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IRMA NEWS

Vol. No. 6 ISSUE No. 1 January 2009

CHAIRMAN SPEAKS

Dear Friends

Greeting and Good Wishes to all the readers for the year 2009.

I am communicating to you for the first time after our Annual General Body Meeting held on Sept 2008. At the outset I would like to thank you on behalf of my team and myself for electing us. We at IRMA bring ideas together and make sincere efforts to present them in the respective forum and share a lot of technical developments, this in turn generates lot of learning ground for new comers and awareness of the present market and future trends.

We as a team should include more members and wider types of industry to build a strong set – up. We shall continue with our routine work of conducting seminars, workshops, technical lectures etc. to strengthen our association.

Please be assured that any time any IRMA member desires our assistance, we as a team shall be honoured to offer the same.

Sudden fall in the petro price was not digestible and handable by industries, this gave birth to industrial recession, having pronounced in engineering and auto industry.

Titanic storm which ruffled the city due to the salvage and mindless act of the terrorist, so many innocent lives were lost, the above shortcomings were overcome by us since our economy is driven by agriculture, even though the blow was very strong, we could sustain our economy since most of the burden was taken care by agriculture sector.

While there is still downward trend in prices of Crude Oil, the volatile market condition still persists. Rupee value is going down verses dollar. We are now feeling the recessionary trend especially in Engineering and Auto Industry. It is the order of the day in the World.

With the announcement of Excise Duty reduction and benefits to Small Scale Industry we hope there may be a slight improvement and the worry about unemployment in large scale may not be the cause of concern.

We eagerly await for a positive change to happen.

VICKY KAPUR

Chairman

Editor: ... • Dr. Prashant Samant

Advisory Committee:

Administrative: ... • Mr. Vicky Kapur • Mr. Ashok Goklani

Commercial: ... • Mr. Bhupendra Sakaria • Mr. Siddharth Shah

Technical: ... • Mr. Ballal Chandrachud • Dr. Prashant Samant • (Prof.) Dr. M. A. Shenoy

MEMBERS ATTENTION

Please note that IRAM's Office has been shifted to the address mentioned below.
All future correspondence to be forwarded to address as given below:

INDIAN RESINS MANUFACTURER'S ASSOCIATION

Office : C/o. Gargi Huttenes Albertes Pvt. Ltd., 203, Vasant Vihar Complex, Next to Basant Cinema, Dr. C. Gidwani Rd., Chembur, Mumbai - 400 074. Telefax: (022) 2558 2866 : E-mail: irma_org@hotmail.com

EDITORIAL

Friends!

I am extremely happy to takeover the responsibility as Editor – IRMA – NEWS. Friends, I have always believed in taking different and interesting responsibilities and fulfill them to the best of abilities. My colleague and friend Nirav and Ashok Goklani have already put in lot of work as Editors of this Bulletin and set a standard which I have to maintain. In achieving this, I need cooperation from all the respected IRMA member Companies and individuals.

Requests have been sent to fellow member companies inviting articles on technical, commercial or any other subject of educative value to our members. The response received from all of you was not so good. I urge all of you to be responsive and participate towards IRMA – NEWS in months to come.

I congratulate past Chairman, Mr.Ashok Mehta and his entire team for organizing a very successful conference in the month of September, which became talk of the town for few weeks in Paint and Resin fraternity.

Dr. PRASHANT SAMANT
EDITOR

I wish all the members and their families, a Very Happy and Prosperous year 2009.

INTERESTING ONE LINERS:

Regular naps prevent old age…especially if you take them while driving.

Marriage is a relationship in which one person is always right and the other is the husband !

I believe we should all pay our tax with a smile. I tried – but they wanted cash.

A child's greatest period of growth is the month after you've purchased new school uniforms.

You can't buy love…but you pay heavily for it.

Bad officials are elected by good citizens who do not vote.

Laziness is nothing more than the habit of resting before you get tired.

Marriage is give and take. You'd better give it to her or she'll take it anyway.

Those who can't laugh at themselves leave the job to others.

Ladies first. Pretty ladies sooner.

You are getting old when you enjoy remembering things more than doing them.

It doesn't matter how often a married man changes his job, he still ends up with the same boss.

Saving is the best thing. Especially when your parents have done it for you.

