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IRMA NEWS

Vol. No. 6 ISSUE No. 2 June 2009

CHAIRMAN SPEAKS

Chairman

Vice Chairman

VOICE OF VICE CHAIRMAN

Dear Friends,

I am taking this opportunity and liberty to communicate with you all as our Chairman, Mr. Vicky Kapur is having a gala time in Europe. The communication is a two day process and I request at least some of you to communicate with Committee Members in giving suggestions, appreciation and give positive criticism for the work done or not done by the Committee Members. We are organizing two days Workshop on the topic "Designing formulations for Resins" which is very vital and crucial subject in today's scenario. It is absolutely essential for our survival in the industry to be competitive and to give better quality to our customers at a reasonable price. Yes, we must keep changing our formulations to give these end results. Therefore, I request our members to enroll in large number and take advantage of this Workshop. Our Workshop Committee Members, Dr. Prashant Samant, Dr. M.A. Shenoy, Mr. Ashok Goklani and yours faithfully are working very hard to make this Workshop successful. Eminent speakers will be sharing their knowledge in Designing Formulations for various types of Resins.

On successful completion of this Workshop the Committee will be undertaking the exercise of arranging visits to factories and laboratories for IRMA Members. It will give an opportunity for all of us to enjoy fellowship and at the same time learning something.

Ballal Chandrachud ...*Vice Chairman – IRMA*

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 2666 : E-mail: irma_org@hotmail.com

EDITORIAL

Friends!

The verdict 2009 has put to rest all speculations that carried out like hung parliament, govt. supported by left parties, etc-etc. It is a mandate for stability, Security and economy of the country. The UPA govt. now has no barriers in pushing forward the reforms like disinvestments in PSU'S and labour reforms. The infrastructure development and power generation needs to be given required impetus which should generate employment and good business environment for FDI'S. Let's hope and wish UPA GOVT under Dr. Manmohan Singh will scale new heights and will make our country's economy strongest in the world.

Friends, IRMA has organized a workshop on 3rd & 4th July in U.I.C.T. Mumbai on 'Designing formulations for resins. It's an extremely important subject for a resin chemist and industries must take advantage of this unique opportunity. The subjects like Alkyds, Acrylics, Amino, Epoxy, Polyurethane and also water based resins will be discussed in detail. Experienced faculty from industry and institutes will deliver lectures on the abovementioned subjects.
Happy learning, friends.

Dr. PRASHANT SAMANT
Editor

INTERESTING ONE LINERS:

1. I've got to sit down and work out where I stand.
2. Where there's a will, I want to be in it.
3. Take my advice, I don't use it anyway.
4. A conscience does not prevent sin. It only prevents you from enjoying it.
5. If at first you don't succeed, skydiving is not for you.
6. War doesn't determine who's right. War determines who's left.
7. If your father is a poor man, it is your fate but, if your father-in-law is a poor man, it's your stupidity.
8. I was born intelligent – education ruined me.
9. A bus station is where a bus stops. A train station is where train stops.
   On my desk, I have a, work station…..What more can I say
10. If it's true that we are here to help others, then, what exactly are the others here for.
11. Since light travels faster than sound, people appear bright Until you hear them speak.
12. How come "abbreviated" is such a long word
13. Living on Earth may be expensive…but it includes an annual free trip around the sun.
14. Your future depends on your dreams. So go to sleep !
15. Can you do anything that other people can't ? Sure, I can read my handwriting…
16. A drunk was hauled into court. Mister, the judge began, you've been brought here for drinking….Great, the drunk exclaimed. When do we get started ?

INSPIRATIONAL FUNNY FACTS:

10% of road accidents are due to drunken driving. Which makes it a logical statement that 90% of accidents are due to driving without drinking!

Laziness is out biggest enemy – Jawaharlal Nehru
We should learn to love our enemies – Mahatma Gandhi
Ab aap batayye kiski sune bapu di ya chacha ki??? (which one you will choose?)

So many options for suicide: Poison, sleeping pills, hanging, jumping from a building, lying on train tracks,
But we chose Marriage, slow and sure !

A man threw his wife in a pond of Crocodiles? He's now being harassed by the Animal Rights Activists for being cruel to the Crocodiles!

