# COMPATIBILITY OF PLASTICIZERS IN LP-32

## MISCIBLE UP TO 100 PARTS IN 100 PARTS LP-32

SANTICIZER 278

SANTICIZER 261

SANTICIZER 160

AROCLOR 1260

AROCLOR 1254

HB-40*

*Exudation at 40 phr in molded sheet

## IMMISBLE AT 100 PARTS IN 100 PARTS LP-32

CHLOROWAX 500

DSW 586595

STLCOPCB4091929

## TEST FORMULATIONS

| | PHR | FORMULATION |
|---|---|---|
| LP-32 | 100 | |
| PLASTICIZER | 15 and 40 | 100 |
| NON-COATED $CaCO_3$ | 40 | |
| **CATALYST SYSTEM** | | |
| LEAD DIOXIDE | 50 | |
| STEARIC ACID | 5 | 15 |
| SANTICIZER 160 | 45 | |
| SULFUR | | 0.1 |

**PLASTICIZERS**

SANTICIZER 160

SANTICIZER 261

SANTICIZER 278

HB-40

AROCLOR 1254

AROCLOR 1260

CHLOROWAX 500

DSW 586596

PLASTICIZER EFFICIENCY IN POLYSULFIDES

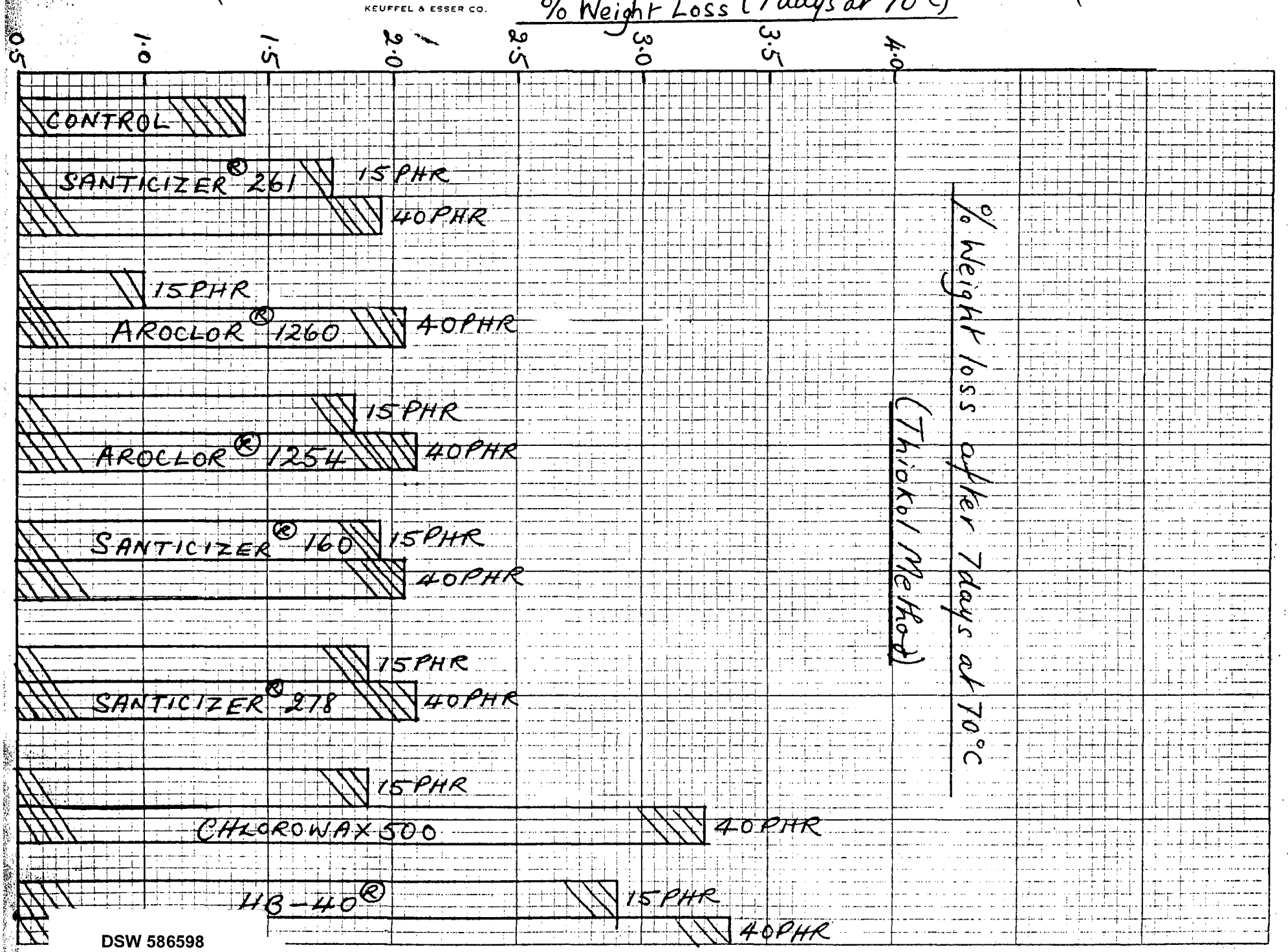
(PLASTICIZER LEVEL: 40 PHR)

