Toxins we ingest: Formaldehyde

QUAMRUL HAIDER

FORMALIN is once again in the limelight because of litchis and mangoes, two of the favourite fruits of a Bangali. Unscrupulous people in Bangladesh engaged in "backyard business" are spraying these and other fruits with formalin to extend their life and keep them fresh. The chemical has endeared itself to them so much that they also coat fish with it to prevent bacterial growth and give them the appearance of freshness. Formalin can also be found as a preservative in foods, such as noodles, meatballs, and salted or dried fish.

Formalin is an aqueous solution that contains around 37% formaldehyde, a naturally occurring colourless and flammable substance made of carbon, hydrogen, and oxygen. Formaldehyde has been in use since time immemorial to embalm and preserve dead bodies.

Formaldehyde is a common indoor air pollutant and a potential killer. Even flies know formalin-treated fish is not good for them; they shy away from those fishes. According to the International Agency for Research on Cancer (IARC), it is a cancer-causing substance.

The list of formaldehyde sources in our house is never-ending. It is found practically everywhere and in everything that we use -- in the adhesive in plywood, particleboard, and paneling; on countertops, cabinets, and sub-flooring. Other sources include cigarette smoke and un-vented gas or kerosene burning stoves.

Formaldehyde is used to add permanent-press qualities to clothing and draperies. It is a component of glues and adhesives, and is used as a preservative in some paints and coating products. It can be found in paper products, tooth pastes, shampoos, other hair-styling products, and nail polish, cosmetics, waxed paper, and grocery bags.

The magnitude of formaldehyde related problems we are faced with evokes feeling of despair and helplessness. They seem so immense that we wonder if anything can be done to alleviate the situation. Yes, we can, by shifting our emphasis from economic efficiency and materialism towards a sustainable quality of life.

For a hot and humid country like Bangladesh, the presence of formaldehyde in so many consumer products is really alarming. Heat and humidity accelerates the rate at which formaldehyde is released.

Once we ingest food items or water containing formaldehyde, the body metabolises it quickly and converts it into formic acid. It is highly toxic especially to a person with weak liver or kidney. Formaldehyde is readily absorbed by the lungs, digestive tracts, and organs leading to toxicity in a functional organ of the human body. Symptoms of formaldehyde poisoning are many: difficulty of swallowing, poor appetite, nausea, acute abdominal pain, diarrhea accompanied by vomiting, hypotension, and arrhythmia.

Formaldehyde irritates the eyes, nose, skin, and throat. When inhaled, it can cause coughing, wheezing, chest pains, and bronchitis. But sensitivity varies among people. Some are sensitive to levels of 1 to 3 parts per million (ppm), while others, who have been exposed to formaldehyde for long periods, become sensitised and respond to levels as low as 0.05 ppm. If high-levels (20-100 ppm) of formaldehyde are inhaled, it will cause fluid build-up in the lungs which may result in death.

Unknown to most of us, dialysis machines cleaned with formaldehyde can cause acute destruction of the red blood cells.

The primary health concern of formaldehyde is its cancer causing potential. The IARC has sufficient evidence for carcinogenicity in humans who were exposed to formaldehyde. If the body contains high concentration of formaldehyde, it will react chemically with almost all the body cells, causing cell damage, and even cell mutations that lead to the development of cancer. It has also been shown to cause mutations in bacteria and many other organisms; many mutagens are also carcinogens. One epidemiological study showed a possible link between formaldehyde exposure and skin cancer in humans.

The magnitude of formaldehyde related problems we are faced with evokes feeling of despair and helplessness. They seem so immense that we wonder if anything can be done to alleviate the situation. Yes, we can, by shifting our emphasis from economic efficiency and materialism towards a sustainable quality of life. Use pure wood furniture, grow your own food; maintain natural nails, a frizzy, curly, or kinky hair, no make-ups; in other words, a plain-Jane lifestyle. Because when your health is at stake, is a "good hair day" worth it?

The writer is a Professor in the Department of Physics & Engineering Physics, Fordham University, New York.

UK astronomers to co-ordinate their search for alien signals

ACADEMICS from 11 institutions have set up a network to co-ordinate their Search for Extra-Terrestrial Intelligence (Seti).The English Astronomer Royal, Sir Martin Rees, will act as patron.

The group is asking funding agencies for a small -- about £1m a year -- sum of money to support listening time on radio telescopes and for data analysis. It would also help pay for research that considered new ways to try to find aliens. Currently, most Seti work is done in the US and is funded largely through private donation.