Wise men talk because they have something to say; fools talk because they have to say something.

They call our language the mother tongue because the father seldom gets to speak !

CONSULTANTS: A Primer

You must have a consultant; every CEO does. In fact, the big ones always have more than one team of consultants working for them. After all, although you always know what is best for your company, it may not always work if everyone knows that it was your idea in the first place. That's why you need a consultant, however expensive should may prove to be, to do your dirty work for you. Before you hire a consultant, however consult **Bluff Your Way in Consultancy** – part of the popular B-Y-W series to find out what the second-oldest profession in the world is really all about.

Entertaining: No client, and still less a potential one, is ever entertained by a would-be advisor. It's manifestly the business of the client to entertain the consultant. Bear that in mind when choosing the venue for meetings.

Networking: Spending time-and effort-infiltrating the top management secretarial network of a client's firm is indispensable for the successful consultant. Your secretary could be his ally or a fearsome adversary-provided you handle it right.

The First Meeting: Consultants always play hard to get. A blank diary is made to seem full, always giving the impression that they had to tear themselves away from more urgent matters to attend to your needs.

The Fee: Everybody knows consultancy is an expensive business. Remember: the man won't try and disillusion you. He might try and charge more; it's your job to know the market rate.

The Objective: Consultants

Thursday, December 18, 2008

On this day….1 year ago………… RBS paid $ 100bn for ABN Amro

For this amount it could now buy…………

1. **Citibank $22.5bn**
2. **Morgan Stanley $10.5bn**
3. **Goldman Sachs $21bn**
4. **Merrill Lynch $12.3bn**
5. **Deutsche Bank $13bn**
6. **Barclays $12.7bn**

And still have $8bn change…..for which you would be able to pick up GM, Ford, Chrysler and the Honda F1 Team !

RAW MATERIAL SCENARIO

NAME OF THE CHEMICAL	PRICE / KG.	REMARK.
Adipic Acid	Rs. 70.00 Basic	International booking $ 1100
Benzoic Acid	Rs. 56.00 Basic	Imported material available. Local availability improved.
Bisphenol "A"	Rs. 47.00 Basic	Local material not available. International booking $ 800.
Normal Butanol	Rs. 43.00 Basic	International booking $ 750.
Cyclohexanone	Rs. 54.00 Basic	Easy availability.
Diacetone Alcohol	Rs. 77.00 Basic	Likely to remain steady.
Diethylenetriamine (DETA)	Rs. 190.00 Basic	International booking $4300.
Epichlorohydrin	Rs. 47.00 Basic	International prices $900.
Ethylenediamine	Rs. 270.00 Basic	International booking $4400.
Fumaric acid	Rs. 53.00 Basic	Availability improved.
Glycerine	Rs. 33.00 Basic	Price expected to go up. International price $580.
Gum Rosin	Rs. 48.00 Basic	Availability improved. International booking up to $850 from Indonesia.
Isopropyl Alcohol	Rs. 40.00 Basic	Easy availability. International booking $800.
Maleic Anhydride	Rs. 49.00 Basic	Imported material available. International booking $760.
Melamine	Rs. 66.00 Basic	International booking $1040.
M. M. Monomer	Rs. 118.00 Basic	Price expected to remain steady.
Paraformaldehyde 91%	Rs. 41.00 Basic	International booking $780.
Pentaerythritol	Rs. 67.00 Basic	Prices expected to remain steady.
Phthalic Anhydride	Rs. 45.00 Basic	Expected to remain steady or may go up
Phenol	Rs. 48.00 Basic	Easy availability. Price expected to remain steady or may go down.
Tolune	Rs. 32.50 Basic	Imported material available.
TETA	Rs. 280.00 Basic	International prices $5100
Mix-Xylene	Rs. 28.00 Basic	Easy availability.
Ortho-Xylene	Rs. 54.00 Basic	Imported material available

Recent Advances In Emulsions

By Ms. Mrinalini D. Patil and Professor (Dr.) M.A. Shenoy, ex- Head, Department of Polymer Engineering and Technology and Department of Surface Coating Technology in University Institute of Chemical Technology Matunga, Mumbai - 400 019. INDIA.

