



SANHO CHEMICAL CO., LTD.

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TOHMIDE TXE-415A

NO:TB-87-1

- =An epoxy curing agent of polyaminoamide.
- =Good compatibility with an epoxy resin.
- =Long pot life.
- =Moderate~ high range of heat curing temperature.
- =High heat resistance and high Tg.
- =Cured product is transparent, and provide with good mechanical properties and chemical resistance.

Recommendable applications.

- =Adhesives, =Encapsulation, =Impregnant.

1. Tentative specifications. (Not fixed yet).

Appearance	Thin yellow color, viscous liquid.
Viscosity, P (25°C)	100
Color	3 max.

Remarks : Specific gravity : 1.054
Flash point, °C : 232.

2. Recommendable mixing ratio.

18~65 parts of TXE-415A to 100 parts of epoxy resin of liquid bisphenol-A whose epoxy equivalent weight is about 190.

3. Curing property.

Curing exothermic temperature when TXE-415A is mixed with a liquid bisphenol-A epoxy resin whose epoxy equivalent weight is about 190.

Total mass : 200g

Measure Temp. : 22~23°C

Mixing ratio :

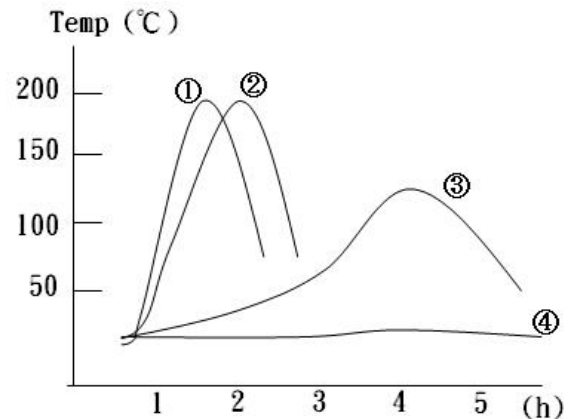
Epoxy/TXE-415A

① 70 / 30

② 75 / 25

③ 80 / 20

85 / 15



4. Mechanical properties of the cured product

- =Epoxy resin : same as (3) above.
- =Mixing ratio : as per listed below.



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(1) Curing condition : 23°C × 7 days.

Mixing ration : Epoxy/TXE-415A	60 / 40	70 / 30	80 / 20
Tensile strength, kgf/mm ²	2.5	3.2	4.0
Bending strength, kgf/mm ²	6.6	7.6	8.4
Flexural modulus, kgf/mm ²	3.5×10 ²	4.2×10 ²	4.3×10 ²
Compressive strength, kgf/mm ²	.5	9.8	10.9
Izod impact resistance, kgf-cm/cm	3.0	2.0	1.7
Heat distortion temperature, °C	53.0	52.5	48.5
Rockwell hardness, M-scale.	56	66	77
Adhesive strength, kgf/mm ²	167	158	153

(2) Curing condition :

Cure at 100°C after store the resin mixture in 23°C for 16 hours.

Mixing ration : Epoxy/TXE-415A	70 / 30	75 / 25	80 / 20	85 / 15
Tensile strength, kgf/mm ²	8.7	9.0	—	—
Bending strength, kgf/mm ²	11.4	12.2	12.3	12.0
Flexural modulus, kgf/mm ²	3.5×10 ²	3.6×10 ²	3.6×10 ²	3.7×10 ²
Compressive strength, kgf/mm ²	10.3	11.0	11.3	11.9
Izod impact resistance, kgf-cm/cm	2.5	3.0	2.5	3.0
Heat distortion temperature, °C	118	120	119	112
Rockwell hardness, M-scale.	100	104	105	109
Adhesive strength, kgf/mm ²	193	189	173	184

5. Chemical properties of the cured product.

=Epoxy resin : same as (4) above.

=Mixing ratio : as per listed below.

(1) Cure epoxy with TXE-415A at 23°C for seven days.

Immerse the cured product in room temperature in chemical substances below in one day, seven days and 30 days to measure the weight changing.

