

Modified Binders

By:
Prof. Hamad I. Al-Abdul Wahhab

CONTENT

WHY?

WHAT?

HOW?



WHY MODIFICATION?

- Asphaltting Projects (Construction / Maintenance)

Continue

- Application of *SUPERPAVE* Mix Design
- Asphalt Mix Problems Diversity
- Asphalt Liquid Price (SR. 300/ton)

Asphalt Role

MOST ASPHALT PAVEMENT DISTRESSES ARE RELATED TO BINDER PROPERTIES



WHY MODIFICATION?

- PRICE OF ASPHALT
- THIN PAVEMENTS
- INCREASED TRAFFIC, LOADS, AND TIRE PRESSURE
- DEFERRED MAINTENANCE
- DISPOSAL OF INDUSTRIAL WASTE
- NEW CONSTRUCTION EQUIPMENT
- EXCESS SUPPLY OF PRODUCTS

TARGETED PAVEMENT PROBLEMS

- PERMANENT DEFORMATION
 - Distortion or shoving
 - Rutting
- CRACKING
 - Repeated load (fatigue cracking)
 - Non-load (thermal cracking)
- DISINTEGRATION
 - Raveling
 - Stripping (moisture damage)

CHANGE

IMPROVED PAVEMENT DESIGN

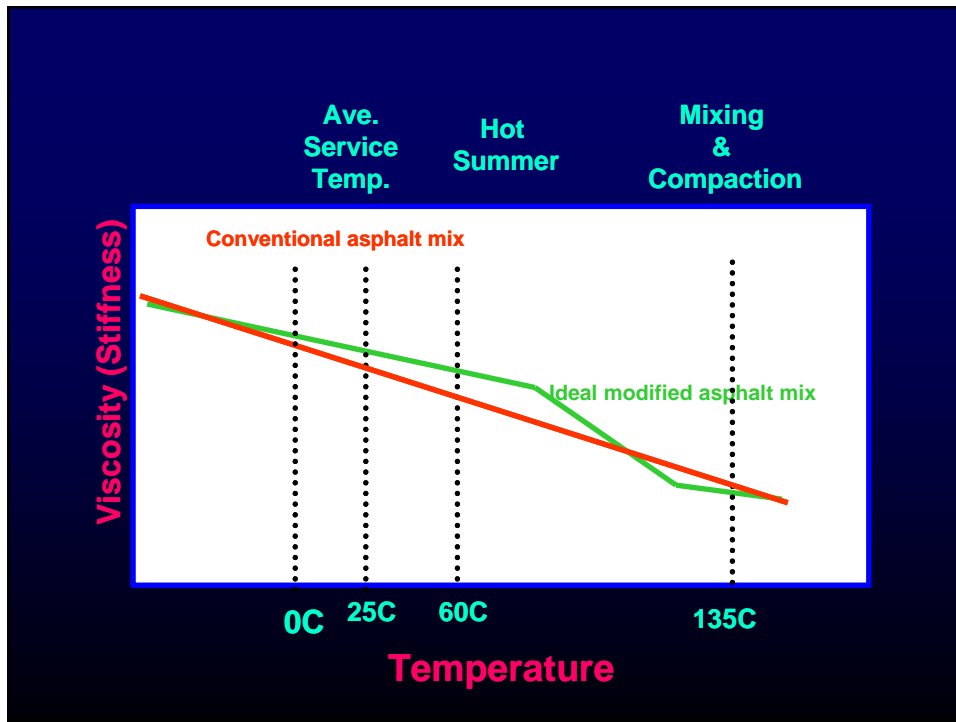
REVISION OF SPECIFICATONS

QUALITY CONTROL

IMPROVEMENT OF BINDERS SYSTEMS

IDEAL PAVEMENT BINDER

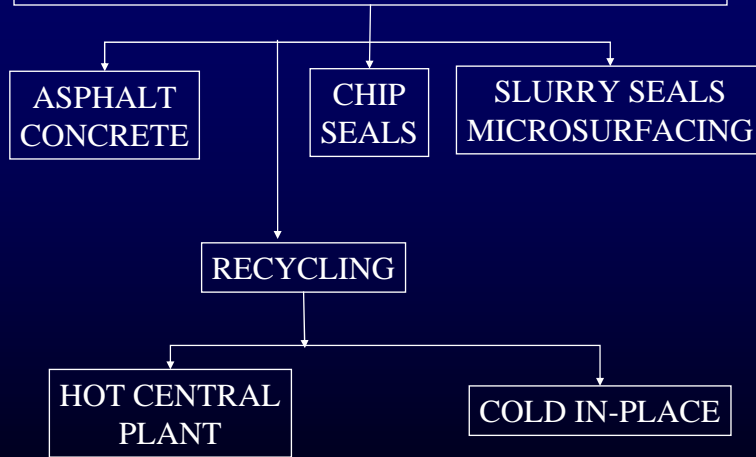
- LOW STIFFNESS AT CONSTRUCTION TEMPERATURE
- LOW STIFFNESS AT LOW PERFORMANCE TEMPERATURE
- HIGH STIFFNESS AT HIGH PERFORMANCE TEMPERATURE
- IMPROVED ADHESION



