Ideas Proposed at Meeting
on
December 13, 1965

1. Make an M50 type of pigment but replace the chromium with some other element.

2. Make an M50 or M50 type containing a third or even a fourth element (in addition to the lead and chromium).

3. Use the Oncor concept (core and shell) to carry a useful organic material (ex. g., silicones) as the shell.

4. Oncor "tint" pigments: single pigments to make a gray, a cream, a light blue, etc., like the Krebs tinted titaniums of the 1930's and early 40's.

5. Make an Oncor pigment combining fire retardant properties with anti-corrosion properties, for example 25% antimony oxides, 25% zinc oxide, 50% silica.

6. Make an Oncor type pearlescent pigment but keep the silica content low.

7. Put the group of nitrites (prepared some years ago by L. M. Kebrich) on a silica or other core to augment the anti-corrosive properties of red lead; would be used in only small amounts.

8. Make a lead silico-titanate-chromate.

9. Investigate more fully the organic inhibitors, ex. g., benzoates, phosphates, nitrites.

10. Use colored glasses -- perhaps as beads -- as pigments in paints, or coat particles of glass or pigments with reflective transparent films.

11. Two-tone, very thick finishes derived from mixtures of coarse, varicolored pigment particles (TiO_2-coated sea sand, carbon black-coated sea sand or sawdust, and phthalo-colored coated silica) bonded together with a material such as phenolformaldehyde resin.

12. Use gels such as Bentone, silicate gels and lead gels of low refractive index in clear finishes to obtain finishes of greater durability.

13. A chromate or chromium oxide core as a substrate for any of a variety of coatings (TiO_2, Al_2O_3, silicates, etc.) to provide anticorrosive properties in various colors; phosphates should also work.

14. Use an Oncor basic zinc chromate for traffic paints because of its cheapness and brilliance.

15. Resinated Oncor pigments - typified by resinated TiO_2-coated silica and resinated zinc-chromate coated silica - have demonstrated good exposure results.

16. Organic derivatives of chromic acid should have greater solubility of the chromate ion and therefore better metal protection as compared to inorganic chromates; organic lead-chromate pigments may prove of interest.

17. Pigment-polymer combinations primarily for use in electro-deposition, wherein the single charge on each particle would allow both pigment and vehicle to move at the same rate to the electrode; such combinations could be either latex-pigment or oil (or alkyd)-pigment.

18. Combine core and coating by a dry electrostatic process in which the two components combine by neutralization of their opposite electrical charges; such combinations could include different physical or chemical forms such as (1) a solid core and an organic coating or (2) a solid core (ex. g., a chromate) enveloped by a water droplet, etc.

19. Coat a very fine polymer particle with a solid material by the Oncor principle.

20. Make a pigment having both organic and inorganic components, ex. g., a lead compound with maleic acid, styrene and chromate.

21. Pigment-gellant combinations, ex. g., Bentonite-PEI-lead chromate.

22. Reaction products of litharge and polyols introduced into alkyds, or M50 used to replace the PbO in such a reaction.

23. Establish free radical sites on pigments by radiation, ex. g., exposing TiO_2 to Co^{60}.

24. For electrostatic printing, pigments which can accept the charge under the influence of light and then leak the charge off to the substrate, ex. g., TiO_2, ZnO; also, pigment-polymer combinations having such properties.

25. Combinations of pigment and polymer which can be in dry powder form and constituted into a finished paint by simply stirring into tap water.

26. Other Oncor-type pigments having coatings of available organic pigments such as DuPont's Monastral Red.

27. Prepare the family or group of "true" lead silicates, i.e., not Oncors.

28. Improve our control of particle size of our present pigments, ex. g., by classification by the Sturtevant, for use in sand mills, Cowles or other high-speed mills.

29. Use a light-sensitive glass as a "pigment" in clear finishes, possibly to offer protection to the vehicle.

30. Investigate anti-corrosion properties - in water systems - of lead chloro-silicate, Plumb-O-Sil B, a "dehydrated" Plumb-O-Sil B; investigate also in electrodeposition and in solvent systems.

31. Prepare a very fine particle size M50 or S25 using stoichiometric quantities of PbO, chromic acid and a source of very fine silica (Cab-O-Sil) to make the required amount of γ-tri-basic lead silicate, and <u>no core</u>.

32. Prepare a very fine particle combination pigment of Dyphos and lead silicate, also without a core.

33. Investigate utility of the earlier lead [illegible]salicylate to reinforce clear finishes, either as the straight compound or formed on a core, as of silica.