He was a good man. He never smoked, drank, had no affair. When he died, the insurance company refused the claim. They said, he who never lived, cannot die!

Expecting the world to treat u fairly coz u r a good person is like Expecting the lion not to attack u coz u r a vegetarian. Think about it.

Don't walk as if you rule the world, Walk as if you don't care who rules the world! That's called Attitude! Keep on rocking!

Every lady hopes. That her daughter will marry a better man than she did. And is convinced that her son will never find a wife as good as his father did!!!

DON'T COPY IF YOU CAN'T PASTE !

A popular motivational speaker was entertaining his audience. Said he: "The best years of my life were spent in the arms of a woman who wasn't my wife!"

The audience was in silence and shock.
The speaker added: "And that woman was my mother!"
Laughter and applause.

A week later, a top manager trained by the motivational speaker tried to crack this very effective joke at home. He was a bit foggy after a drink.

He said loudly, "The greatest years of my life were spent in the arms of a woman who was not my wife!"
The wife went wan with shock and rage.
Standing there for 20 seconds trying to recall the second half of the joke, the manager finally blurted out"…and I can't remember who she was!"

Moral of the story: Don't copy if you can't paste !

RAW MATERIAL SCENARIO

NAME OF THE CHEMICAL	PRICE / KG.	REMARK.
Adipic Acid	Rs. 84.00 Basic	International booking $ 1550
Benzoic Acid	Rs. 69.00 Basic	Imported material available. Local availability improved.
Bisphenol "A"	Rs. 65.00 Basic	Local material not available. International booking $ 1200.
Normal Butanol	Rs. 49.00 Basic	International booking $ 860.
Cyclohexanone	Rs. 64.50 Basic	Easy availability. Likely to go up
Diacetone Alcohol	Rs. 68.00 Basic	Likely to remain steady.
Diethylenetriamine (DETA)	Rs. 230.00 Basic	International booking $3450.
Epichlorohydrin	Rs. 75.00 Basic	International prices $1380.
Ethylenediamine	Rs. 189.00 Basic	International booking $3400.
Fumaric acid	Rs. 46.00 Basic	Availability improved.
Glycerine	Rs. 33.00 Basic	Price to remain steady. International price $580.
Gum Rosin	Rs. 47.00 Basic	Availability improved. International booking up to $840 from Indonesia.
Isopropyl Alcohol	Rs. 46.00 Basic	Easy availability. International booking $800.
Maleic Anhydride	Rs. 50.00 Basic	Imported material available. International booking $870.
Melamine	Rs. 72.00 Basic	International booking $1130.
M. M. Monomer	Rs. 104.00 Basic	Price expected to remain steady.
Paraformaldehyde 91%	Rs. 31.00 Basic	International booking $550.
Pentaerythritol	Rs. 73.00 Basic	Prices expected to remain steady.
Phthalic Anhydride	Rs. 54.00 Basic	Expected to remain steady or may go up
Phenol	Rs. 59.00 Basic	Easy availability. Price expected to remain steady or may go down.
Tolune	Rs. 41.00 Basic	Imported material available.
TETA	Rs. 255.00 Basic	International prices $4550
Mix-Xylene	Rs. 42.00 Basic	Easy availability.
Ortho-Xylene	Rs. 45.00 Basic	Imported material available

POLYMERS FOR AUTOMOTIVE COATING TECHNOLOGIES

Deepak H Shanbhag
Senior Officer
Asian PPG Industries Limited
Lal Bahadur Shastri Marg, Bhandup (w), Mumbai 400078

The automotive finishes process consists of the application of several layers of inorganic or organic based coatings using a variety of application techniques (Fig 1).

Film builds in OEM (Original Equipment Manufacturer) are controlled by the application technique and all layers from Pretreatment and electrocoat to topcoat are heat cured at high temperature (above 120°C)

In this respect, repair coatings (Auto Refinish) are different since film builds depend on the application method and product quality. Repair paints are cured at lower temperatures (room temperature to a maximum of 60°C)

The various coats applied for film builds in OEM are as follows in the order in which they are applied on a bare metal substrate:

1. Pretreatment
2. Electrocoat
3. Anti-chip primer / Primer-surfacer
4. Base coat
5. Clear coat

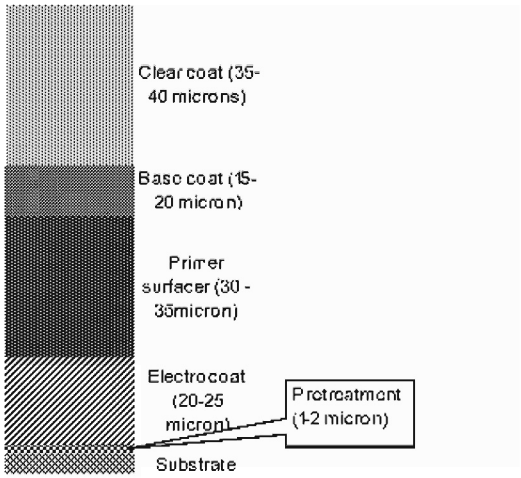

FIGURE 1: VARIOUS LAYERS IN THE PAINT FILM ON A VEHICLE

PRETREATMENT

Pretreatment bath does not contain use of any polymeric part. It is basically an inorganic treatment of the substrate.

ELECTROCOAT

Cationic electrocoat applied by dipping process is used worldwide for coating autobodies and its adoption in 1970's and 1980's led to major improvement in the corrosion resistance of cars. Until mid 1970, electrocoat was of anodic type. In 1976, PPG introduced the first cathodic primer and this technology, with continuous improvement has become the standard of the automotive industry worldwide.

The resins used in CED are epoxy amine resins neutralized by an acid and dispersed in water. Current CED systems are characterized by excellent corrosion protection, good throwing power and good filling properties at film thickness of ca.20 µ.

ANTI-CHIP PRIMER AND PRIMER-SURFACERS

There are also primers other than the above CED system. These primers are used in areas vulnerable to stone chipping, for e.g. Lower rocker panels. While the basecoat/clearcoat might be damaged from severe stone impingement, the anti-chip primer helps to minimize chipping all the way down to bare metal. Anti-chip primer system consists of polyester resin having better anti-chip properties which are combined with amino resins. The anti-chip primers are used in the areas vulnerable to stone chipping, primer-surfacers are used throughout the rest of the vehicle to provide a smooth surface for the subsequent basecoat/clearcoat. In some cases, this primer-surfacer may also be tinted to a colour compatible with the basecoat to assist in its colour development.

Water based primer-surfacer were introduced in 1985 and proved to give an excellent balance of properties and wide application tolerance on the line.

BASECOAT AND CLEARCOAT

The technology used in OEM basecoats has been based on polyester polyols which are cross-linked with melamine formaldehyde adducts in a stoving cycle of 30 min at 130-140 C. The technology used in OEM clearcoats has been based on acrylic polyols which are cross-linked with melamine formaldehyde amino resin in a stoving cycle of 30 min at 130-140 C.
In the past Medium solids basecoat and clearcoat were used. But, in response to the environment protection agency (EPA), low VOC (Volatile Organic Content) basecoats (solvent and water borne) were commercialized. These low VOC basecoats and clearcoats form the basis of **"High Solid Technology"**

In High solid technology, the polymers of lower molecular weights are used. This technology uses special polyols as well as special acrylic binders. Reactive diluents such as oxazolidines, Ketimines and aldimines are used in the formulation of high solids 2K finishes.

The control of molecular weight in acrylic polyols is affected by temperature, solvent type, initiator, process conditions and chain transfer agents. Solution polymerization which normally generate lower molecular weight polymers are used for synthesis of automotive polymers with high solids. Mercaptans have been used to control molecular weights. However, high levels are needed in order to get low molecular weights. High levels of mercaptan result in odour problems, poor conversions and poor durability of the coating on outdoor exposure. A highly effective chain transfer agent (CTA) based on cobalt has been discovered. The structure of this material is shown in Fig 2. This CTA is effective at a very low concentration and can synthesize acrylic polyols with a narrower molecular weight distribution. The chain transfer activity mechanism also allows the preparation of macro monomers which can be used in the synthesis of graft copolymers.

