



NaSS Homopolymer (Poly-NaSS) and Copolymers

1. Introduction

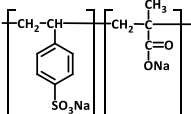
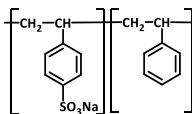
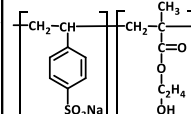
TOSOH produces various NaSS (co)polymers (20wt% aqueous solution). Key properties include low toxicity, excellent thermal/chemical stability, sulfonate functionality and hydrophobicity which lead to its use in varied and unique applications.

Table1 NaSS homopolymer(Poly-NaSS) grades

	PS-1	PS-5	PS-50	PS-100	PS-35 ¹⁾
Chemical Formula					
Status	Commercial				
CAS No.	25704-18-1				
REACH	Exemption				
TSCA	Listed				
METI	6-1040				
Appearance	Red clear liquid	Light yellow clear liquid			APHA <60
Active Solid(wt%)	20~22 (aqueous solution)				
Viscosity(mPa·s/25°C)	5~10	20~50	200~500	800~1600	250~400
pH	6~9	7~9	7~9	8~11	11~13
GPC Mw (x10 ⁴)	1~3 ²⁾	5~10 ²⁾	30~40 ²⁾	50~70 ²⁾	30~40 ²⁾

1) Special grade , 2) Reference value

Table2 NaSS copolymer grades

	MA-2005L	ST-5005 ⁵⁾	HM-2510 ⁵⁾
Comonomer	MAA·Na ¹⁾	St ²⁾	HEMA ³⁾
Chemical Formula			
Status	Commercial	Developing	
CAS No.	57833-28-0	31619-79-1	96361-50-1
REACH	Exemption		
TSCA	Listed		Not listed
METI	6-1596	6-122	6-1720
Appearance	APHA <100	Light yellow clear liquid	
Active Solid(wt%)	20~22 (aqueous solution)		
Viscosity(mPa·s/25°C)	< 10	5~10	20~50
pH	8~10	6~10	6~10
GPC Mw (×10 ⁴)	0.2~1.2	2~5 ⁴⁾	5~10 ⁴⁾

1) Sodium methacrylate:20mol% ,2) Styrene:50mol% , 3) 2-Hydroxymethacrylate:25mol%

4) Reference value ,6) Specifications are tentative

2. Properties

(1) Thermal Stability

The excellent thermal stability of Poly-NaSS is shown by TG-DTA. It is well suited to applications that involve high temperature condition such as mold lubricant, ironing aid, oilfield chemicals etc.

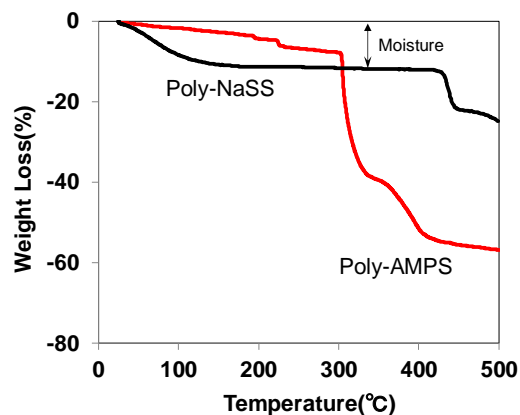


Fig.1 TG-DTA of Poly-NaSS and Poly-AMPS
(Temp.: RT→500°C, 10°C/min, in N₂)

(2) Chemical Stability

-Acid/Alkali Stability-

Poly-NaSS shows excellent stability in strong alkaline solution. On the other hand, it is less stable in strong acidic solution, however it can be stabilized by water soluble antioxidant such as hydroquinone.

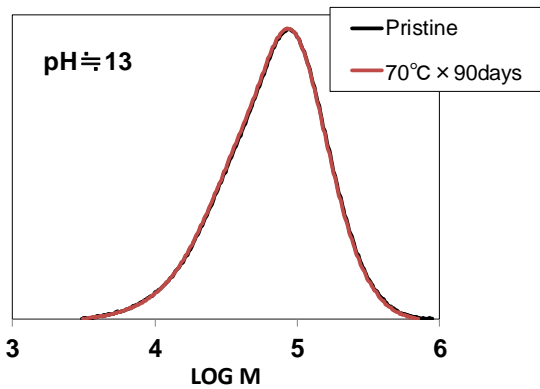


Fig.2 GPC Mw change in strong alkaline solution at 70°C(Poly-NaSS:PS-5)

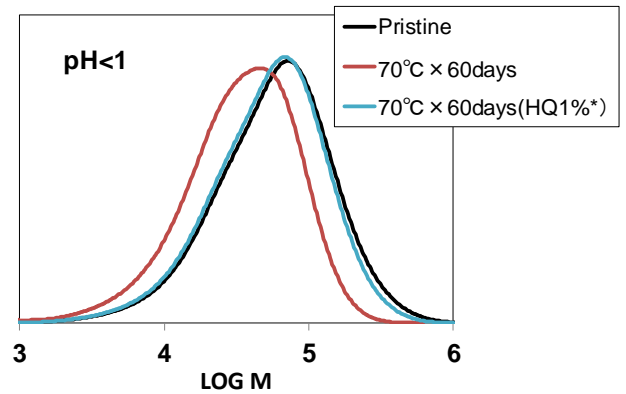


Fig.3 GPC Mw change in strong acidic solution at 70°C (Poly-NaSS: PS-5, *Hydroquinone)

-H2O2 Stability-

Poly-NaSS shows better stability in H₂O₂ aqueous solution than other aliphatic sulfonate polymers. It is well suited to applications that involve harsh condition such as oilfield chemicals, thickener for bleach, nano-filtration etc.