Emulsions

An emulsion may be defined as an opaque, heterogeneous system of two immiscible liquid phases ('oil' and 'water'), where one of the phases is dispersed in the other as drops of microscopic or colloidal size (typically around 1m). There are two kind of simple emulsions, oil-in-water (O/W) and water-in-oil (W/O), depending on which phase comprises the drops. Emulsions made by the agitation of the pure immiscible liquids are very unstable and break rapidly to the bulk phases. Such emulsions may be stabilized by the addition of surface-active materials, which protects the newly formed drops from re-coalescence. An emulsifier is a surfactant, which facilitates emulsion formation and aids in stabilization through a combination surface activity and possible structure formation at the interface.

Emulsification

Emulsification consists of dispersing one fluid into another, nonmiscible one, via creation of an interface. Properties of emulsions (e.g., stability, rheological properties) and their industrial uses are governed not only by variables such as temperature and composition but also by the droplet size distribution. The highest level of control consists of producing "monodisperse," that is, narrow size distributed emulsions with a tunable mean size. From a fundamental perspective, monodispersity has allowed significant progress in emulsion science Monodispersity also opens perspectives for new technological applications

Following is a brief review of some possible routes to fabricate emulsions such as high-pressure homogenization and membrane, microchannel and spontaneous emulsification, along with the recent advances in each method.

1. High-Pressure Homogenization

High-pressure homogenization (microfluidization) is widely used for producing dairy and food emulsions. It consists of forcing the two fluids or a coarse premix to flow through an inlet valve, into a mixing chamber, under the effect of a very high pressure. The fluids undergo a combination of elongation and shear flows, impacts, and cavitations. Despite the complexity of the mechanisms involved, the size distributions are usually reproducible with a mean size ranging from 50 nm to 5 m.

Emulsification by high-pressure homogenization results from a dynamical equilibrium between breakup promoted by drop deformation resulting from the high speed flow and of recombination (coalescence) promoted by collisions. Numerous studies have been performed to determine the effect of stabilizing agent concentration (protein or surfactant), applied pressure, number of cycles on the droplets size and emulsion stability. Taisne and Cabane [1] have developed a refractive index contrast matching technique allowing the determination of oil exchange between the droplets. They were able to distinguish two regimes of emulsification in a high-pressure homogenizer depending on the surfactant concentration, *C*surf.

In the **"surfactant-poor" regime** (*C*surf <CMC/10 where CMC is the critical micellar concentration), the average drop size, *d*, only weakly depends on the applied pressure. Lobo and co-workers [2] have elaborated a quantitative method based on the dilution of a fluorescent excimer signal during oil exchange to determine the number of coalescence events during emulsification. They showed that a high level of coalescence leads to emulsions with average diameters ranging from 0.3 to 2 ìm depending on the surfactant concentration. Drops are first fragmented at a low size and then coalesce because of insufficient interfacial coverage. In the **"surfactant-rich" regime** (*C*surf > 10 CMC), the average droplet diameter d is lower, typically varying from 50 to 350 nm, and is almost independent of the surfactant concentration. Even though coalescence can not be completely arrested in a high-pressure homogenizer, a low level of recombination is attained. Hence, the size is determined mainly by droplet fragmentation and scales with the applied pressure P_h as:

$$d \, \alpha \, P_h^{-\alpha} \quad (1:1)$$

where the power law *á* typically varies between 0.6 and 0.9.
Br¨osel and Schubert [3] showed that during the deformation and breakup of a single drop, almost no surfactant molecules adsorb at the new interface because the adsorbing time is larger than that of disruption. Surfactant adsorbs between two breakup events, thus lowering the interfacial tension and facilitating further rupturing. The existence of two regimes can be generalized to protein-stabilized emulsions: larger sizes are obtained by drop coalescence for low protein concentrations. Other parameters may influence the final droplet size distribution:

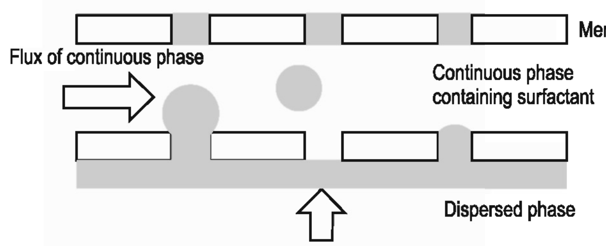


Figure 1:1. Schematic principle of membrane emulsification

(1) an increasing number of passes reduces the size distribution width.
(2) whatever the emulsifier (surfactant or proteins), large dispersed phase volume fractions favor collisions and recombinations but the droplet volume fraction *ö* has little influence on the average size for *ö* < 30%.

