third of a working day and less than one-quarter of the hours in a whole year. The most significant energy savings can be achieved, therefore, by ensuring that, wherever possible, the heating, ventilation and air conditioning (HVAC) systems are

off, or set back as much as possible. Controls, with the ability to detect when spaces are occupied and respond to required demands, are essential for this. User behaviour is also important; identifying the agreed working hours can allow the simple setback of systems to achieve significant energy savings.

2/ Understand actual loads

Generic metrics like building regulation calculations allow for a relative comparison between buildings. Simplifications in the modelling, however, do not accurately reflect the benefits of different HVAC strategies within a laboratory environment.

Our experience shows that, for laboratory buildings, the actual total energy consumption is typically twice that predicted by building regulations calculations. As a result, it is crucial that decisions about servicing strategies for laboratories are based on optimising energy-consumption reductions for the actual building, not just improving the building regulations calculation.



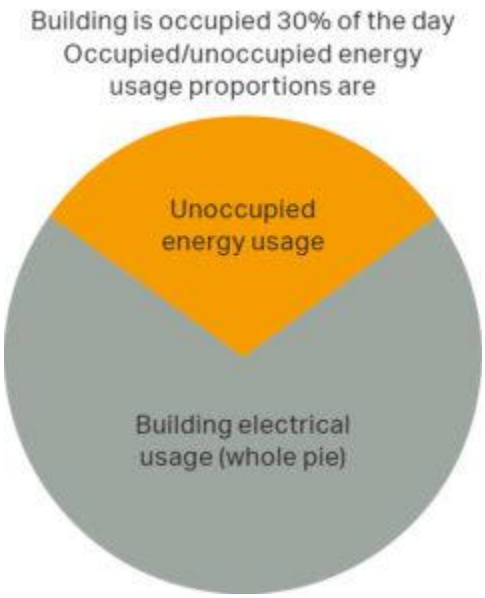


Figure 1: Laboratory daily lifecycle

3/ Decentralise systems

Large centralised air handling systems for ventilating and cooling laboratories can provide a relatively easy solution. However, the resulting compromise in control of the central systems and energy losses in distribution can lead to significant energy use. Localising ventilation and cooling systems to specific laboratories allows air to be supplied at just the right temperature and flow rate to suit the specific requirements. This helps generate significant savings from free cooling from fresh air as well as reduced distribution losses.

4/ Decrease water consumption

Historically, laboratories have been very large consumers of water. By providing the right infrastructure, such as closed loop cooling systems for condensers, we can facilitate improvements in scientific working practices that result in significant reductions in actual water consumption. This reduction in actual consumption is not generally reflected in standard design allowances for storage and distribution design.

Figure 2 below shows the actual water consumption for the GSK Carbon Neutral Laboratories for Sustainable Chemistry compared with the modelled demand

based on standard design metrics. By designing to these actual consumption figures, we can cut the size of storage, distribution and hot water generation facilities and save capital costs, limiting the risk of stagnation in oversized water systems and saving energy from standing losses in oversized hot water systems.

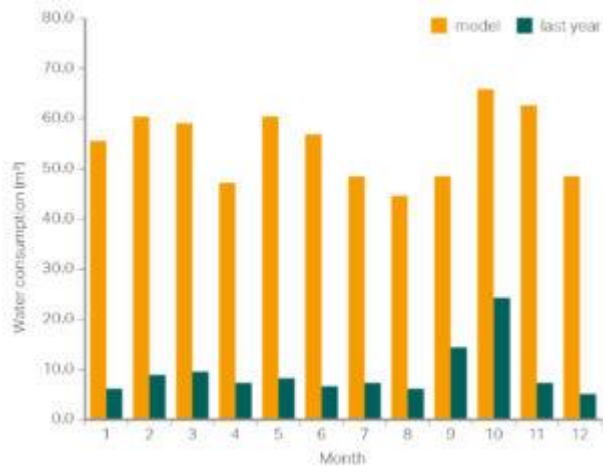


Figure 2: Annual water consumption for the GSK Carbon Neutral Laboratories for Sustainable Chemistry

5/ Smart metering and ongoing monitoring

Providing the best possible building does not end at hand over. Even with expert design input, you can not anticipate every possible operating scenario. In addition, the new building's users may need support, guidance and encouragement to use the facilities in the most efficient way. Smart metering is an important tool that can help with this, enabling the monitoring of energy and water consumption throughout the building.

Within the GSK Carbon Neutral Laboratories for Sustainable Chemistry, we have been monitoring power consumption in the laboratories and feeding the results back to the users about how their habits are impacting building performance, particularly, where equipment is being left on overnight.