CLASSIFICATION OF MODIFIERS

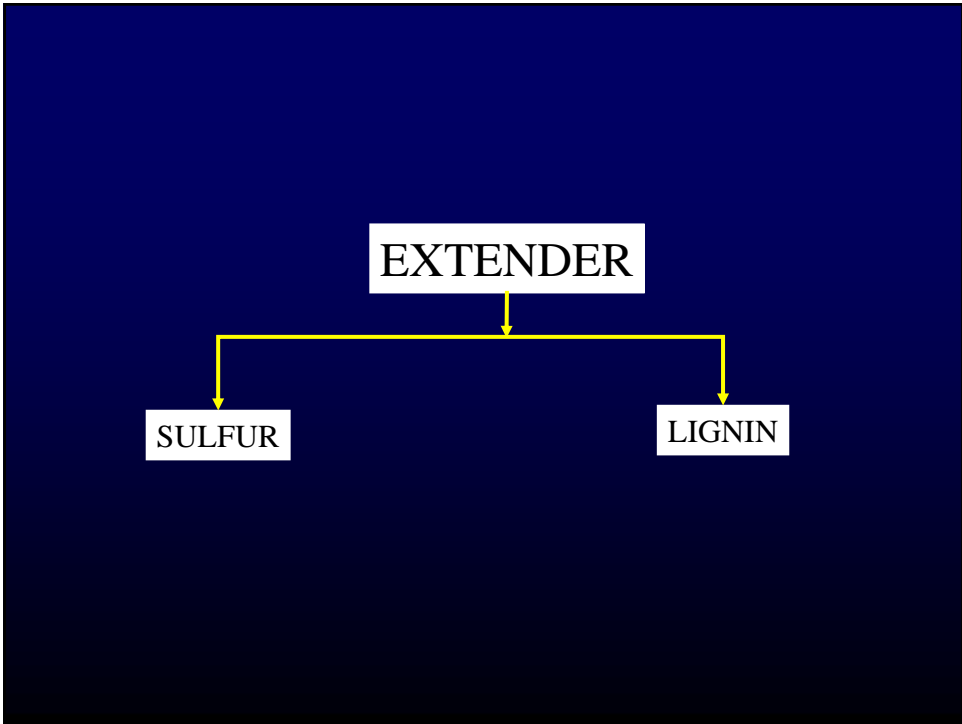
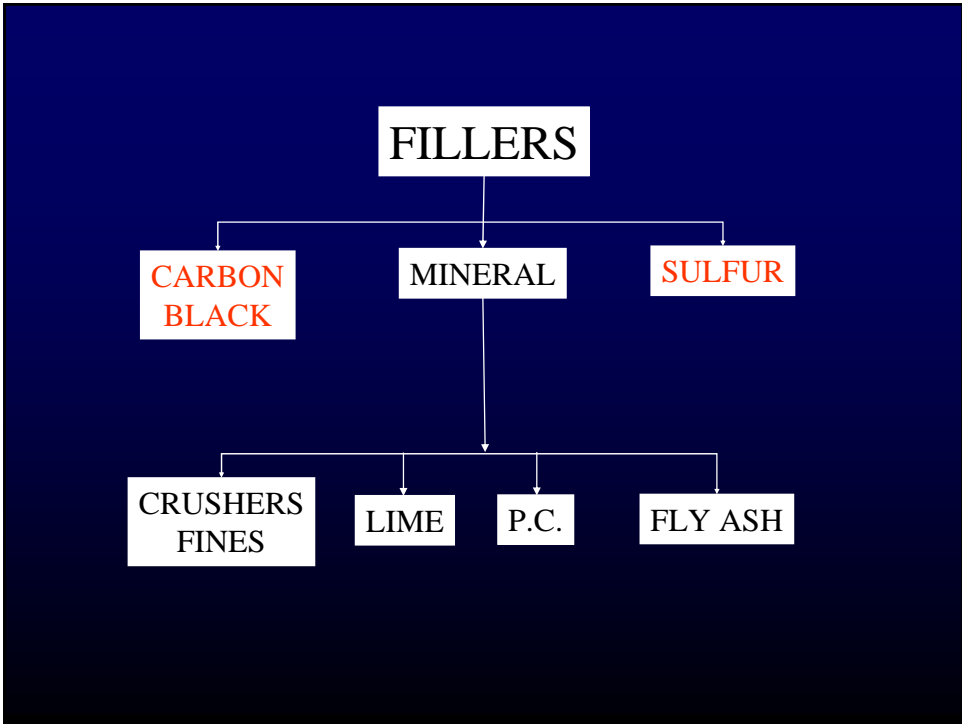
- FILLER
- EXTENDER
- RUBBER
- PLASTIC
- COMBINATIONS
- FIBERS
- OXIDENTS
- ANTIOXIDANTS
- ANTISTRIPS