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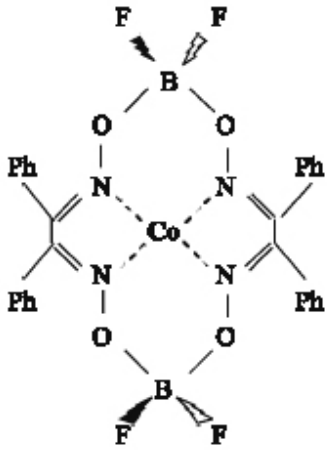

FIGURE 2 : COBALT CHAIN TRANSFER AGENT

Free radical polymeristion (FRP) has been now replaced by Controlled radical polymerization (CRP). CRP is carried out using reversible addition fragmentation transfer (RAFT) agents such as Dibenzyltri Thio carbonate. The CRP carried out using RAFT agents give narrow range of chain lengths, controlled molecular weights and lower PDI.

Microgels formed from nonaqueous emulsion polymerizations are added to prevent sagging in high solids coatings. Polymer microgels and organoclays are the common rheology control agents in high solids coatings.

High solids coating with lower molecular weights are considered undesirable because properties like scratch and mar resistance usually decrease proportionally with molecular weight. But if a careful synthesis technique like catalytic chain transfer with the cobalt complexes is used to retain the number of functional groups in the oligomer as molecular weight decreases, molecular weight is no longer a problem. The insight here is to realize that low molecular weight itself is not bad, but a non functional molecular weight is catastrophically bad.

Another emerging technology is Nanotechnology.

NANOTECHNOLOGY

Nano means one-billionth and, by definition, for nanotechnology we are working with particles whose size ranges from 0.1 to 100 nanometers. In automotive coating industry, this technology is used by the use of raw materials and additives that are nanosized. These extremely small particles are able to do things that their more standard sized cousins are not. For example, nano sized pigments yield more chromatic colours, thus giving the automotive colour stylists more colour options to offer their customers. There are also nano-sized additives that are being used to improve the mar and scratch resistance of clearcoats.

PPG is incorporating nanomaterials in clear coats. They use nanoparticles in such a way that drastically cuts down the amount of dullness and cloudiness that develops when you get scratches from washing the car and other environmental factors.

WATER BASED CLEARCOATS FOR OEM

The successful introduction of waterborne basecoats in OEM was the start of the development of a water based clearcoat. So far this has been a success due to the different requirements for basecoat versus clearcoats. Basecoats are typically based on higher molecular weight acrylic or urethane emulsions which are modified to give a pseudoplastic rheology. Such binders cannot be used for clearcoats since they give poor productivity and aesthetic appearance. Solvent based acrylic polymers are considered a better choice and are used. They suffer only on account of the VOC which they generate.

The automotive coating industry has focused on not only improving existing technologies, but also is investigating alternative 'clearcoats' for e.g. Clear powder coatings.

POWDER CLEARCOATS FOR OEM

Clear powder coatings have successfully been applied over base coats resulting in ceramic-like finishes with excellent aesthetics and performance characteristics. Powder coatings do have interesting features since they are close to zero VOC and could easily be recycled. Powder slurries are also used in OEM coatings.

SELF-HEALING COATING

A more appealing development being pursued is a clearcoat that is "Self-healing". The two component polyurethane coatings are inherently self-healing due to their unique chemistry and offer a number of intrinsic advantages that address customer and market requirements. These type of self-healing coatings actually "repairs" day-to-day scratches by re-flowing the clearcoat when exposed to warm temperatures. The advantages of self-healing coatings include:

1. High reactivity and full crosslinking even at low-temperature.
2. Good chemical resistance curing and weather stability.
3. Hardness, toughness and elasticity due to urethane and urea structure.

4. Hydrogen bonds that allow for thermoplastic flow to relieve stress and allow self-healing of defects.
5. Pleasing optical properties (a high gloss or "wet look")

WET-ON-WET-ON-WET APPLICATION (3 COAT 1 BAKE):

In this technology, the primer surfacer is not baked and after flash-off, Basecoat is applied on it and after flash-off of this base coat the clearcoat is applied and finally the substrate is baked. Hence this technique is also called 3 Coat 1 Bake or simply 3C1B technology.

This is a very useful, productive and economical technology. The above primer surfacer drying oven section is eliminated. The space required and the capital expenditure is reduced by about 30%. The complexity of the painting process is clearly reduced resulting in reduction of material consumption. It is because of the development of above wet-on-wet coating technology, coating machines, automated cleaning processes and modern paints, the time taken today for the coating process, including pretreatment can be as short as 8 hrs for a car body leaving the body shop and entering the assembly line.