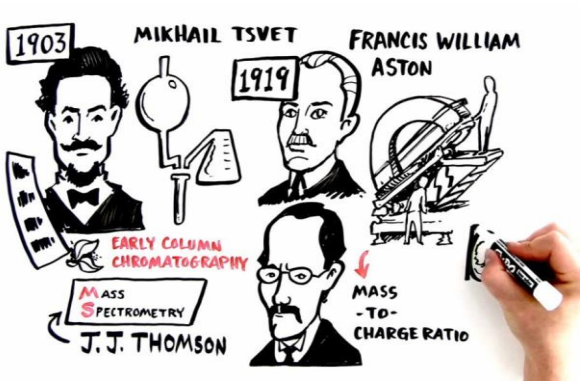
Monitoring the building's HVAC systems' fuel and power consumption is helping us to understand how the controls are actually interacting with

the building so that we can identify where they can be tweaked to support and promote the best performance from the building.

Figure 3: Average power consumption profile for a laboratory in the GSK Carbon Neutral Laboratories for Sustainable Chemistry

A fresh approach

Designing laboratories in the same way they have always been designed results in poor-performing buildings. By using experience gained from previous buildings and better understanding the specific requirements of individual users, we can design buildings that are more efficient and better able to respond to the specific user requirements. Monitoring utility demands and profiles will optimise supporting engineering infrastructure and, more widely, help us secure the low carbon future we need.



An Illustrated History of Gas Chromatography

Have you ever wondered how gas chromatography developed into the technologies we use today? This entertaining and educational cartoon will teach you about the characters and history involved in early gas chromatography (GC) studies to combining GC with mass spectrometry (MS) for GC-MS and GC-MS/MS analyses, followed by a peek into where this technology is going today, including the development of the Thermo Scientific™ Q Exactive™ GC Orbitrap GC-MS/MS system.

ANALYTICAL INSTRUMENTATION MARKET 2019-2025 GROWTH OUTLOOK, EMERGING MARKET TRENDS

Ryan Johnson

13th-Jun-2019

3

Analytical Instrumentation Market

Analytical instruments are one of the costliest instruments required by the companies and each year a huge amount of money is spent over the annual maintenance of these instruments by the end users. With the rising prices of these instruments the end users especially the companies which are small and mid-sized consider the refurbished systems option as the best option in order to fulfill their requirement. Global analytical instrumentation market growth is owed to the heavy usage of high end sophisticated instruments for qualitative and quantitative analysis in the industries such as pharmaceuticals, biotechnology, life science, chemicals, and academics among others.

As a general observation the analytical instrumentation market is a mature and highly competitive market but the market still holds a lot of growth opportunities for the preexisting and dominating players in the market. This industry is driven by the solutions that would reduce the overall operating costs for the end users. Analytical instruments such as HPLC, GC, UV-VIS, NMR and many more are very costly instruments and sensitive which need skilled labor to use.

The analytical instruments are the basic need of industry which need to perform qualitative and quantitative analysis of any sample, so the demand for these instruments would go on forever. Currently the companies are shifting the business focus from just selling the product in the market to providing services to the end user as and when required in order to satisfy the customer and generate a good amount of revenue year on year from annual maintenance contracts and comprehensive maintenance contracts.

Key Players: WATERS Corporation, Thermo Fisher Scientific Inc., Agilent Technologies, Inc., KNAUER Wissenschaftliche Geräte GmbH, Nanalysis Corp., Shimadzu Corporation., Bruker, JASCO., Oxford Instruments and Danaher.

Browse more detail information about Global Analytical Instrumentation Market Report at:

https://www.adroitmarketresearch.com/industry-reports/analytical-instrumentation-market

The after sales service market in the analytical industry is expected to flourish over the forecast period and implementation of industrial IOT models in instruments will boost the growth of the dominating players. Companies have already started focusing on incorporating artificial intelligence which would allow systems to detect and resolve the issue automatically. Implementation of such technology to these instruments will help the end users to make better use of the system and thus increase the output by decreasing the downtime. Also, with the help of IIoT (industrial internet of things) and AI (artificial intelligence) downtime can be prevented even before it occurs by observing the historical trends.

Analytical instrumentation market is primarily driven by the growth in the pharmaceutical, biotechnology, R&D, life sciences, academia sectors among others. The Asia-Pacific region is expected to grow with the maximum CAGR over the forecast period, with major countries witnessing the increased demand for pharmaceutical, life science and biotechnology companies. These countries include India, China, Korea, and Japan. The Indian analytical instrumentation market is highly import dependent and around 75-80% sophisticated instruments are imported for U.S. and European market in order to cater its growing demand, while local manufacturing is only limited to basic to medium technology equipment.