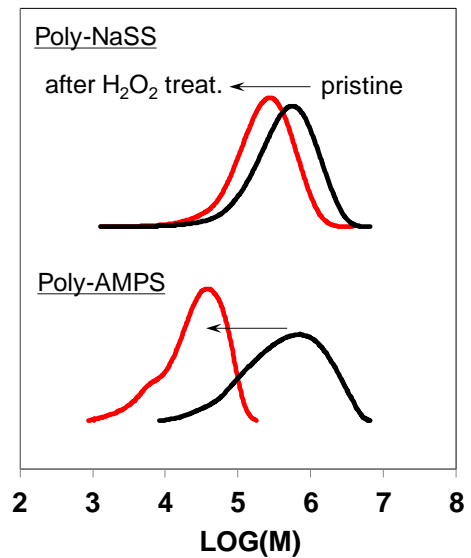


Fig.4 GPC Mw change by H₂O₂ treatment (20%Polymer/30%H₂O₂=100g/5g,50°C×14days)

(3) Dispersing Ability

Poly-NaSS has better dispersing ability than a versatile dispersant, sodium salt of condensation product of 2-naphthalenesulfonic acid and formalin, due to benzene sulfonate sequence. It is well suited to applications such as dispersant, anti-scalant, agrochemical granule, washing agent etc.

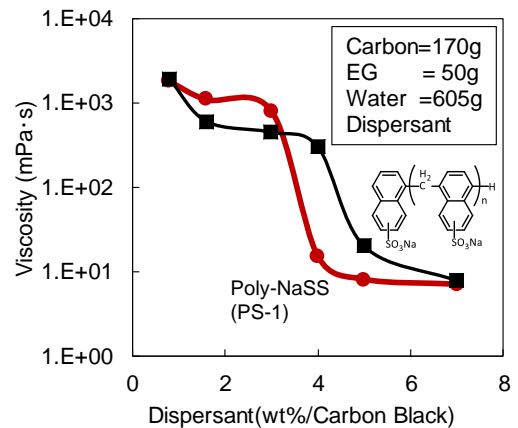


Fig.5 Viscosity of carbon black* dispersion
[*#40(Mitsubishi Chemical)]

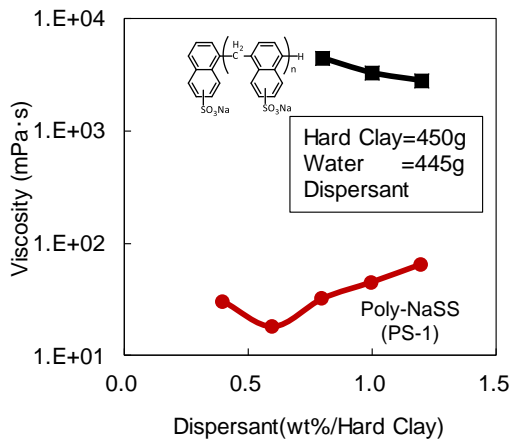


Fig.6 Viscosity of hard clay* dispersion
[*Crown Clay(Southeastern Clay)]

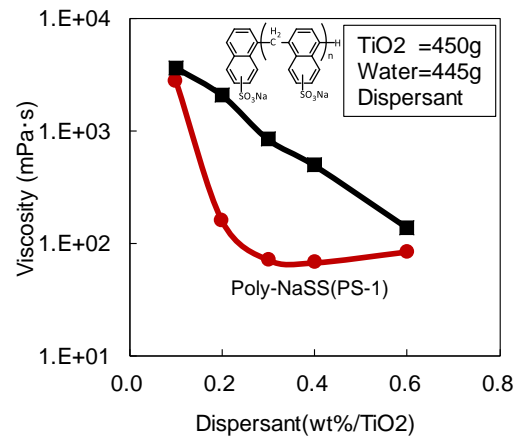


Fig.7 Viscosity of TiO2* dispersion
[*R-550(Ishihara Sangyo)]

3.Use of Poly-NaSS

Photographic paper, Household items (Ironing aid, Fabric washing, Bleach), Dispersant (Pigment, Chlorinated-PVC,CNT), Mold Lubricant, Adjuvant for Agrochemical, Microcapsule, Chemical Mechanical Polishing (CMP), Al-foil etching, Dampening water and Fiber treatment.

For more information, please contact us

TOSOH USA,INC.:3600 Gantz Road,Grove City,Ohio 43123
 TOSOH EUROPE B.V.:1096 HA Amsterdam,The Netherlands
 TOSOH(SHANGHAI)CO.,LTD.:Zunyi Road, Changning, Shanghai
 TOSOH ASIA PTE.LTD.:Singapore 048942
 TOSOH FINECHEM:3-8-2,Siba,Minato-ku,Tokyo,Japan

info.tusa@tosoh.com
info.tse@tosoh.com
info@tosoh.com.cn
info.tsas@tosoh.com
mail@tosoh-finechem.co.jp