| | SHORE A HARDNESS | 100% MODULUS (PSI) |
|---|---|---|
| SANTICIZER 261 | 12 | 40 |
| SANTICIZER 278 | 16 | 37 |
| SANTICIZER 160 | 18 | 53 |
| AROCLOR 1254 | 21 | 41 |
| AROCLOR 1260 | 24 | 52 |

DSW 586597

STLCOPCB4091931

K+E 10 X 10 TO THE INCH 46 0700
7 X 10 INCHES
KEUFFEL & ESSER CO.
MADE IN U.S.A.




DSW 586598

STLCOPCB4091932

| | PHR | FORMULATION |
|---|---|---|
| LP-32 | 100 | |
| SRF CARBON BLACK (STATEX F-12) | 30 | 100 |
| PLASTICIZER | 25 | |
| CATALYST SYSTEM | | |
| LEAD DIOXIDE | 50 | |
| STEARIC ACID | 5 | 15 |
| PLASTICIZER | 45 | |

PLASTICIZERS

SANTICIZER 160

SANTICIZER 278

AROCLOR 1254

AROCLOR 1260

CHLOROWAX 500

(Tests made on 0.040 inch thick slab molded at 287° F)

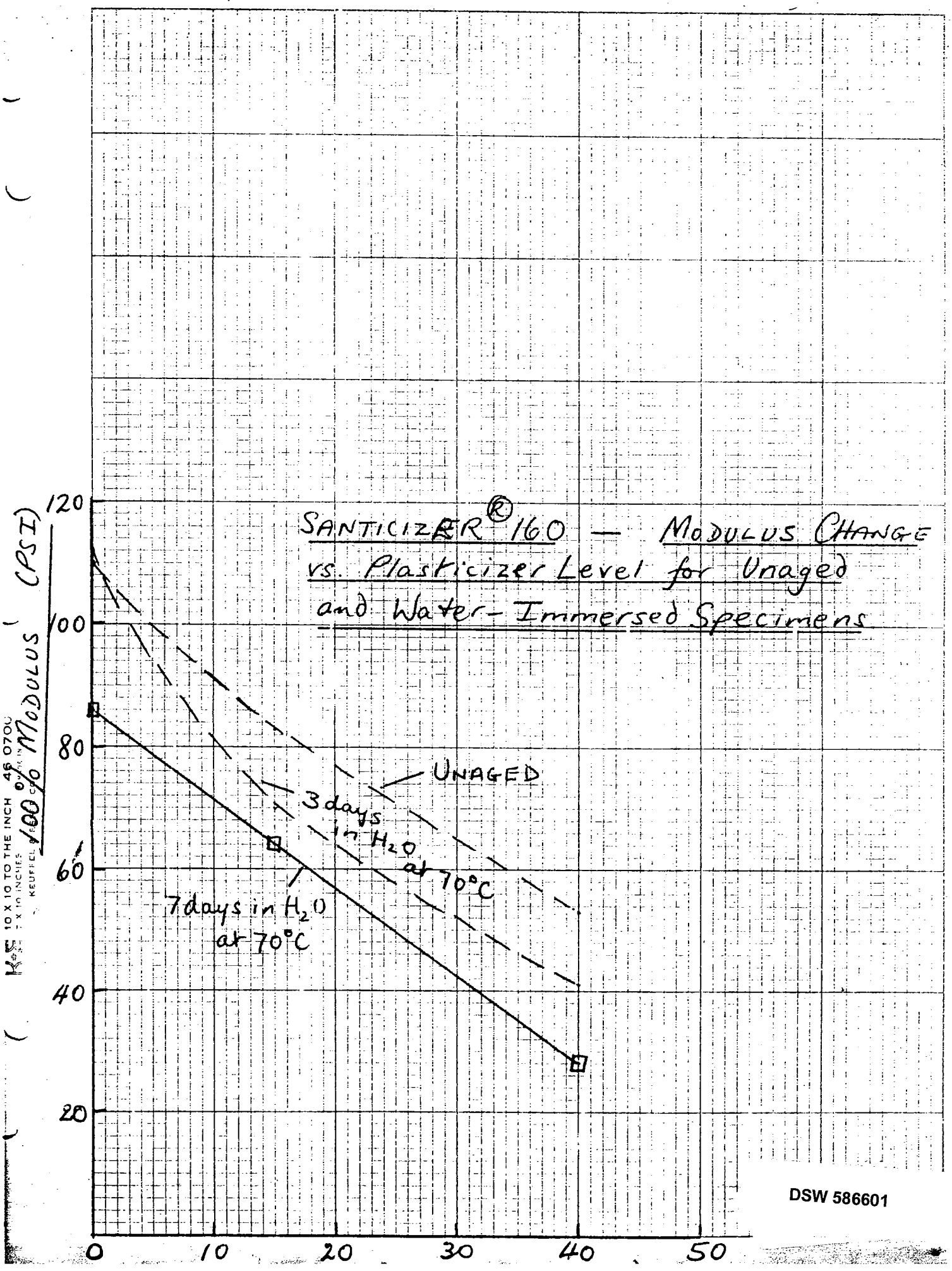
DSW 586599

## VOLATILITY (CHARCOAL ABSORPTION)

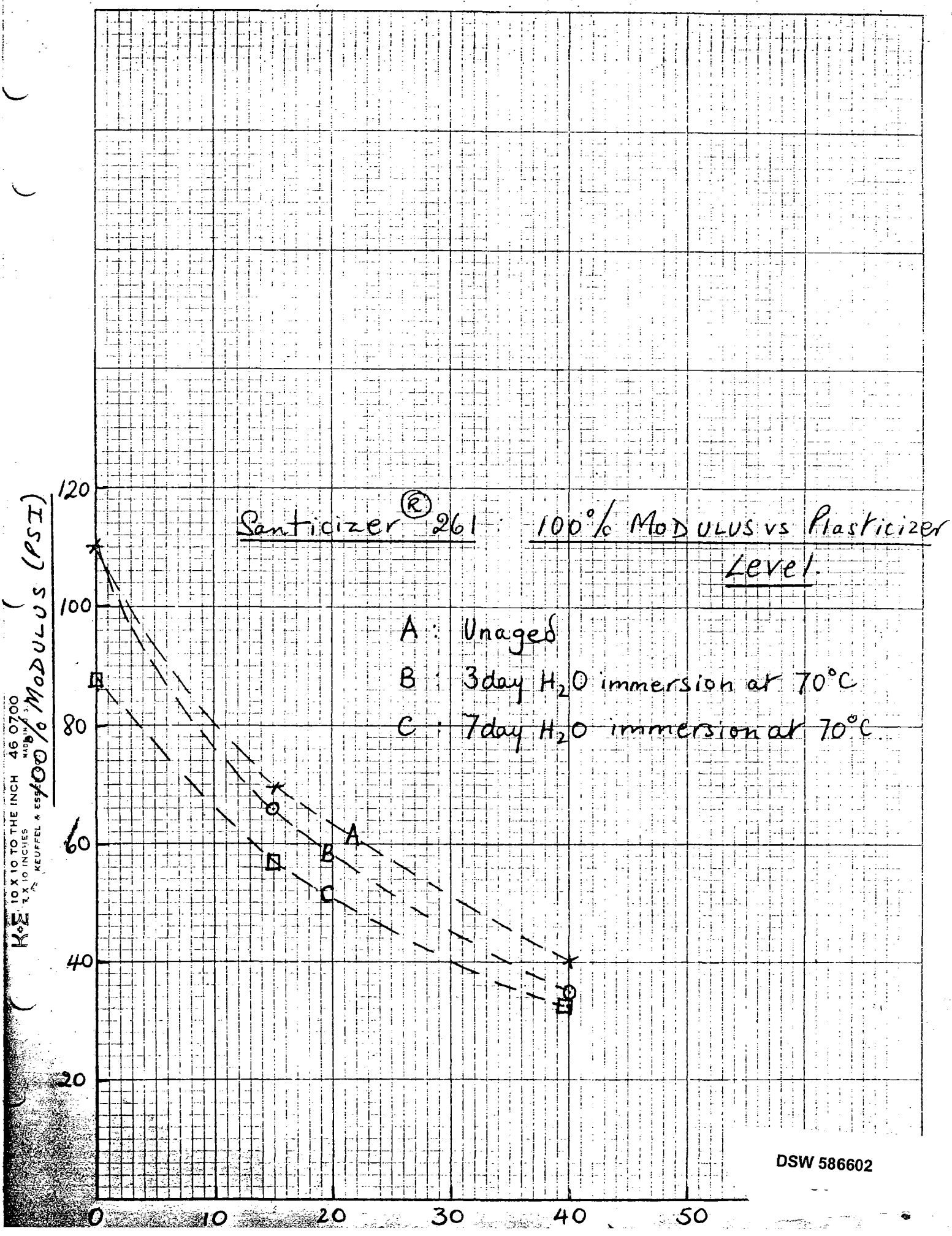
| | % WEIGHT LOSS AT 100° C | |
|---|---|---|
| | 4-5 DAYS | 7 DAYS |
| SANTICIZER 278 | ~1.0 | 6.2 |
| AROCLOR 1260 | 13.0 | 18.7 |
| CHLOROWAX 500 | 15.5 | 21.0 |
| SANTICIZER 160 | 16.8 | 21.1 |
| AROCLOR 1254 | 22.8 | 25.6 |



