

PVC : WHAT DOES THE FUTURE HOLD ?



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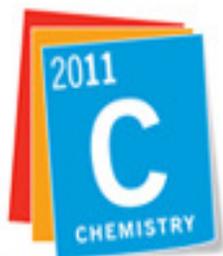
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**Vinyl India 2011
International PVC & Chlor-Alkali
Conference, Mumbai**

April 6, 2011



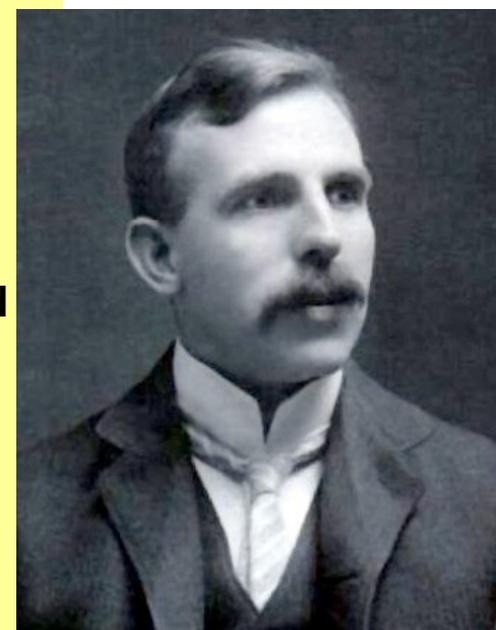
International Year of **CHEMISTRY** 2011



Madame Curie, Nobel Prize in Chemistry, 1911

- Celebrate the achievements of chemistry
- Improve public understanding of chemistry
- Champion the role of chemistry in addressing the critical challenges of our society
 - Food and nutrition
 - Clean water
 - Sustainable energy
 - Climate change
- Broader outreach and engagement
- Get younger people more interested in chemistry

PVC, along with other synthetic polymers that followed, are considered as some of the most significant contributions of chemistry to mankind

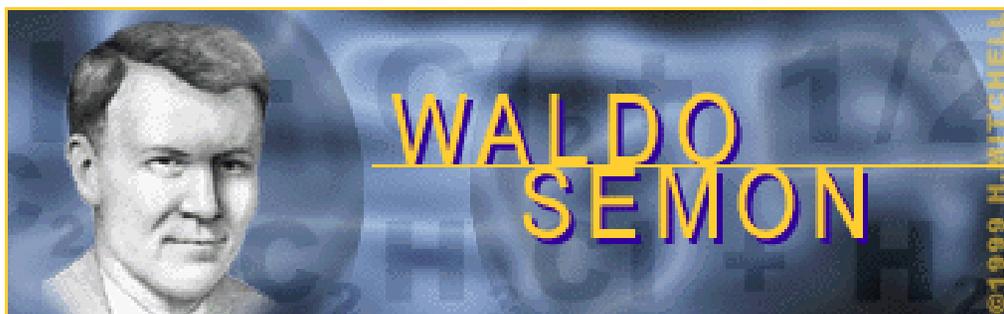
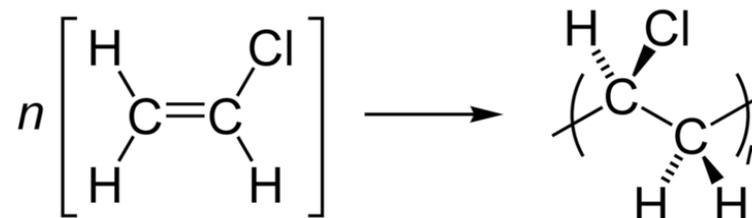


Ernest Rutherford, The Structure of the Atom. 1911

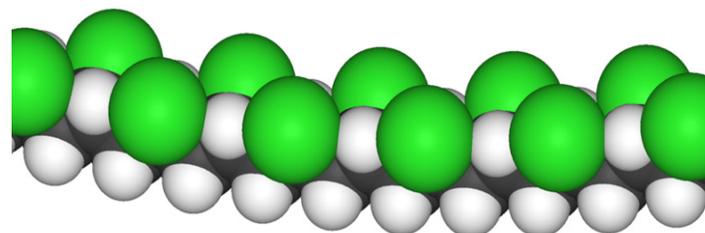
PVC : ORIGINS AND HISTORY



Henri Victor Regnault , 1835



*On December 11, 1935, in Akron ,
Ohio Dr. Semon
made flexible PVC by using a
plasticizer, paving the way for its
large scale applications*