STAR POLYMERS

Using ring opening polycondensation oligomers can be prepared with narrow molecular weight distribution, control of functionality and compositional distribution (Fig 3).

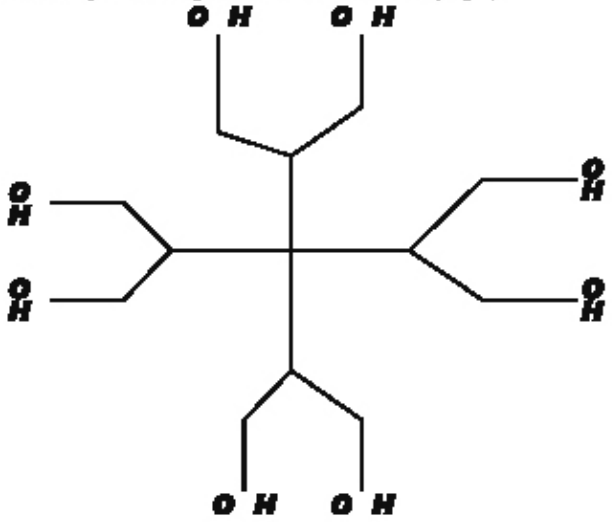

FIGURE 3 : HYDROXY FUNCTIONAL STAR POLYMER

Such oligomers are called "Star Polymer" These star polymers offer advantages against acrylic polyols in drying performance and VOC.

NON-AQUEOUS DISPERSIONS (NAD)

NAD prepared using different types of hydroxyl functional graft co-polymers offer advantages in properties, VOC and rheology in high solids solvent borne clearcoats.

Aqueous acrylic dispersions and emulsions are prepared using acid (anionic) or amine(cationic) functional macromonomers without surfactants.

COATINGS FOR PLASTICS IN OEM

Use of plastic is increasing to reduce the weight of the vehicle. Different types of plastics like PP-EPDM, ABS, MFN, SMC etc are being used. The primer or tiecoat based on chlorinated polypropylene is necessary for polypropylene. Special epoxy-polyamide primers are used for SMC. Generally, for ABS, primer is avoided to reduce the cost. Top coats on plastics are mainly acrylic polyol – isocyanate (2K PU).

Tightening of VOC regulations are causing formulators of plastic coatings to reformulate with compliant waterborne technologies. Hence the use of **Polyurethane dispersions** (PUD) has been explored. PUD, when used in plastic coating application gives the following advantages.

- Enhances soft feel effect in plastic coatings for applications such as automotive interior.
- Excellent adhesion of primer/filler systems to a variety of plastic substrate type.
- Increased weatherability, toughness and abrasion resistance of waterborne basecoat for automotive OEM and Refinish.

REFINISH COATINGS

Today, refinishing is almost entirely done with polyurethane based basecoat/clearcoat systems.

The technology used in refinish coating is based on acrylic polyols crosslinked with trifunctional isocyanates at room temperature or a maximum of 60C bake. A typical medium solids clearcoat composition is shown in the table below. Such coats are base/metal catalysed and the spray solids by weight is limited for two reasons: a) acrylic polyol molecular weight, hydroxyl value and Tg determine the balance of physical and chemical drying. b) Polyisocyanate trimer, lower molecular weight materials are too toxic to use.

New types of acrylic polyols based on high Tg bulky monomers do offer a better balance of physical dry and low VOC. The examples are Isobornyl(meth)acrylate, 3,3,5-trimethylcyclohexyl(meth)acrylate etc. (Fig 4).