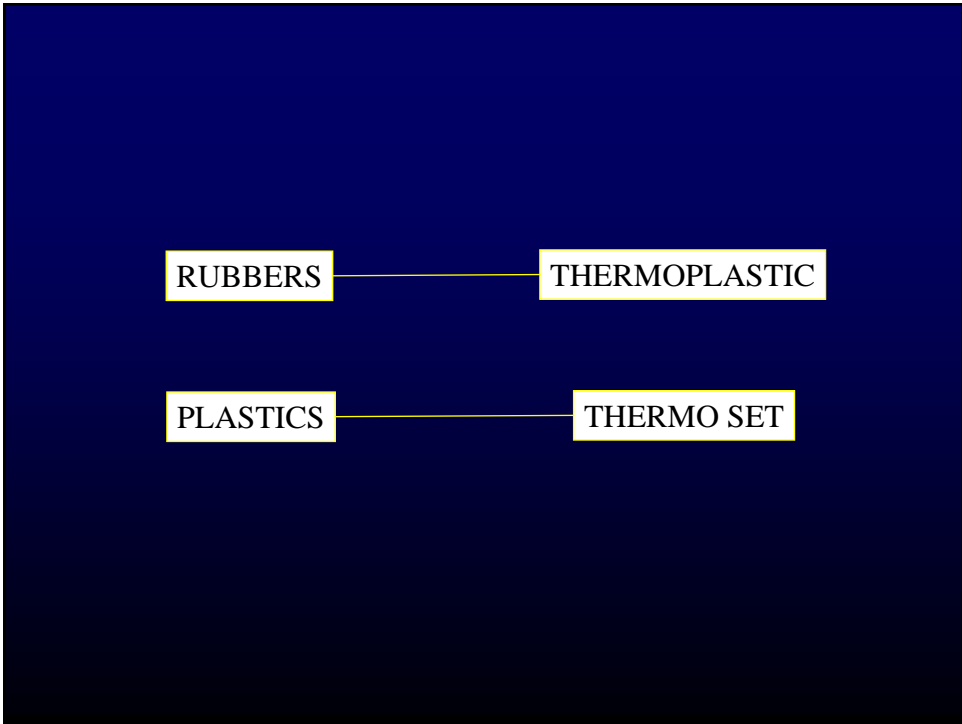
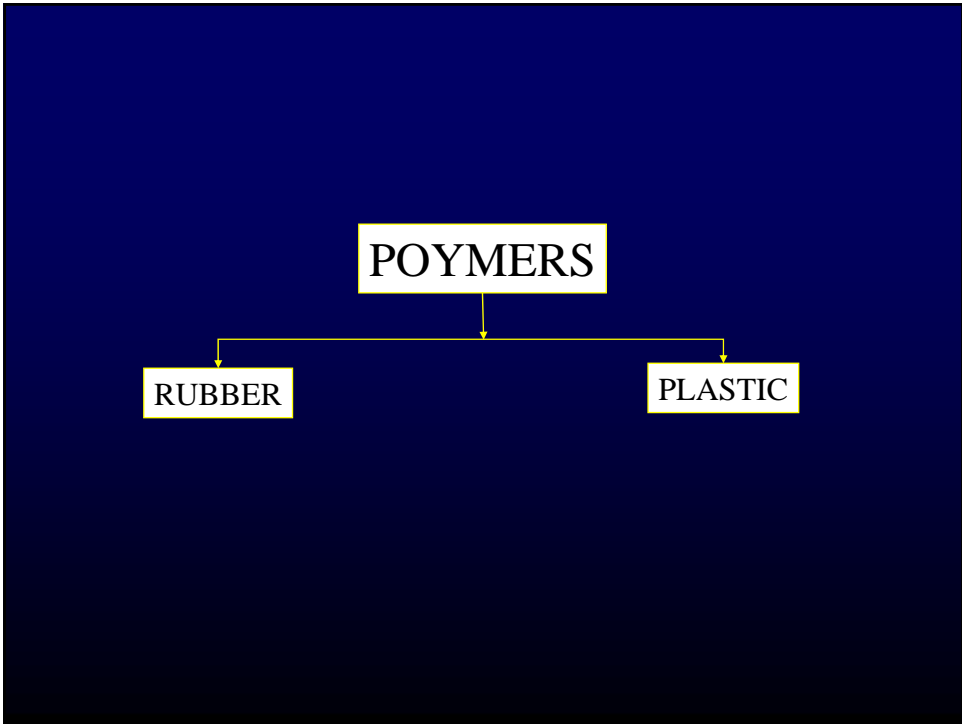
USES OF MODIFIED ASPHALTS



CONSTRUCTION

- STORAGE
- TRANSPORT
- HANDLING
- MIXING
- PLACEMENT
- COMPACTION





RUBBER

NATURAL LATEX

SYNTHETIC LATEX

BLOCK COPOLYMER

RECLAIMED RUBBER

PLASTICS

HOMOPOLYMERS

POLYETHYLENE (PE)

POLYPROPYLENE (PP)