STLCOPCB4091934

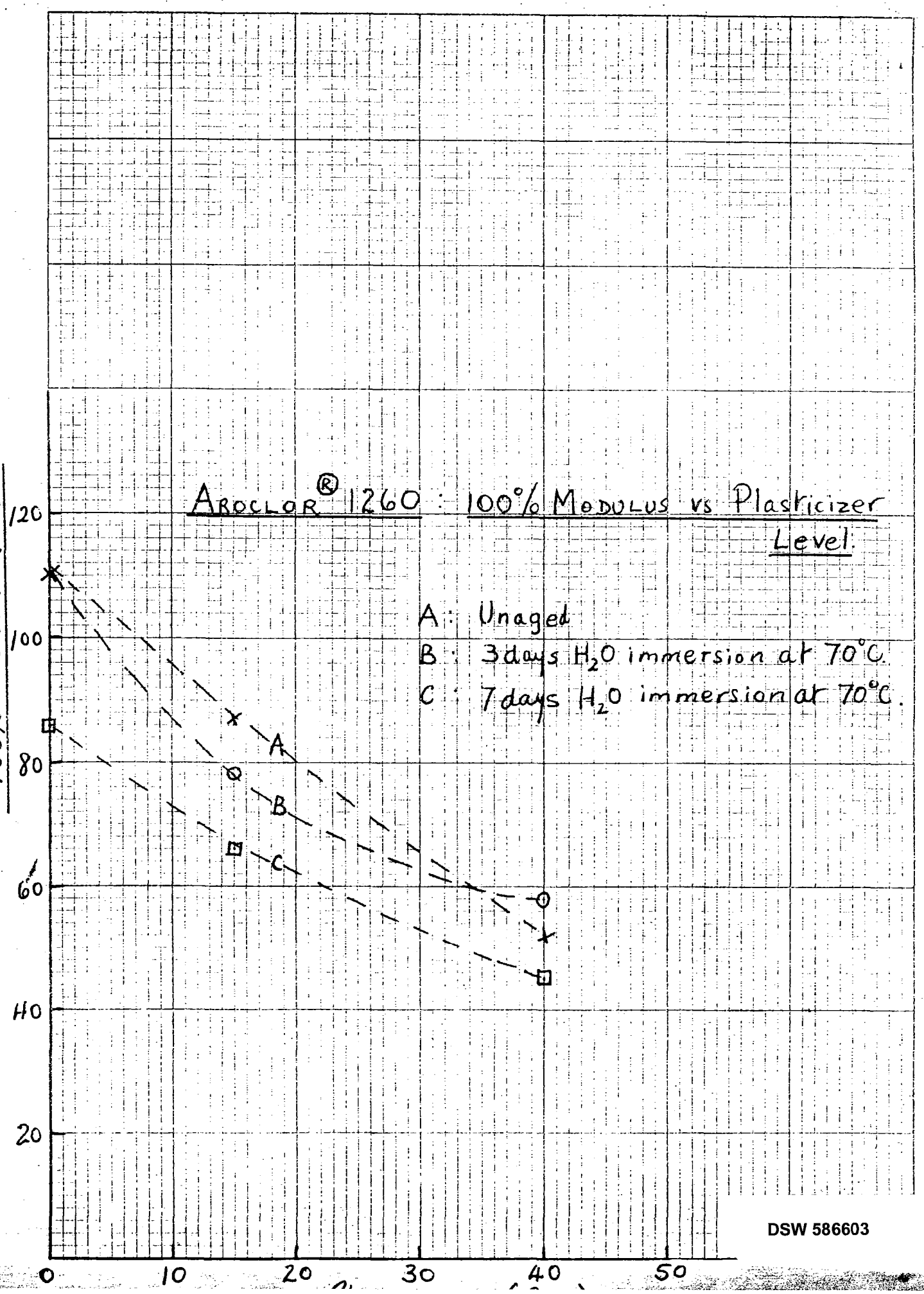



STLCOPCB4091935

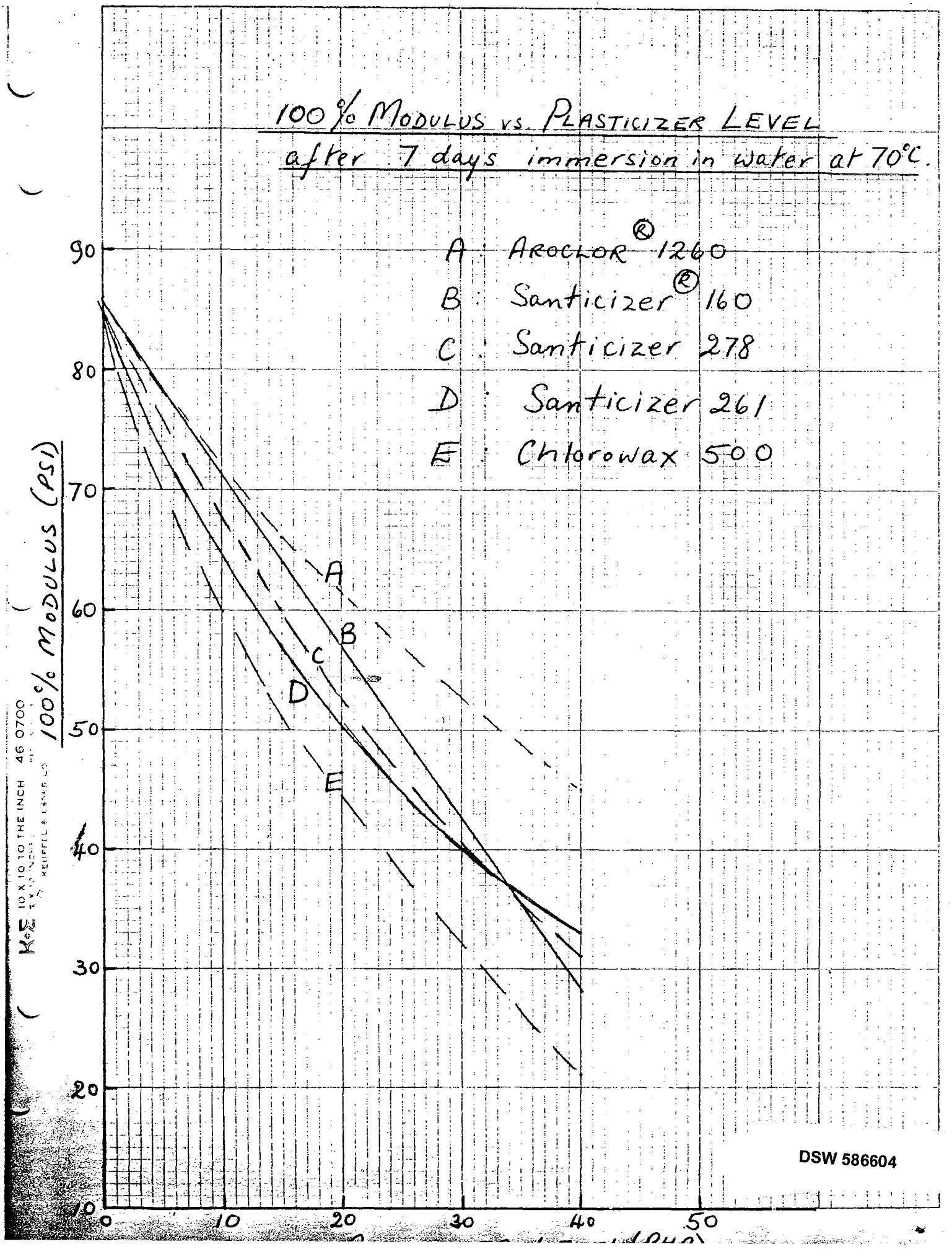



DSW 586602

STLCOPCB4091936


ARoCLOR® 1260 : 100% MoDULUS vs Plasticizer Level
A: Unaged
B: 3days $H_2O$ immersion at 70°C.
C: 7days $H_2O$ immersion at 70°C.
100% MoDULUS (PSI)
120
100
80
60
40
20
0
10
20
30
40
50
A
B
C

DSW 586603




STLCOPCB4091938

## SIGNIFICANCE OF PLASTICIZER CHOICE

## (100% MODULUS AFTER 7 DAYS WATER IMMERSION AT 70° C)

| MINIMUM 100% MODULUS (PSI) | PLASTICIZER | MAXIMUM PLASTICIZER LEVEL (PHR) |