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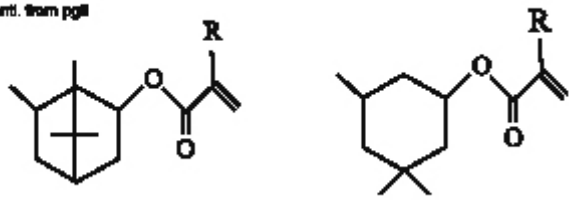

Isobornyl Methacrylate 3,3,5-Trimethylcyclohexyl Methacrylate

FIGURE 4 : SPECIAL HIGH Tg BULKY MONOMERS FOR LOW VOC REFINISH ACRYLIC POLYOLS

REFERENCES :

1. Ulrich Poth "Automotive Coating Formulation"
2. Dr Jos Huybrechts. "Automotive Coating Trends" PPCJ 13-14, April 1996.
3. Kahl L, Halpaap R, Wemgwolt C "2C-PV Automotive OEM Clearcoats with Improved Etch and Scratch Resistance" Surface Coatings International 10, 394-399 (1998).
4. Robinson G M, Hoffman M D, Johnson T L "High Performance Polyurethane Coating System utilizing Oxazolidine base reactive diluents" Waterborne, Higher solids and powder coatings Symposium, Feb 9-11, 1994, New Orleans.

PROGRAMME SCHEDULE FOR WORKSHOP
At U.I.C.T., Matunga, Mumbai - 400 019

Day I – 3rd July 2009

Time		Programme	Speaker
09.00 a.m.	9.30 a.m.	Registration	
09.30 a.m.	10.00 a.m.	Inauguration	
10.00 a.m.	10.30 a.m.	Tea Break	
10.30 a.m.	11.30 a.m.	Introduction	
11.30 a.m.	01.30 p.m.	Lecture – i)	Mr. P. K. Khisamrao
01.30 p.m.	02.15 p.m.	Lunch	
02.15 p.m.	03.30 p.m.	Lecture – ii)	Prof. P. A. Mahanwar
03.30 p.m.	03.45 p.m.	Tea Break	
03.45 p.m.	05.15 p.m.	Lecture – iii)	Dr. S. P. Deshpande

Day II – 4th July 2009

Time		Programme	Speaker
09.30 a.m.	10.00 a.m.	Tea and Breakfast	
10.00 a.m.	12.00 noon	Lecture - iv)	Dr. P. S. Samant
12.00 noon	01.30 p.m.	Lecture - v)	Prof. M. A. Shenoy
01.30 p.m.	02.15 p.m.	Lunch	
02.15 p.m.	03.15 p.m.	Lecture - vi)	Mr. S. Durgavale
03.15 p.m.	03.30 p.m.	Tea Break	
03.30 p.m.	04.30 p.m.	Distribution of Certificate	

And Open house

Photo News - Gargi

IRMA's member Gargi were honored by the presence of His Excellency, Dr. Philipp Rosler, Minister of Economics, Labour and Transport of Niedersachsen, Federal State of Lower Saxony, Germany, Hon'ble Consul General of the Federal Republic of Germany - Mr. Walter Steebel, and members of business delegation (35 Members) visited Gargi's Plant at Navi Mumbai.

Gargi Huttenes Albertus (GHA) is one of the model units of Indo-German joint venture in SBM and therefore the visit by the delegation.

Members of delegation with Dr. Philipp Rosler, Minister for Economics, Labour and Transport of Niedersachsen, Federal State of Lower Saxony, & Mr. Walter Steebel, Consul General of the Federal Republic of Germany along with Gargi HATians.

TWO DAY WORKSHOP ON
"DESIGNING FORMULATIONS FOR RESINS"

REGISTRATION FORM

Indian Resins Manufacturers Association
C/o. Gargi Huttenes Albertus Pvt.Ltd
203, Vasant Vihar Complex,
Next to Basant Cinema, Dr. C. Gidwani Road
Chembur, Mumbai - 400 074

Dear Sir,

Please enroll the following as delegates to the Two days workshop **"Designing Formulations for Resins"** at U.I.C.T., Matunga, Mumbai 400 019 on 3rd and 4th July 2009.

Sl.No	Delegate Name	Designation

Delegate Fees:

For IRMA Members : Rs.1000/- per delegate
For Others : Rs.1500/- per delegate

DD / Cheque _____ Date _____ Amount Rs._____

Bank _____ in favour of **"Indian Resins Manufacturers Association"**

Company Name :_____

Address :_____

_____

Telephone No. :_____

Email ID :_____

Type of products dealt: (a) Resins ☐ (b) Raw materials ☐

Whether (a) Manuf. ☐ (b) Dealer ☐ ©) Trader of Raw materials ☐ Resins ☐

Member of (1) IRMA ☐

(2) OTHERS ☐

Signature _____