2. Membrane Emulsification

Membrane emulsification consists of forcing the dispersed phase to permeate into the continuous phase through a membrane having a uniform pore size distribution. The dispersed phase is pressed perpendicular to the membrane while the continuous phase is flowing tangential to the membrane (Fig. 1.1). Although easy in principle, membrane emulsification is dependent on many parameters such as membrane properties, fluxes, and formulation, all influencing the emulsion size distribution.

To obtain a monodisperse emulsion, the membrane pores must themselves have a narrow size distribution. Usually, the drop size is proportional to the pore size. The choice of membrane porosity is the result of a compromise: if the pore density is too large, coalescence of freshly formed drops is likely to occur, increasing polydispersity; conversely, if the pore density is too low, the production rate is insufficient. The dispersed phase should not wet the membrane coating and consequently a hydrophilic membrane should be used to produce an oil-in-water (O/W) emulsion. High continuous phase velocity and low interfacial tension will promote small drops.

The pressure to be applied to the dispersed phase depends on both the interfacial tension and the membrane pore size. A compromise between high pressures promoting either large drops or a dispersed phase jet and low pressures decreasing the production rate should be found. For a more detailed review on membrane emulsification of simple and double emulsions, the one can refer to [4] and [5] and references therein.

3. Microchannel Emulsification

Microchannel technology allows fabrication of monodisperse emulsions with an average droplet diameter ranging from 10 to 100 ìm. The principle is reminiscent of membrane emulsification. The dispersed phase is forced into the continuous phase through microchannels manufactured via photolithography. A scheme of a microchannel device is shown in Fig. 1.2. The use of a high-speed camera and a microscope allows direct observation of the flow and of the emulsi-fication process. The phase to be dispersed is pushed through a hole in the center of the plate in such a way that it passes through the microchannels and in-flates on the terrace in a disk-like shape. When it reaches the end of the terrace, the phase falls onto the well and a drop detaches. The spontaneous detachment and relaxation into the spherical drop are driven by interfacial tension.

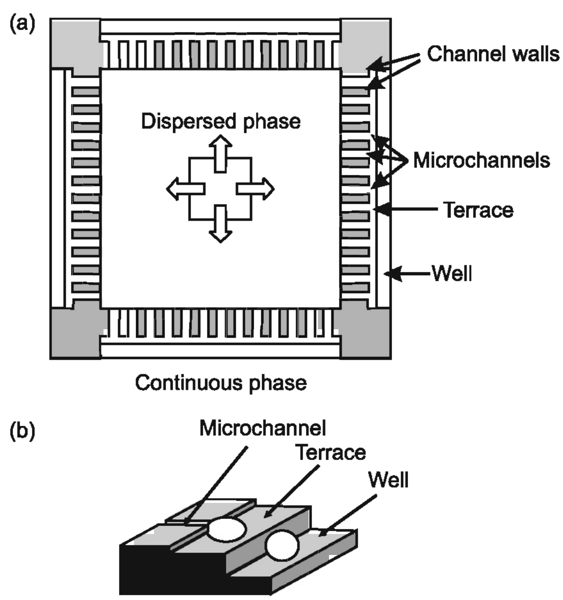


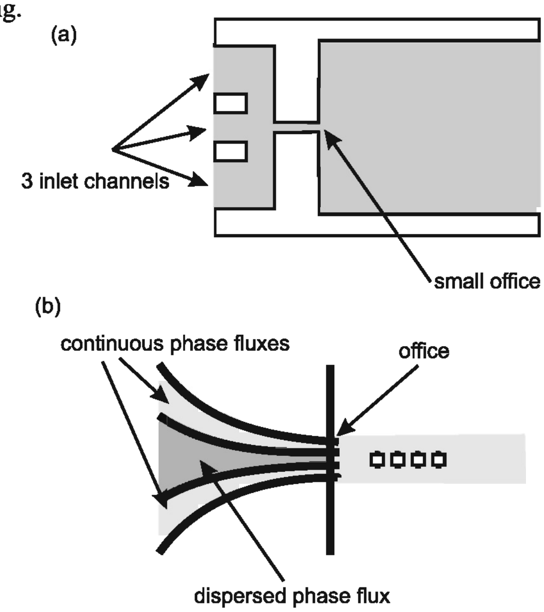
Figure 1:2. Schematic principle of microchannel emulsification. (a) Top view; (b) side