34. Prepare Oncor-type materials having a mercury compound on the surface.

35. Investigate the value of additions of lead sulfate in M50 in order to improve color stability, as in 45X.

36. Investigate sensitivity of lead compounds to radiation for possible utility in color TV, etc.

37. Encapsulate pigments with polymers to make "stir-in" paints.

38. Combine both antimony and chlorine in the same pigment to make a single flame-retardant pigment.

39. Investigate both organic and inorganic compounds which can liberate chlorine at flame temperatures.

40. Extend the "pump circuit process" to other pigments to make finer particle size products or to introduce a desirable coating on the particles.

41. Improve the "softness" of our pigments through the deliberate introduction of some other (perhaps foreign) material prior to calcination, as in the case of Oncor 23A.

42. Make an Oncor-type of Dythal, perhaps with a core other than silica.

43. Investigate Oncors having a platey core or substrate.

44. Similarly, investigate Oncors having a fibrous core or substrate.

45. Prepare Oncors for uses other than paints, ex. g., a lead arsenate Oncor for insecticides, thereby extending chemically reactive materials.

46. Make use of the hydroxyl functionality present in some of our pigments (both lead and titanium) to introduce organic structures and thereby serve as pigmented film formers with improved properties of flexibility, bonding to substrates, etc.

47. Chlorinate TiO_2, PbO, etc. to permit the introduction of organic moieties to obtain advantages as in No. 46.

48 Using the reaction of $TiCl_4$ and aluminum as a point of departure, investigate the reactions of other metal salts and metal oxides (manganese dioxide and aluminum chloride, litharge, TiO_2, zinc oxide, etc.) to make paints in situ, i.e., one-package systems produced at time of application, as by spray.

49. Investigate halogenated phosphors for TV tubes.

50. Make use of a modified Schiff-base chelate reaction with low molecular weight polymers, to produce both organic and inorganic pigments.

51. Using a purely organic approach, investigate electro-chemical compounds, ex. g., the electrolysis of nitro aromatic compounds.

52. Combine the concept of No. 51 with silicone polymers or polyimide polymers.

53. Chemically react polymeric diazo compounds to produce or enhance pigmentary properties.

54. Form block polymers from polyacrylonitriles to utilize their conductivity.

55. Put functional groups on ferrocene-type compounds.

56. Make complexes of transition metal salts with ethers or other groups to make organic or inorganic materials which may have color capabilities.

57. Further react the products of metal oxides with polyols via the hydroxyl(s) to form esters, etc., which may have utility as easily wetted stabilizers for PVC as well as pigments.

58. Investigate softer core materials in the Oncors, ex. g., hydrous silica cores.

59. Make Oncor 23A with a flux such as zinc borate, to improve wetting and flame retardance.

60. Investigate lead compounds based on fluorophosphoric acids.

61. Investigate lead ferrites in present-day latex and other new vehicles.

62. Bear in mind and direct efforts toward general improvement of dispersion and wetting characteristics.

63. Indicated the advantages which may derive from more homogenous coating systems.

64. Investigate the Oncor concept in ceramics and flame spraying.

65. Investigate the Oncor concept in the glass industry.

66. Investigate lead azosalicylate in the ADM water-soluble linseed oil vehicle.

67. Investigate modified M50's (perhaps different crystal structure) as catalysts.

68. Investigate clear lead salts - possibly from the reaction of lead pigments or litharge with glycerine or polyols - as a vinyl stabilizer.

69. Investigate Bentone derivatives as pigments, ex.g., the old Bentone Blue.

70. Utilize increased pigment agglomeration to improve exterior durability.

71. Materials made on the Oncor principle might have utility as fillers in adhesives, epoxies, etc.

72. Other cheap inorganic substrates, such as asbestine or clays instead of silica for Oncor pigments.

73. Cellular, glass type envelope to contain colored or fluorescent pigments for decorative or safety purposes; the reverse of Oncor.

74. Continuous grinding of silica, closed loop of pebble mill and hydraulic classifier, to scalp out specific mesh, recyling coarse particles, to cheapen grinding and provide better particle size control.

75. Pigment E, Barium Potassium Chromate Pigment, on silica core.

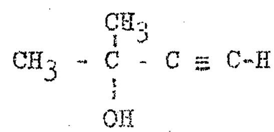
76. Staurolite type pigment composition containing iron oxide, aluminum and silica, for increased inertness while corrosion resistant.

77. Tributyltin oxide on silica.

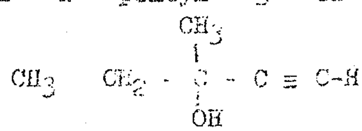
78. PbO or $PbSO_4$ on a carbon core for use in batteries.

79. Investigate higher boiling homologs of:

2 methyl - 3 - butyn - 2 - ol (B. P. 104°C)



3 methyl - 1 - pentyn - 3 - ol (B. P. 121°C)



These two materials are used as inhibitors in acid pickling baths. The higher boiling homologs are soluble in mineral spirits etc. and might serve as part of the vehicle in a pigmented oleo-resinous paint.

WAG/vk

February 7, 1966