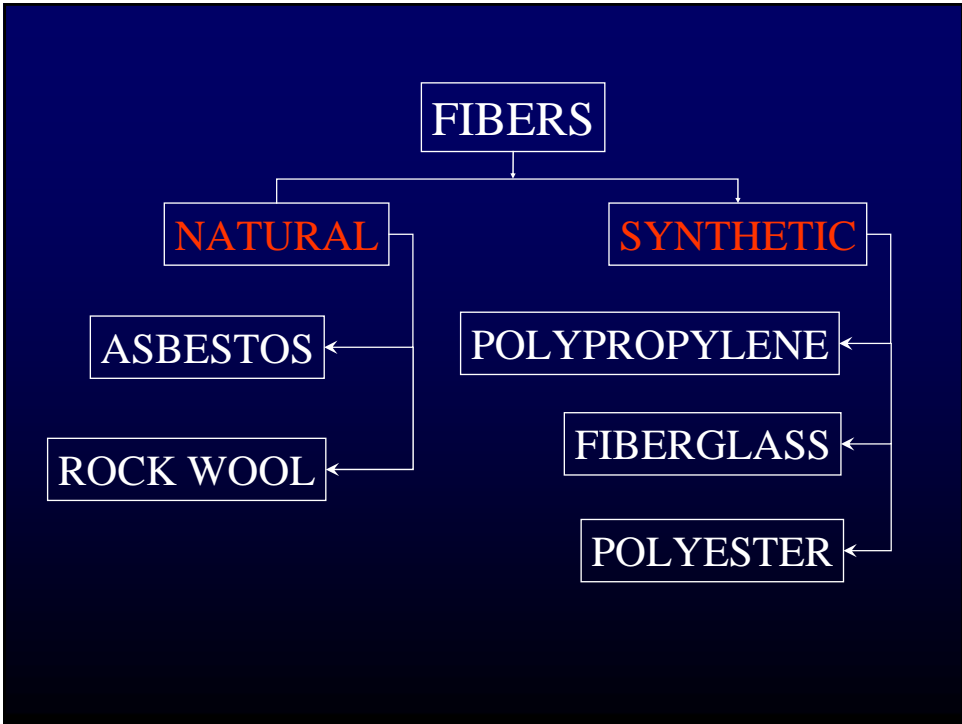
RANDOM COPOLYMERS

POLYVINYL CHLORIDE (PVC)

ETHELENE VINYL ACETATE (EVA)

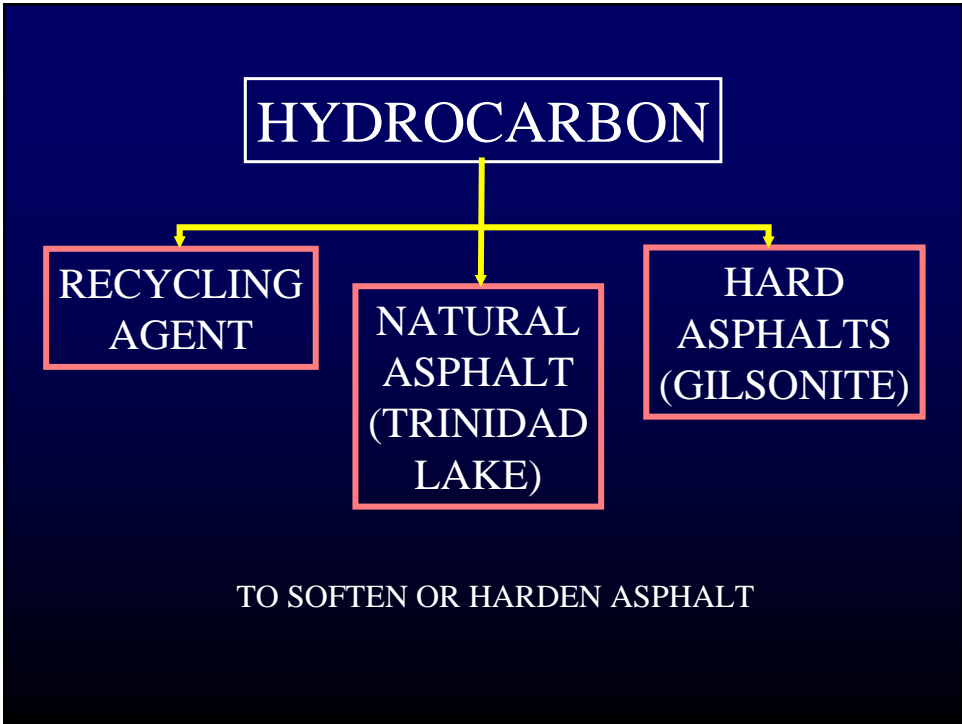
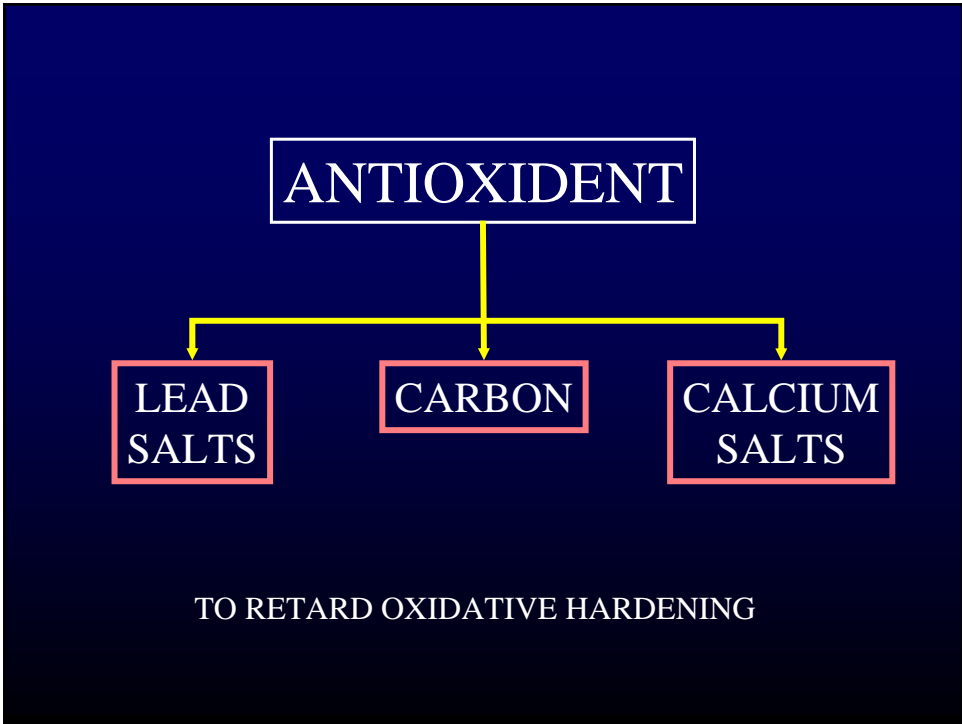
PROPERTIES
&
CONSTRUCTION