Outstanding monodispersity is obtained by this process. Direct, reverse, and multiple emulsions can be developed. As for membrane emulsification, an O/W emulsion is produced using hydrophilic microchannels, whereas producing a W/O emulsion requires a hydrophobic device. The influence of various parameters on droplet size and monodispersity has been studied:

- The geometry of the device is important; the terrace length and microchannel depth are size-determining factors.
- At low flow velocity of the dispersed phase, the interfacial tension does not influence the droplet diameter but it affects the time-scale parameters for droplet formation; the detachment time becomes shorter at high interfacial tension (low surfactant concentration).
- The surfactant type (anionic, nonionic) is indifferent, but cationic surfactants should be avoided to produce O/W emulsions because they lead to complete wetting of the dispersed phase on the microchannel plate.

More complex geometries have been developed [6] and the influence of the geometrical structure has been examined. Although straight-through microchannel emulsification has been developed, the production rates are still low compared to those obtained with standard emulsification methods. However, the very high monodispersity makes this emulsification process very suitable for some specific technological applications such as polymeric microsphere synthesis, microencapsulation, sol–gel chemistry, and electro-optical materials.

Microchannel technology has also opened the route to microfluidics. Devices with different geometries have been reported. Emulsification can proceed through flow focusing where geometries are composed of three inlet channels and a small orifice located downstream (Fig. 1.3a and b). The liquid that becomes the dispersed phase flows into the middle channel and the second immiscible fluid flows into the two outside channels. When passing through the orifice, the inner fluid breaks into drops of size comparable with the orifice width. As for microchannel emulsification, the geometrical and hydrodynamic parameters influence both droplet size and polydispersity. Use of an expanding nozzle geometry (Fig. 1.3c) allows fixing the position of drop breakup at the orifice where the shear force is the highest. Emulsification can also be induced by a junction defined as the intersection of two microchannels, where the shear is locally highest. Using a two-step method and both hydrophilic and hydrophobic junctions, double emulsions can be obtained. Microfluidic emulsification is suitable for certain specific applications such as in microactuators, allowing rapid manipulation of microdroplets, or in microreactors, where it is useful for screening of protein crystallization conditions, glucose detection in clinical diagnostic, and controlling a reaction or mixing.



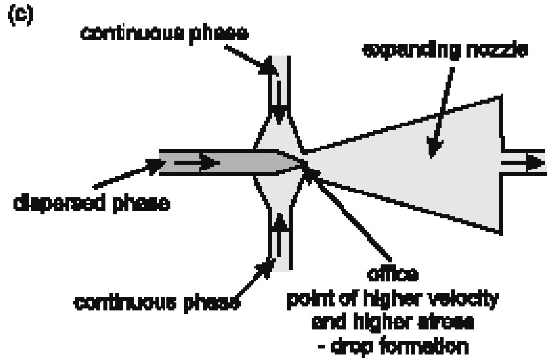


Figure 1:2. Schematic principle of "flow focusing" emulsification.

4. Spontaneous Emulsification

Spontaneous emulsification is a process that occurs without external energy supply when two immiscible fluids with very low interfacial tension are brought in contact. The most famous example of spontaneous emulsification is the famous "pastis" beverage put in contact with water. Without stirring, the blend becomes turbid. Because increasing the interfacial area generally requires energy input, spontaneous emulsification is an intriguing phenomenon, as revealed by the abundant literature devoted to it. It is worth noting that in industrial processes, the kinetics of this kind of emulsification, also termed self-emulsification, is accelerated by an energy supply. Spontaneous emulsification was reported for the first time in 1878 by Joahnnes Gad [7]. Although observed a long time ago, this phenomenon is still not fully understood. So far, different mechanisms have been proposed and some of them are described hereafter

Interfacial turbulence :
Due to a nonuniform distribution of surfactant molecules at the interface or to local convection currents close to the interface, interfacial tension gradients lead to a mechanical instability of the interface and therefore to production of small drops.