|---|---|---|
| 30 | Chlorowax 500 | 32 |
| | Santicizer 160 | 39 |
| | Santicizer 278 | 41 |
| | Santicizer 261 | 46 |
| | Aroclor 1260 | 65 |
| 40 | Chlorowax 500 | 25 |
| | Santicizer 261 | 30 |
| | Santicizer 278 | 32 |
| | Santicizer 160 | 32 |
| | Aroclor 1260 | 48 |
| 50 | Chlorowax 500 | 17 |
| | Santicizer 261 | 21 |
| | Santicizer 278 | 23 |
| | Santicizer 160 | 25 |
| | Aroclor 1260 | 33 |
| 60 | Chlorowax 500 | 11 |
| | Santicizer 261 | 13 |
| | Santicizer 278 | 15 |
| | Santicizer 160 | 18 |
| | Aroclor 1260 | 22 |

DSW 586605

STLCOPCB4091939

DSW 586606

STLCOPCB4091940

## EFFECT OF PLASTICIZER ON 100% MODULUS AFTER WATER IMMERSION

| PLASTICIZER: 15 PHR | INITIAL | (7 DAYS AT 70° C) AFTER IMMERSION | % RETENTION |
|---|---|---|---|
| CONTROL | 110 PSI | 86 PSI | 78% |
| SANTICIZER 261 | 69 | 57 | 83 |
| SANTICIZER 278 | 58 | 60 | 103 |
| SANTICIZER 160 | 83 | 64 | 77 |
| AROCLOR 1260 | 87 | 66 | 76 |
| AROCLOR 1254 | 94 | 77 | 82 |
| CHLOROWAX 500 | 82 | 51 | 62 |
| HB-40 | 81 | 68 | 84 |