UK Seti Research Network (UKSRN) co-ordinator Alan Penny said there was important expertise in Britain keen to play its part. "If we had one part in 200 -- half a percent of the money that goes into astronomy at the moment -- we could make an amazing difference. We would become comparable with the American effort," the University of St Andrews researcher told BBC News.

"I don't know whether [aliens] are out there, but I'm desperate to find out. It's quite possible that we're alone in the Universe. And think about the implications of that: if we're alone in the Universe then the whole purpose in the Universe is in us. If we're not alone, that's interesting in a very different way."

The UKSRN held its first get-together at this week's National Astronomy Meeting.

British researchers and facilities have had occasional involvement in Seti projects down the years.

The most significant was the use in 1998-2003 of Jodrell bank, and its 76m Lovell radio telescope, in Project Phoenix. This was a search for signals from about 1,000 nearby stars. Organised -- and paid for -- by the Seti Institute in California, it ultimately found nothing.

Jodrell has since been updated, linking it via fibre optics into a 217km-long array with six other telescopes across England. Known as eMerlin, this system would be a far more powerful tool to scan the skies for alien transmissions.

And Jodrell's Tim O'Brien said Seti work could be done quite easily without disturbing mainstream science on the array. "You could do serendipitous searches. So if the telescopes were studying quasars, for example, we could piggy-back off that and analyse the data to look for a different type of signal -- not the natural astrophysical signal that the quasar astronomer was interested in, but something in the noise that one might imagine could be associated with aliens. This approach would get you Seti research almost for free," the Jodrell associate director explained.

"There are billions of planets out there. It would be remiss of us not to at least have half an ear open to any signals that might be being sent to us."

In addition to eMerlin, the UK is also heavily involved in Lofar -- a European Low Frequency Array that incorporates new digital techniques to survey wide areas of the sky all at once.

And Jodrell itself is the management HQ for the forthcoming Square Kilometre Array, a giant next-generation radio observatory to be built in South Africa and Australia. It will have incredible power, not only to screen out interference from TV and phone signals here on Earth, but to resolve very faint signals at vast distances. It has been said the SKA could detect an airport radar on an alien world 50 light-years away.

One attraction of Seti is the great potential for "citizen science" involvement.

The Seti@Home screensaver has proved to be a big hit with the public, using downtime on home and business PCs to analyse radio telescope data for alien signals. The UK has a strong history in this area also with projects such as Galaxy Zoo, which sees citizen scientists help professional astronomers sift and classify the colossal numbers of images we now have of galaxy structures.

Sir Martin said there was huge public interest in the Seti question and some modest state funding for the area would probably get wide support. "I'd put it this way: if you were to ask all the people coming out of a science fiction movie whether they'd be happy if some small fraction of the tax revenues from that movie were hypothecated to try to determine if any of what they'd just seen was for real, I'm sure most would say 'yes'," he told BBC News.

The issue is whether UK astronomy, currently operating under very tight fiscal constraints, can afford any spare cash for a field of endeavour that has completely unknown outcomes.

Sheffield University's Paul Crowther doubted the Science and Technology Facilities Council (STFC), the main funders of UK astronomy, would be able to support UKSRN.

"Continued flat-cash science budget awards are constantly eroding STFC's buying powers, causing the UK to withdraw from existing productive facilities such as the United Kingdom Infrared Telescope and the James Clerk Maxwell Telescope.

"[British astronomy] faces the prospect of a reduced volume of research grants, and participation in future high-impact facilities [eg the Large Synoptic Survey Telescope] is threatened. I would be shocked if STFC's advisory panels rated the support of UKSRN higher than such scientifically compelling competition."

Dr Penny argued Seti could make a strong case, and that his group would try to get research council backing.

"The human race wants to explore, wants to find things out, and if we stop trying we're on the road to decay," he said.

Source: **BBC**

Feeding galaxy caught in distant searchlight

ASTRONOMERS have always suspected that galaxies grow by pulling in material from their surroundings, but this process has proved very difficult to observe directly. Now ESO's Very Large Telescope has been used to study a very rare alignment between a distant galaxy [1] and an even more distant quasar -- the extremely bright centre of a galaxy powered by a super-massive black hole. The light from the quasar passes through the material around the foreground galaxy before reaching Earth, making it possible to explore in detail the properties of the gas around the galaxy [2]. These new results give the best view so far of a galaxy in the act of feeding.