PVC : REPLACEMENT FOR A RENEWABLE RESOURCE



**78 rpm
Gramophone
records**



**33 rpm long
playing records
(vinyls)**



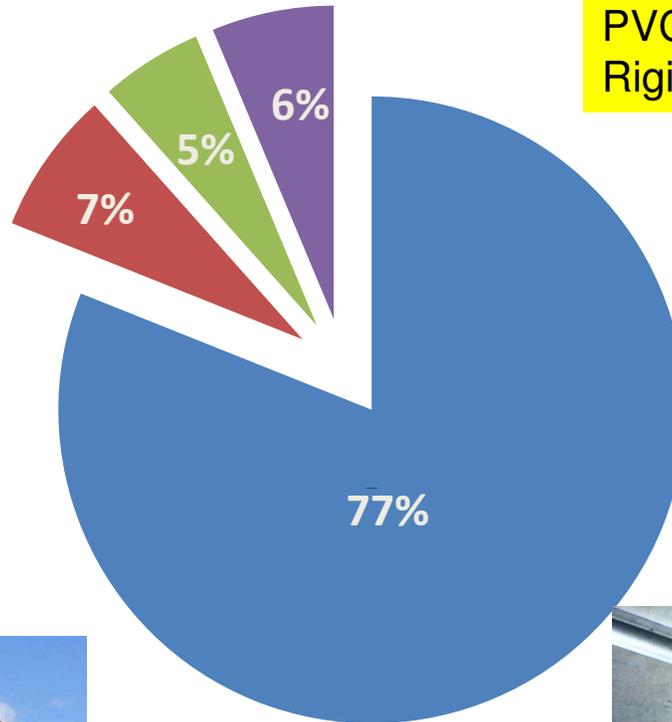
Shellac, a natural resin secreted by the female lac bug on trees; Main constituent : Aleuritic acid; In the early part of twentieth century , India was the largest supplier of Shellac to the world



PVC : A VERSATILE PLASTIC



Global consumption exceeds 34 million tons with a per capita consumption of 5.1 kg ; Consumption will grow to 40 million tons by 2016



**PVC and C-PVC : Plumbing
Rigid PVC : Vinyl siding**

- Construction
- Institutional
- Electrical
- Packaging



Applications : Global



Nortown Casitas, North York (now Toronto), Ontario, Canada, April 1995: Set-up for subsequent code infraction in plastic pipe wall penetrations: Improper hole sizing. Firestops (in the walls) the plumber considered to be the drywall's responsibility. Floor openings are properly done in this case, with intumescent pipe collars and firestop mortar. The intumescent will expand and choke off the melting pipes. Drywall mud does not work as a plastic pipe firestop in the wall.



PVC : THE INDIAN SCENE

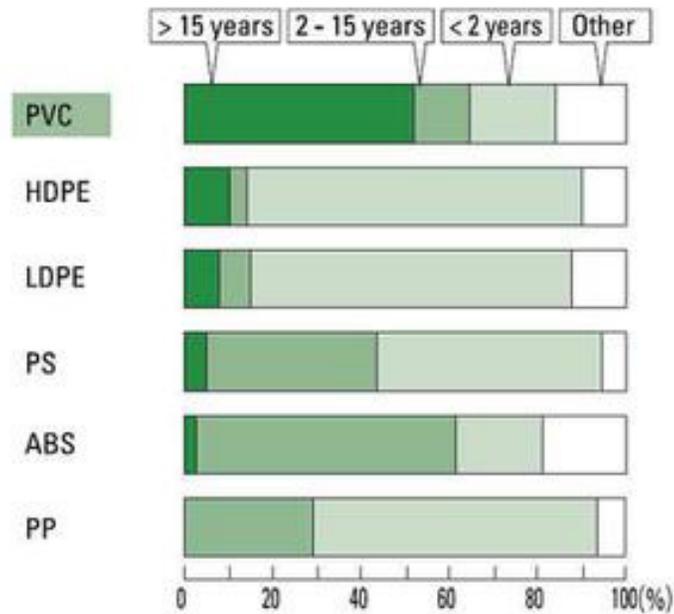
- **Total Installed capacity : 1.3 million tons**
- **Total consumption : 1.9 million tons; imports ~650 ktpa**
- **>1500 processors with capacities ~250 ktpa**
- **Five producers, eight manufacturing plants, four plants have capacities >200 ktpa**
- **Per capita consumption 1.7 kg**
- **Growth rate : ~ 10 % pa; India needs a 250 ktpa plant every year to meet the domestic demand**
- **Pipes and fittings : 58%; profiles and tubings : 11%; films and sheets : 10%; wires and cables / calendaring : 9% ; Bottles : 4% ; others : 8%**
- **Profiles : only 3 % ; Globally profiles have a significant market share**