Negative interfacial tension:
Due to adsorption of surfactants or cosurfactant molecules, the interfacial tension can become extremely low (less than 1 mN/m) and eventually transiently negative. Therefore, the interface can increase and any fluctuation can break it.
The two aforementioned mechanisms involve a *mechanical* instability of the interface that breaks up and produces small droplets.

Diffusion and stranding:
In this case, emulsification has a *chemical* origin and can take place even for quite high interfacial tensions. This kind of spontaneous emulsification often occurs when a cosolvent, soluble in both phases, is present. For example, if a mixture of alcohol and oil is brought in contact with water, the alcohol diffuses from the oil to the water phase, carrying with it some oil that can be "stranded" in fine drops as soon as water becomes supersaturated in oil. Although emulsification is an out-of-equilibrium process, phase diagrams coupled with the diffusion path theory can be used to predict the phases that are likely to form when the two fluids are brought in contact and to determine the phase in which spontaneous emulsification will take place. More recently, other mechanisms have been proposed to explain spontaneous emulsification owing to the development of new experimental techniques. Among others, one can mention the formation and swelling of water/surfactant aggregates at the vicinity of the interface. The structural change and the swelling can be driven by temperature, osmotic, or concentration gradients. In addition to the amazing and spectacular nature of this phenomenon, spontaneous emulsification is attractive because of the numerous potential applications in various fields such as agriculture (emulsifiable concentrates for insecticides, pesticides, and herbicides), pharmaceutics, cosmetics, oil recovery, and all applications in which nanometric emulsions are required. For a more complete review of spontaneous emulsification, the one can refer to the reviews of Miller [8] and Lopez-Montilla et al. [9]. Despite the ease of production (no or low energy input) and the diversity of applications, spontaneous emulsification applies only to moderate dispersed volume fractions (less than 10%).

References

[1] L. Taisne, P. Walstra, and B. Cabane: "Transfer of Oil Between Emulsion Droplets," J. Colloid Interface Sci. 184, 378 (1996).

[2] L. Lobo, A. Svereika, and M. Nair: "Coalescence During Emulsification, 1. Method Development." J. Colloid Interface Sci. 253, 409 (2002).

[3] S. Br¨osel and H. Schubert: "Investigation of the Role of Surfactants in Mechanical Emulsification Using a High-Pressure Homogenizer with an Orifice Valve." Chem. Eng. Process. 38, 533 (1999).

[4] S.M. Joscelyne and G. Tr¨agardh: "Membrane Emulsification—a Literature Review." J. Membr. Sci. 169, 107 (2000).

[5] S. Van der Graaf, C.G.P.H. Schro¨en, and R.M. Boom: "Preparation of Double Emulsions by Membrane Emulsification—a Review." J. Membr. Sci. 251, 7 (2005).

[6] S. Sugiura, M. Nakajima, and M. Seki: "Prediction of Droplet Diameter for Microchannel Emulsification: Prediction Model for Complicated Microchannel Geometries." Ind. Eng. Chem. Res. 43, 8233 (2004).

[7] G. Quincke: "Ueber Emulsionbildung Und Den Einfluss Der Galle Bei Der Verdauung." Pfl¨uger Arch. Physiol. 19, 129 (1879).

[8] C.A. Miller: "Spontaneous Emulsification Produced by Diffusion—a Review." Colloid Surfaces 29, 89 (1988).

[9] J.C. Lopez-Montilla, P.E. Herrera-Morales, S. Pandey, and D.O. Shah: "Spontaneous Emulsification: Mechanisms, Physicochemical Aspects, Modeling and Applications." J. Dispersion Sci. Technol. 23, 219s (2002).