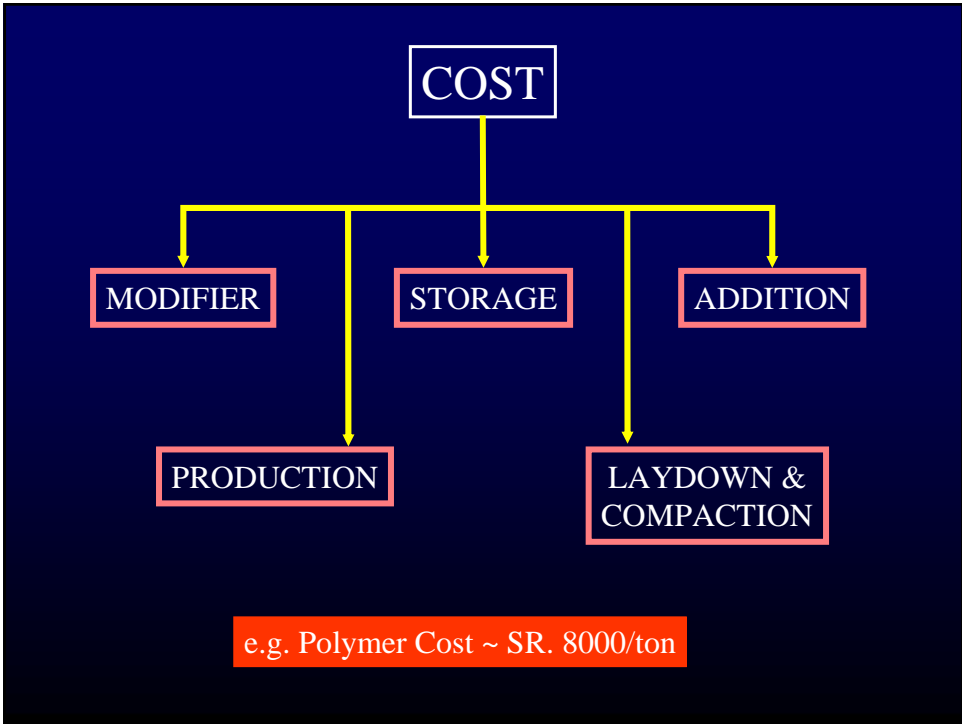
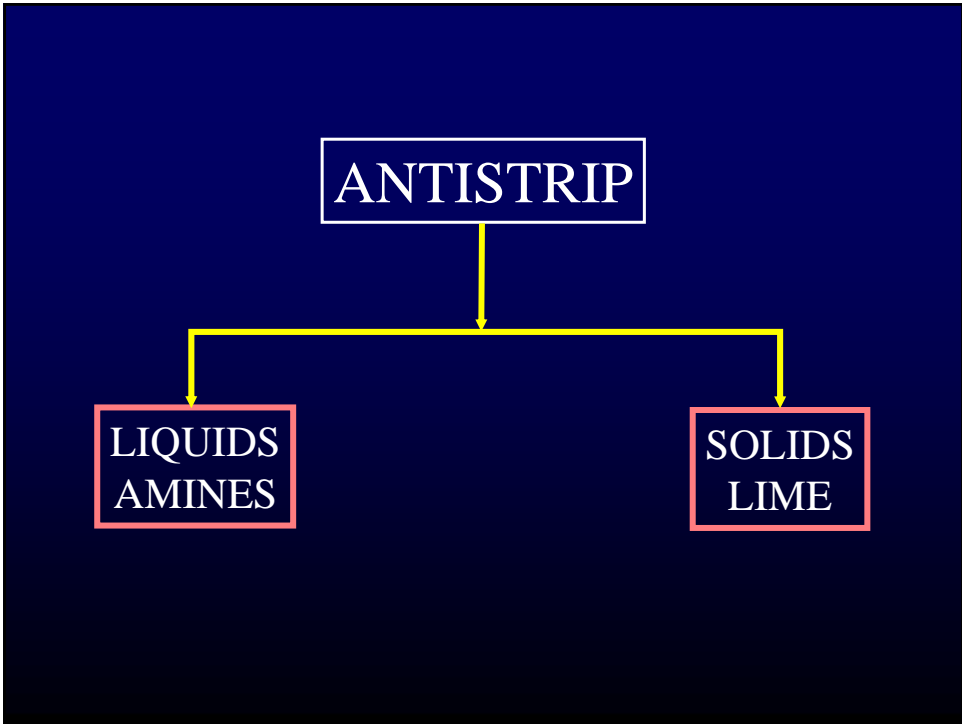
COMBINATIONS