CAN PVC BE SUBSTITUTED ?



- Applications have evolved historically
- Current use pattern of PVC reflect the fact that PVC preceded Poly(olefin)s by a quarter of century !
- Substitution in legacy markets difficult because of investments already on ground
- However, in emerging markets, there is a need to make rational decision on the most appropriate materials for specific applications based on , both “cost to consumer” and “cost to society” considerations
- Blind imitation of products and its applications not desirable merely based on consideration of historical growth of a material
- PVC substitution must be seriously considered where appropriate

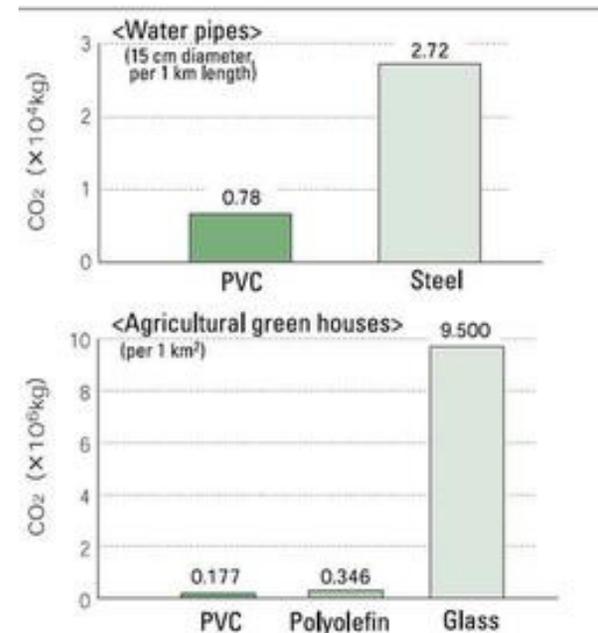
PVC : IS IT SUSTAINABLE ?



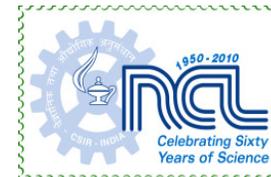
Source: Prepared from "A plastics demand structure survey report" by the MITI

Longest Life Cycle Applications

Low CO₂ emissions



Source: Prepared from the survey report by Chem Systems



PVC : THE ISSUES AND THE DEBATE

- Hazards of VCM and Dioxin formation from ethylene oxychlorination**
- Plasticizer migration and heavy metals in additives**
- End of use disposal (incineration, landfill etc)**
- Emissions from fire**



PVC RECYCLING

- **Rigid PVC : Mechanical Recycling**
- **Flexible PVC : Chemical recycling (solvent based, VinylHoop of Solvay)**
- **Use of PVC to replace coke in blast furnaces**
- **Gasification to hydrogen, carbon monoxide and HCl**

Waste-to-energy plant raises stink

3 Comments

Author(s): [Ravleen Kaur](#), [Ruhi Kandhari](#)