"This kind of alignment is very rare and it has allowed us to make unique observations," explains Nicolas Bouché of the Research Institute in Astrophysics and Planetology (IRAP) in Toulouse, France, lead author of the new paper. "We were able to use ESO's Very Large Telescope to peer at both the galaxy itself and its surrounding gas. This meant we could attack an important problem in galaxy formation: how do galaxies grow and feed star formation?"

Galaxies quickly deplete their reservoirs of gas as they create new stars, and so must somehow be continuously replenished with fresh gas to keep going. Astronomers suspected that the answer to this problem lay in the collection of cool gas from the surroundings by the gravitational pull of the galaxy. In this scenario, a galaxy drags gas inwards, which then circles around the galaxy, rotating with it before falling in. Although some evidence of such accretion had been observed in galaxies before [3], the motion of the gas and its other properties had not been fully explored up to now.

This artist's impression shows a galaxy in the distant Universe, just two billion years after the Big Bang, in the process of pulling in cool gas (shown in orange) from its surroundings. Astronomers have been able to find out a lot about this object by studying not just the galaxy, but also the light of a much more distant quasar (the bright object to the left of the central galaxy), which happens to be in the right place to shine through the accreting gas. The motions of the gas and its composition fit very well with theories of cool gas accretion as a way of feeding star formation and galaxy growth.

The astronomers used two instruments known as SINFONI and UVES [4], both of which are mounted on ESO's VLT at the Paranal Observatory in northern Chile. The new observations showed both how the galaxy itself was rotating, and revealed the composition and motion of the gas outside the galaxy.

"The properties of this vast volume of surrounding gas were exactly what we would expect to find if the cold gas was being pulled in by the galaxy," says co-author Michael Murphy (Swinburne University of Technology, Melbourne, Australia). "The gas is moving as expected, there is about the expected amount and it also has the right composition to fit the models perfectly. It's like feeding time for lions at the zoo -- this particular galaxy has a voracious appetite, and we've discovered how it feeds itself to grow so quickly."

Astronomers have already found evidence of material around galaxies in the early Universe, but this is the first time that they have been able to show clearly that the material is moving inwards rather than outwards, and also to determine the composition of this fresh fuel for future generations of stars. Without the quasar's light to act as a probe this surrounding gas would be undetectable.

"In this case we were lucky that the quasar happened to be in just the right place for its light to pass through the in-falling gas. The next generation of extremely large telescopes will enable studies with multiple sightlines per galaxy and provide a much more complete view," concludes co-author Crystal Martin (University of California Santa Barbara, USA).

Notes:

[1] This galaxy was detected in the 2012 redshift $z \sim 2$ SINFONI survey called the SINFONI Mg II Program for Line Emitters (SIMPLE). The quasar in the background is called HE 2243-60 and the galaxy itself lies at a redshift of 2.3285 -- meaning that we are seeing it when the Universe was just about two billion years old.

[2] When the quasar light passes through the gas clouds some wavelengths are absorbed. The patterns of these absorption fingerprints can tell astronomers much about the motions and chemical composition of the gas. Without the quasar in the background far less information would have been be obtained -- the gas clouds do not shine and are not visible in direct images.

[3] Some hints that galaxies were being fed from material around them were found in earlier data, including that from the SAURON survey (LINK to SAURON ANN of 3 July).

[4] SINFONI is the Spectrograph for INtegral Field Observations in the Near Infrared, while UVES is the Ultraviolet and Visual Echelle Spectrograph. Both are mounted on ESO's Very Large Telescope. SINFONI revealed the motions of the gas in the galaxy itself and UVES the effects of the gas around the galaxy on the light coming from the more distant quasar.

Source: **Science Daily**

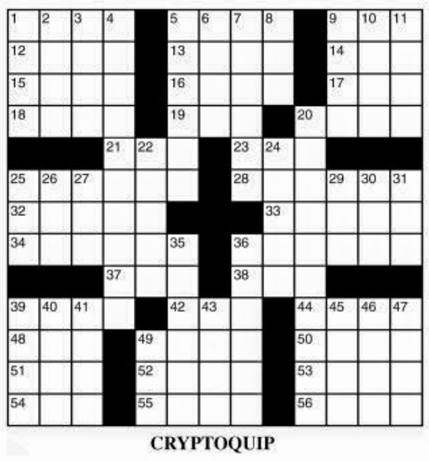
ACROSS
1 Give a darn
5 IOU, e.g.
9 Trip to Mecca (Var.)
12 Like 28-Across
13 Top-notch
14 Chicken-king link
15 The Swedish Nightingale
16 Hold sway
17 Cartoonist Chast
18 Creche trio
19 Auto grille cover
20 "For cryin' out loud!"
21 Id counterpart
23 Personal question
25 Beckon
28 Vast sandy expanse
32 Leafy shelter
33 Release a deadbolt
34 Trolley sounds
36 Present from birth
37 Common Mkt.
38 Pigpen
39 Pre-swan
42 Puncturing device
44 It gets in the whey
48 Seek restitution
49 Neighborhood
50 Quite eager
51 Historic time
52 Read bar codes
53 — good example
54 Press for payment
55 Cattle group
56 A bit unclear