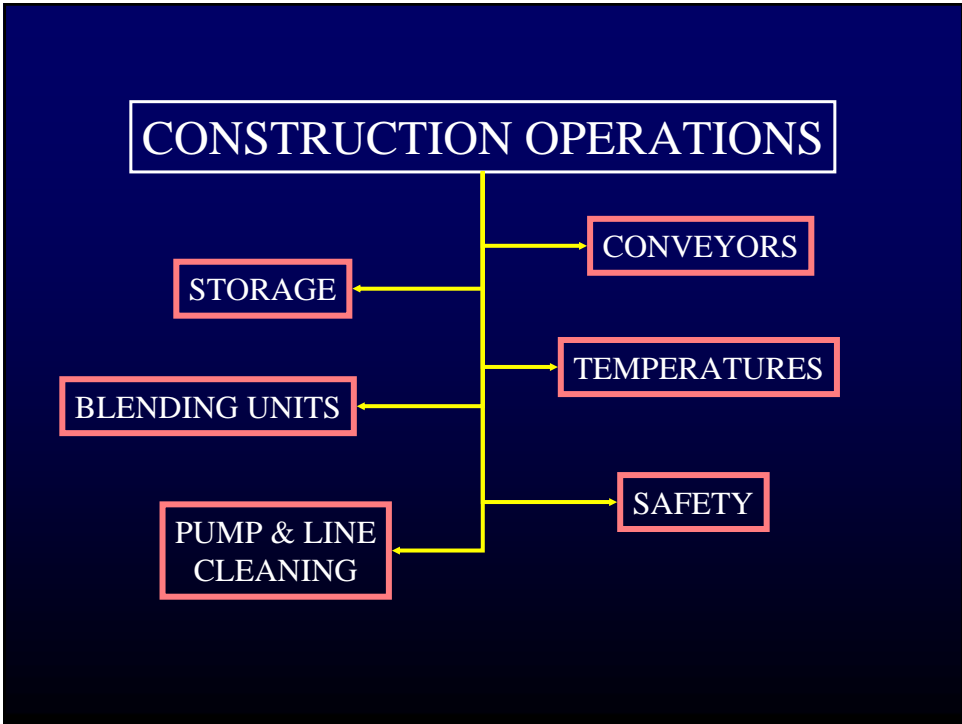
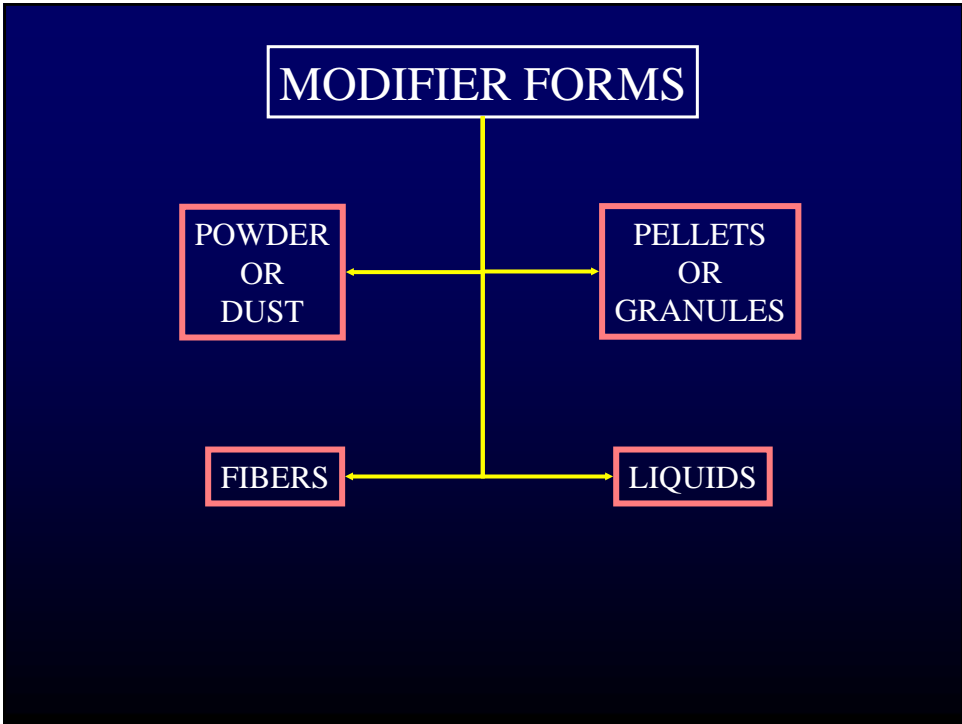