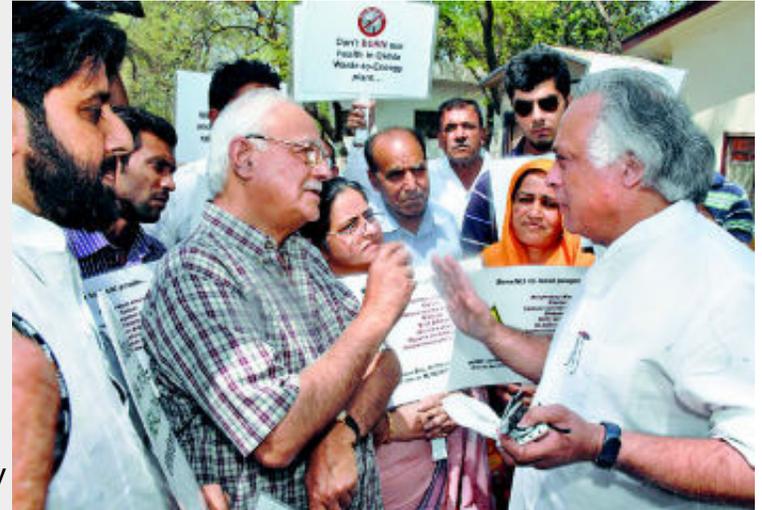
Issue: Jul 22, 2010

Sukhdev Vihar residents say plant won't solve waste problem, will impact people's health

S C Mehra, a retired Air commodore from the Indian Air Force, misses his friends in South Delhi's Sukhdev Vihar locality. One and a half years ago, he and his wife moved out of their house in Sukhdev Vihar when they could no longer stand the pollution from a bio-medical waste treatment plant in Okhla. "I stayed there for 20 years. It was long enough time to make friends whose company you enjoy after retirement. But I am not so lucky. The smoke was becoming unbearable day by day and everything we touched was coated with a black layer of soot," Mehra said.

Mehra and his wife are now living with their son in Gurgaon. The son shifted earlier to the satellite city in Haryana because of the pollution. Like them, many other families too have moved out of the Sukhdev Vihar locality. Those who stayed back are having a bad time and there is worse in store. A waste-to-energy plant is coming up in

PROACTIVE CIVIL SOCIETY : A CHALLENGE TO THE INDUSTRY



16 Mw waste to energy plant in Timarpur- Okhla

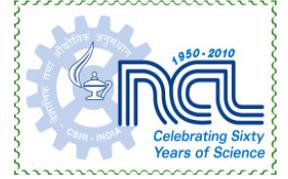
Waste-to-energy plant at Okhla: Sheila to review

Neha Lalchandani, TNN, Mar 19, 2011, 03.47am IST

Tags: [Sheila Dikshit](#)

NEW DELHI: Reacting to a letter written by environment minister Jairam Ramesh to reconsider location of the Timarpur-Okhla waste-to-energy plant, chief minister [Sheila Dikshit](#) on Friday said she would call a meeting with residents and if there were any serious concerns, the government would take another look at the project.

PVC : TECHNOLOGY CHALLENGES



- **From ethylene to ethane and methane**
- **Recycling of HCl to chlorine; heat and water integration**
- **Chlorine : Integration of chlor-alkali plant with renewable energy sources; minimize impact of energy cost on chlorine**
- **Safer alternatives to phthalate plasticizers**
- **Eliminate heavy metals (Lead/Cadmium)in processing additives**
- **Improve thermal Stability of PVC by eliminating structural defects (t-Cl, allylic Cl, H-H linkages)**

PVC : WHAT LIES AHEAD ?

- **Can we do without PVC ? No**
- **Is PVC sustainable ? Yes , if**
 - *Used only for long life cycle applications, > 15 years in service*
 - *Part of the energy used in chlor - alkali manufacture can be realized from renewable energy*
 - *Flexible PVC using safer plasticizers or replaced with soft poly (olefin)s (food contact, toys, medical and indoor applications)*
- **Can PVC be safely recycled ? Yes , only if**
 - *Restricted to mechanical recycling*
 - *Segregated waste, not co-mingled urban waste*
 - *Overcome “not- in- my- backyard” syndrome*
 - *Industry takes ownership of recycling*
 - *Responsible engagement with civil society*
- **Does PVC provide room for innovation ? Yes and plenty**



THANK YOU

