

APPENDIX A
Sample Calculation of Unmodified Epoxy

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Molecular Weight (MW) of Epoxy (EPIKOTE 828) = 390 g / mol

Molecular Weight (MW) of MXDA = 136 g / mol

Mole of Epoxy to Amine = 2:1

Theoretical amount (% mol) of epoxy that react at gel point:

Take basis of 100g epoxy:

$$\begin{aligned}\text{From equation: No. of mol, } n_{\text{epoxy}} &= \frac{\text{Mass}}{\text{MW}} \\ &= \frac{100\text{gram}}{390 \text{ g / mol}} \\ &= 0.2564 \text{ moles epoxy}\end{aligned}$$

Since mol epoxy to amine = 2:1

$$n_{\text{amine}} = \frac{0.2564 \text{ moles}}{2} \times 1 = 0.1282 \text{ moles}$$

Amine needed to react with epoxy:

$$\begin{aligned}\text{Mass(amine)} &= n_{\text{amine}} \times \text{MW}_{\text{amine}} \\ &= 0.1282 \text{ moles} \times 136 \text{ g / mol} \\ &= 17.4352 \text{ grams}\end{aligned}$$

Therefore:

100g epoxy need 17.44g of MXDA.

(Sample calculation taken from Polymer, Material & Product Processing Lab Manual, July 2005, Universiti Teknologi Petronas)

APPENDIX B
Sample Calculation of Modified Epoxy

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From Appendix A;

$$\text{Amount of MXDA (A)} = 17.44\text{g}$$

$$\text{Amount of Epikote 828 (B)} = 100\text{g}$$

Therefore,

$$\text{Amount of PANI (C)} = \frac{X(A+B)}{(1-X)}$$

0.5% PANI

$$C = \frac{(0.005)(100 + 17.44)}{(0.995)}$$

$$= 0.5902\text{g}$$

Since PANI in 3% xylene, so amount of PANI needed is:

$$= \frac{0.5902\text{g}}{3} \times 100\text{g} = 19.67\text{g}$$

1.0% PANI

$$C = \frac{(0.01)(100 + 17.44)}{(0.995)}$$

$$= 1.186\text{g}$$

Since PANI in 3% xylene, so amount of PANI needed is:

$$= \frac{1.186\text{g}}{3} \times 100\text{g} = 39.53\text{g}$$

1.5% PANI

$$C = \frac{(0.015)(100 + 17.44)}{(0.985)}$$

$$= 1.788\text{g}$$

Since PANI in 3% xylene, so amount of PANI needed is:

$$= \frac{1.788\text{g}}{3} \times 100\text{g} = 59.61\text{g}$$