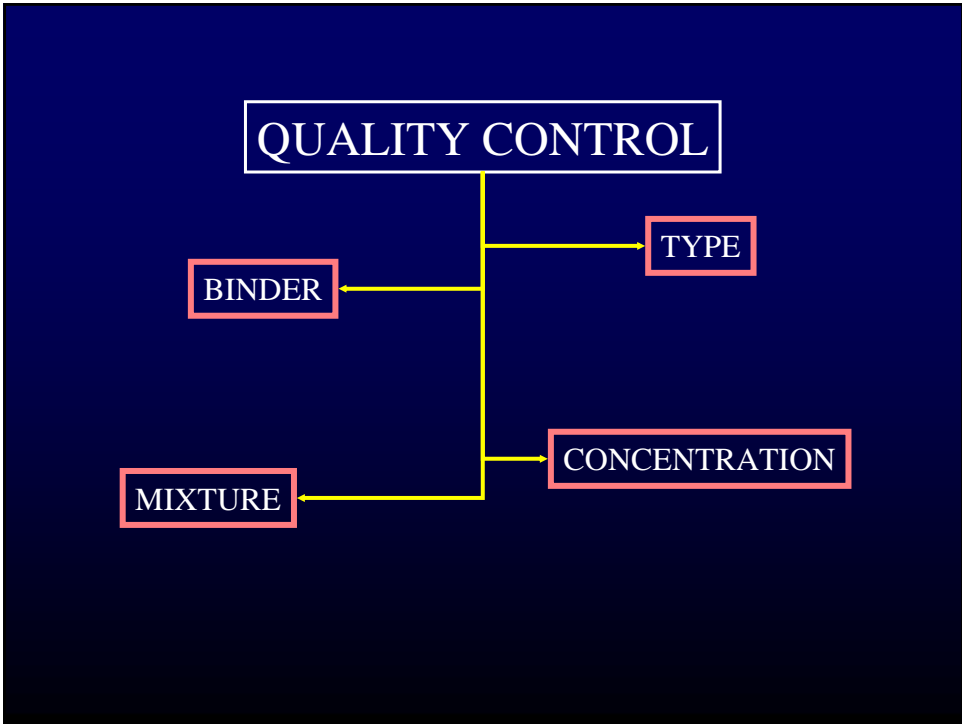
OXIDANT

CATALYST TO ACCELERATE ASPHALT
HARDENING SUCH AS MANGANESE SALT





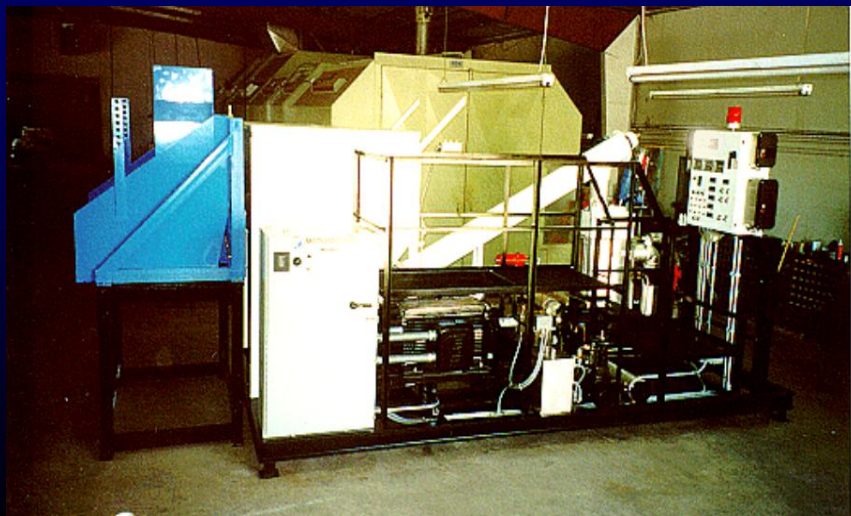




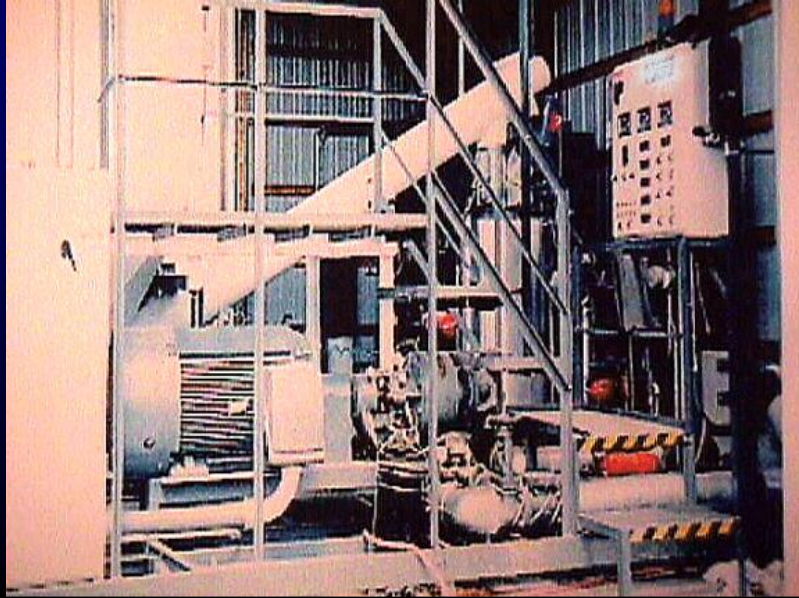
Modifier Production



Modifier Production

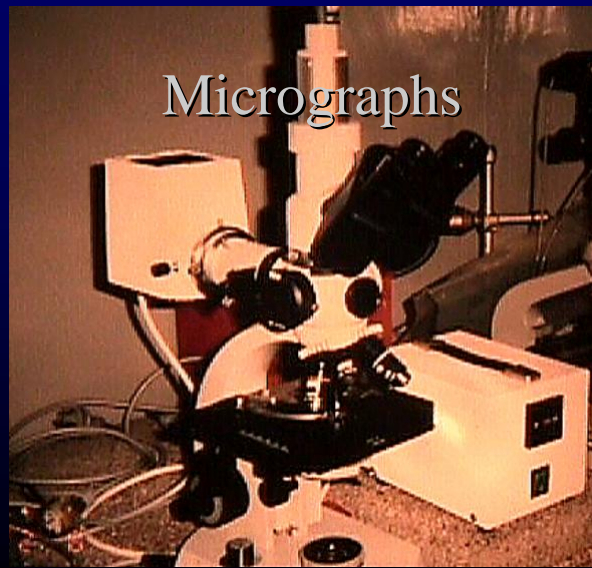


Modifier Production