YEAR 2008 RETROSPECT

IRMA organized a Seminar in the month of September 2008 on "Resins – Today & Tomorrow – VI "Changing Face of Resin Industry". The Chief Guest was Mr. H. M. Bharuka, MD, Kansai Nerolac Paints Ltd. There were five presentations by Dr. Prashant Samant on "Water Thinnable Alkyds", Dr. Ashok Shingore, Sudarshan Chemicals Ltd., on "Safety & Environment", the Session was Chaired by Mr. Aseth Sarkar of Akzo Noble India and by Mr.Vrijesh Kumar Singh of Perstorp on "Non Conventional Polyols for Resins", Dr. Paul Cameron from Croda on "Novel Application of Dimer Acid", Mr. Jagdeep Kapoor, Renowned Brand Guru on "Brand Marketing, the Session was Chaired by Dr. Mosongo Moukwa of Asian Paints Ltd. There were Questions and Answers in each session. The programme was appreciated by the delegates.

On the same day IRMA Annual General Body Meeting was held. The following are the Committee Members for the year 2008 - 09:-

Mr. Vicky Kapur	-	Chairman
Mr. Ballal Chandrachud	-	Vice Chairman
Mr. Ashok Goklani	-	Hon. Secretary
Mr. Bhupendra Sakaria	-	Treasurer
Mr. Ashok Mehta	-	Past Chairman & Committee Member
Mr. Nirav Raveshia	-	Committee Member
Mr. T. R. Raghuraman	-	Committee Member
Mr. Rupen Choksi	-	Committee Member
Mr. Siddharth Shah	-	Co-opted Member
Dr. Prashant Samant	-	Co-opted Member
Mr. Anil Bajaria	-	Co-opted Member
Mr. Subash L. Purohit	-	Co-opted Member

Left to right sitting: Mr. D.M. Sathaye, Mr. B. Chandrachud, Mr. Vicky Kapur, Mr. Ashok Mehta, Mr. D.G. Parikh, Dr. Prashant Samant. Standing: Dr. K.K. Saxena, Mr. Rajesh Doshi, Mr. Rupen Choksi, Mr. Bhupendra Sakaria, Mr. Nirav Raveshia, Mr. Siddharth Shah, and Mr. Ashok Goklani

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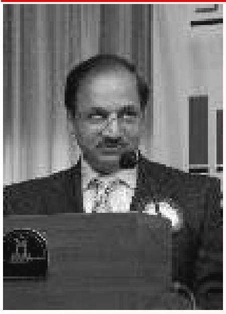


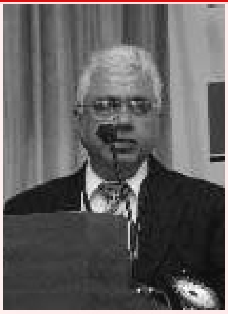
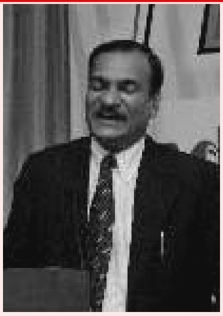





ALWAYS LOOK FOR SIMPLE SOLUTIONS

Case 1

When NASA began the launch of astronauts into space, they found out that the pens wouldn't work at Zero gravity (ink won't flow down to the writing surface).

To solve this problem, it took them one decade and $ 12 million.

They developed a pen that worked at zero gravity, upside down, underwater in practically any surface including crystal and in a temperature range from below freezing to over 300 degrees C.

And what did the Russians do... ?
They used a pencil!

Case 2

One of the most memorable case studies on Japanese management was the case of the empty soapbox, which happened in one of Japan's biggest cosmetics companies.

The company received a complaint that a consumer had bought a soapbox that was empty. Immediately the authorities isolated the problem to the assembly ! Line, which transported all the packaged boxes of soap to the delivery department. For some reason one soapbox went through the assembly line empty.

Management asked its engineers to solve the problem. Post haste, the engineers worked hard to devise an Xray machine with high resolution monitors manned by two people to watch all the soapboxes that passed through the line to make sure they were not empty.

No doubt, they worked hard and they worked fast but they spent a whooper amount to do so.

But when a rank-and-file employee in a small company was posed with the same problem, he did not get into complications of X-ray, etc., but instead came out with another solution. He brought a strong industrial electric fan and pointed it at the assembly line.

He switched the fan on, and as each soapbox passed the fan, it simply blew the empty boxes out of the line.

MORAL

Always look for simple solutions

Always focus on solution & not on problems

So at the end of the day, the thing that really matters is

HOW WE LOOK INTO THE PROBLEM ...