DOWN
1 Tranquil
2 Bocelli solo
3 Peal
4 "Two Tickets to Paradise" singer
5 Diamonds, essentially
6 Session with a shrink
7 Extended family
8 Shirt shape
9 Tortoise's opponent
10 Lotion additive
11 Satchmo's genre
20 "I Walk the Line" singer
22 Canyon
24 Obsess
25 Pouch
26 Surfer's destination
27 Biz deg.
29 Lawyers' org.
30 Snitch
31 Exist
35 Hard to find
36 Gilligan's home
39 Second-hand
40 Mentor
41 Slender
43 Sport
45 Eye layer
46 "Puttin' on the —"
47 Crucial time
49 Blond shade

Solution time: 27 mins.

J	I	M	■	T	R	A	P	■	A	C	N	E
O	R	A	■	I	O	W	A	■	P	L	U	S
B	A	S	E	B	A	L	L	■	L	U	M	P
■	■	Q	U	I	D	■	■	B	O	B	B	Y
L	A	U	R	A	■	F	A	R	M	■	■	■
O	R	E	O	■	A	R	M	Y	B	A	S	E
M	E	R	■	B	R	A	I	N	■	P	I	C
B	A	S	E	L	I	N	E	■	D	O	T	H
■	■	■	S	O	A	K	■	L	A	S	S	O
C	R	Y	P	T	■	■	S	H	U	T	■	■
L	E	E	R	■	D	A	T	A	B	A	S	E
A	N	T	I	■	O	D	E	S	■	S	U	N
D	O	I	T	■	C	O	M	A	■	Y	E	S

Yesterday's answer 6-1



CRYPTOQUIP

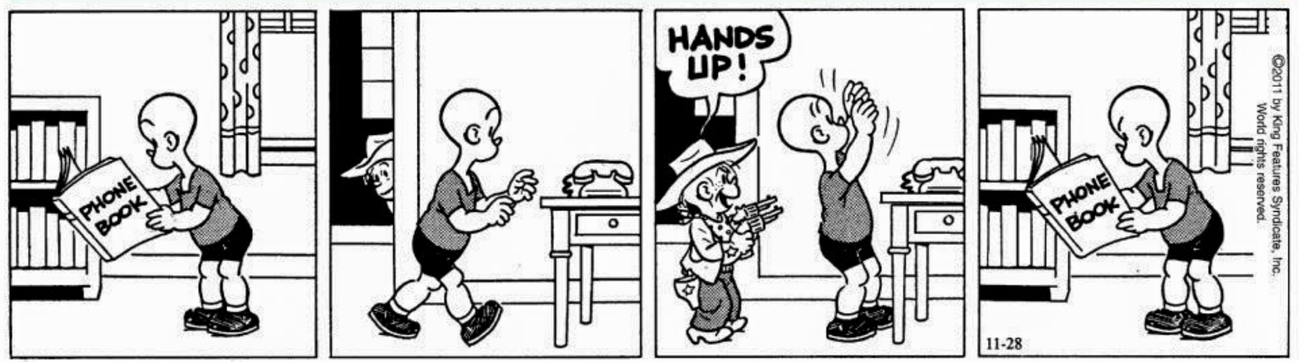
D KXGNAH BFRPWSRXA U CDEA AHEAE RW YAUHV BG EDNNPUHVPO YADRSUKRP, U FGRPEH'S YAPUAMA CO UFA!

Yesterday's Cryptoquip:
WHILE PREPARING TO ENGAGE IN HIS FINAL FLIGHT, THE DUELIST SHOUTED "THIS IS THE LAST DRAW!"

Today's Cryptoquip Clue: R equals U

BEETLE BAILY by Mort Walker

HENRY by Don Tranchte



QUOTABLE *Quotes*

"When the people fear the government there is tyranny, when the government fears the people there is liberty."

Thomas Jefferson