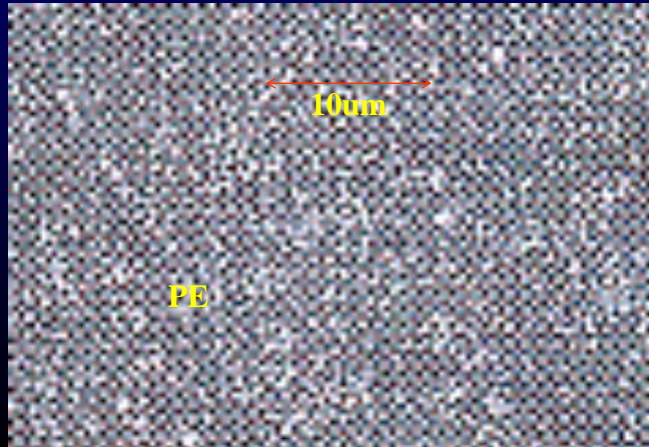
Modifier Testing

Micrographs



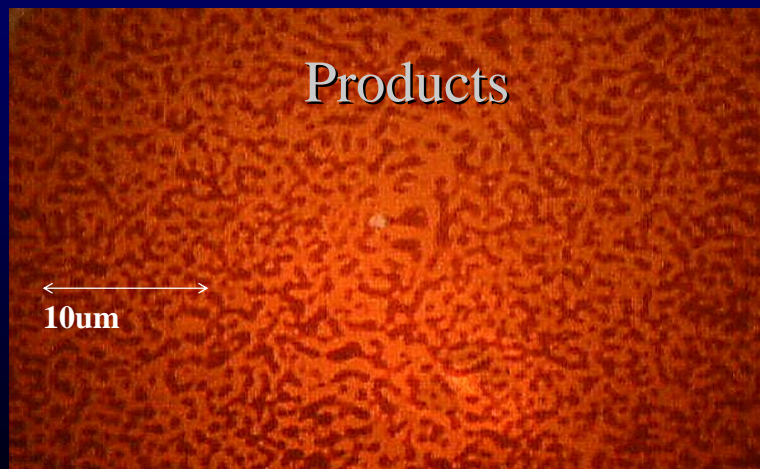
Modifier Testing

Products from Mills

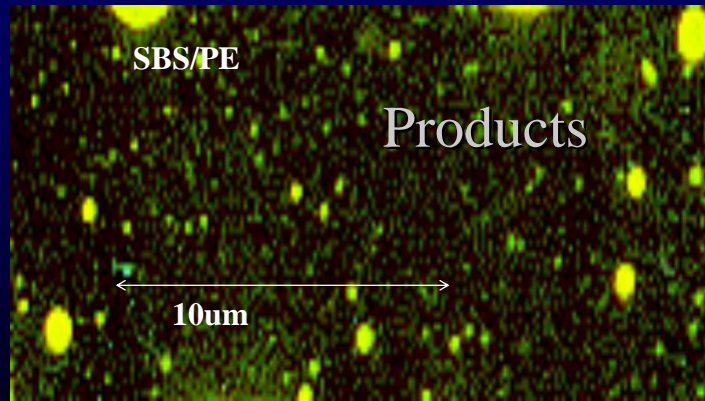


Modifier Testing

Products



Modifier Testing



Modifier Utilization



Rubber Utilization



Tires used

Asphalt Rubber Solves problems