DSW 586607

STLCOPCB4091941

# Monsanto Plasticizer Canidates for Polysulfides.

PHTHALATES
PHOSPHATES
Bi/Terphenyls
Permanents

DSW 586608

STLCOPCB4091942

| | | Mol. Wt. | Vap. press. mm. Hg 200° | Viscosity centistokes 25°C |
|---|---|---|---|---|
| **1. PHTHALATES** | | | | |
| DBP | Di butyl | 278 | 9.00 | 15.6 |
| SANTICIZER® 160 | Butyl benzyl | 312 | 2.00 | 41.5 |
| SANTICIZER 261 | Octyl benzyl | 368 | 1.00 | 78.3 |
| SANTICIZER 278 | — | 471 | 0.20 | 860.0 |
| **2. PHOSPHATES** | | | | |
| SANTICIZER® 140 | Cresyl diphenyl | 340 | 1.00 | 33.0 |
| SANTICIZER 148 | Isodecyl diphenyl | 390 | 0.54 | 22.0 |
| **3. BI/TERPHENYLS.** | | | | |
| HB-40® | Hydrogenated terphenyl | 244 | 15.00 | 70.0 |
| AROCLOR® 1254 | Chlor. biphenyl (54% Cl) | 326 | 9.00 | 7.5-1( |
| AROCLOR 1260 | Chlor. biphenyl (60% Cl) | ~350 | 5.00 | 20.0-2 |
| AROCLOR 5442 | Chlor. terphenyl (42% Cl) | ~385 | — | SOLID |
| **4. PERMANENTS.** | | | | |
| SANTICIZER® 405 | polyester | 4000 | — | 10-13M |
| SANTICIZER 409 | polyester | 2000 | — | 3-3.5 |
| SANTICIZER 411 | polyester | 3000 | — | 9-10M |
| SANTICIZER 412 | polyester | 800 | — | 230-5 |
| SANTICIZER 429 | polyester | 2500 | — | 4-6M |

*210°F.

DSW 586609

STLCOPCB4091943

# SANTICIZER® 261
versus
# AROCLOR® 1254

| | SANTICIZER® 261 | AROCLOR® 1254 |
|---|---|---|
| MOLECULAR WEIGHT | 368 | 326 |
| VAP. PRESS. (200°C) | 1.00 mm Hg. | 9.00 mm. Hg |
| VISCOSITY (centistokes) | 78.3 (25°C) | 7.5-10.0 (100°C |
| WEIGHT/GALLON (LB. 25°C) | 8.9 | 12.8 |

AT 25 PHR IN LP-32/SRF at 30 PHR:

| | | |
|---|---|---|
| % Wt. loss (7 days at 100°C) | <15% | ~25% |

AT 40 PHR IN LP-32/$CaCO_3$ at 40 PHR:

| | | |
|---|---|---|
| SHORE A | 12 | 21 |
| % Wt. loss (7 days at 70°C) | 1.9% | 2.1% |
| 100% MODULUS (psi) | 40 | 41 |
| 100% Modulus (7 days in $H_2O$ at 70°C) (psi). | 33 | 38 |
| Tensile Strength (psi) | 104 | 99 |
| Tensile Strength (7 days in $H_2O$ at 70°C) (psi) | 102 | 157 |
| % Elongation | 365 | 475 |
| % Elongation (7 days in $H_2O$ at 70°C) (psi). | 665 | 835 |

DSW 586610

STLCOPCB4091944

SUGGESTED NEW

POLYSULFIDE PLASTICIZERS.

SANTICIZER® 261
SANTICIZER 148
AROCLOR® 5442
SANTICIZER 412
SANTICIZER 429

DSW 586611

STLCOPCB4091945