	Immersing & measuring One day after Mixing ratio : Epoxy / TXE-415A		
	60 / 40	70 / 30	80 / 20
City water	0.6	0.2	0.1
5% salt water	0.6	0.2	0.1
10% caustic soda	0.3	0.2	0.1
10% ammonia	0.5	0.2	0.1
5% sulfuric acid	46.0	10.4	0.4



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5% hydrochloric acid	31.9	3.9	0.2
Lamp oil	0.0	0.0	0.0
IPA	1.5	0.2	0.2
MEK	0.0	0.1	1.3

	Immersing & measuring 7 days after Mixing ratio : Epoxy / TXE-415A		
	60 / 40	70 / 30	80 / 20
	City water	2.3	0.7
5% salt water	2.0	0.6	0.4
10% caustic soda	0.9	0.6	0.3
10% ammonia	1.5	0.6	0.4
5% sulfuric acid	94.0	21.6	0.8
5% hydrochloric acid	73.5	9.7	0.5
Lamp oil	0.0	0.0	0.0
IPA	3.4	0.3	0.2
MEK	0.1	0.2	1.7

	Immersing & measuring 30 days after Mixing ratio : Epoxy / TXE-415A		
	60 / 40	70 / 30	80 / 20
	City water	8.2	1.8
5% salt water	13.1	1.5	0.9
10% caustic soda	2.3	1.3	0.8
10% ammonia	6.1	1.7	0.9
5% sulfuric acid	—	32.2	1.4
5% hydrochloric acid	—	16.1	1.2
Lamp oil	0.0	0.0	0.0
IPA	7.1	0.4	0.4
MEK	0.4	0.4	2.1

(2) Leave resin mixture of epoxy with TXE-415A in 23°C for 16 hours.

Thereafter cure at 100°C for two hours.

Immerse each cured product in chemical substance below for one day, seven day, seven days and 30 days to measure weight changing.

	Immersing & measuring
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	One day after			
	Mixing ratio : Epoxy / TXE-415A			
	70 / 30	75 / 25	80 / 25	85 / 15
City water	0.2	0.2	0.2	0.1
5% salt water	0.2	0.1	0.1	0.1
10% caustic soda	0.2	0.1	0.1	0.1
10% ammonia	0.2	0.2	0.1	0.1
5% sulfuric acid	1.4	0.4	0.2	0.2
5% hydrochloric acid	1.0	0.3	0.2	0.1
Lamp oil	0.0	0.0	0.0	0.0
IPA	0.0	0.8	0.0	0.0
MEK	0.1	0.1	0.1	0.2

	Immersing & measuring			
	7 days after			
	Mixing ratio : Epoxy / TXE-415A			
	70 / 30	75 / 25	80 / 20	85 / 15
City water	0.8	0.7	0.6	0.6
5% salt water	0.7	0.6	0.5	0.5
10% caustic soda	0.6	0.6	0.5	0.4
10% ammonia	0.7	0.6	0.6	0.5
5% sulfuric acid	5.1	1.2	0.7	0.6
5% hydrochloric acid	3.3	1.0	0.7	0.5
Lamp oil	0.1	0.0	0.0	0.0
IPA	0.0	0.0	0.0	0.0
MEK	0.3	0.2	0.3	1.1

	Immersing & measuring			
	30 days after			
	Mixing ratio : Epoxy / TXE-415A			
	70 / 30	75 / 25	80 / 20	85 / 15
City water	2.1	1.8	1.6	1.3
5% salt water	1.8	1.5	1.4	1.1
10% caustic soda	1.5	1.4	1.2	0.9
10% ammonia	1.9	1.5	1.4	1.2
5% sulfuric acid	12.5	3.1	1.6	1.4
5% hydrochloric acid	7.8	2.7	1.7	1.1
Lamp oil	0.1	0.1	0.1	0.1
IPA	0.2	0.2	0.2	0.3



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MEK	0.8	0.6	0.7	1.5
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6. Changing of heat distortion temperature.

Leave resin mixture of epoxy with TXE-415A in room temperature for 16 hours.

Thereafter, cure them for one hour at each curing temperature listed below.

Mixing ratio : Epoxy / TXE-415A					
	70 / 30	75 / 25	80 / 20	85 / 15	90 / 10
Later cure for 1 (one) hour :					
at 150°C	—	133	153	162	82
at 120°C	—	136	137	128	—
at 100°C	118	119	114	—	—

7. Changing of Glass Transition Temperature.

Measure the Tg FROM DSC curve. (Heating speed of DSC=5°C/min.)

Curing time, h	Tg, °C											
	0.5			1.0			2.0			3.0		
Curing temp, °C	100	120	150	100	120	150	100	120	150	100	120	150
Mixing ratio : Epoxy / TXE-415A												
80 / 15	—	—	145	101	128	155	109	135	156	133	140	156
85 / 20	—	—	145	109	138	149	122	135	148	122	136	151

Mixing ratio : Epoxy / TXE-415A					
	70 / 30	75 / 25	80 / 20	85 / 15	90 / 10
Later cure for 1 (one) hour :					
Curing 1h × 150°C	—	113	149	155	83
1h × 120°C	—	110	138	128	—
1h × 100°C	113	114	109	101	—