Table 2.1. *Summary of synthesis parameters, molecular weight data, and cloud points for HEMA homopolymers. (prepared via ATRP in methanol at 25 ℃)*

entry no.	Target degree of polymerization	M_n (theory)	M_n (^{1}H NMR)	M_n (GPC)	M_w/M_n
1	BrB-$HEMA_{30}$	4100	4264	12792	1.13
2	$HEMA_8$-AMBEP-$HEMA_8$	2700	3689	9881	1.13
3	$HEMA_{12}$-AMBEP-$HEMA_{12}$	3700	4447	11420	1.15
4	$HEMA_{15}$-AMBEP-$HEMA_{15}$	4500	5267	16237	1.17
5	$HEMA_{30}$-AMBEP-$HEMA_{30}$	8400	9519	19505	1.15

Table 2.2. *Summary of molecular weight date and cloud points for HEMA and NVP diblock copolymers. (prepared via conventional radical polymerizationl at 70 ℃)*

entry no.	copolymer composition	M_n (theory)	M_n (^{1}H NMR)	M_n (GPC)	M_w/M_n
1	$HEMA_{34}$-b-NVP_{30}	8000	8234	16051	1.25
2	$HEMA_{34}$-b-NVP_{40}	9100	9233	26540	1.26
3	$HEMA_{34}$-b-NVP_{50}	10200	10454	27894	1.25
4	$HEMA_{34}$-b-NVP_{70}	12400	12452	31568	1.27
5	$HEMA_{34}$-b-NVP_{80}	13500	14006	35432	1.32

Table 2.3. *Carbonyl group curve-fitting results of the (a) blends and (b) diblock copolymers.*

Samples(wt%)	Free C=O		H-bonded C=O		fb[a](%)
	ν_f(cm^{-1})	A_f(%)	ν_b(cm^{-1})	A_b(%)	
(a)PHEMA/PVP					
90 /10	1686.7	6.34	1665.2	93.66	91.9
70 /30	1685.3	18.06	1666.8	81.94	77.7
50 /50	1687.9	24.56	1665.2	75.44	70.2
30 /70	1686.5	29.73	1671.4	70.27.	64.5
10 /90	1683.1	32.87	1669.8	67.13.	61.1
(b) PHEMA-b-PVP					
56 /44	1693.5	3.18	1672.2	96.82	95.9
50 /50	1689.3	7.47	1674.3	92.53	90.5
44 /56	1691.3	11.58	1678.9	88.42	85.4
37 /63	1689.7	19.18	1673.5	80.82	76.4
33 /67	1685.6	31.94	1670.7	68.06.	62.1

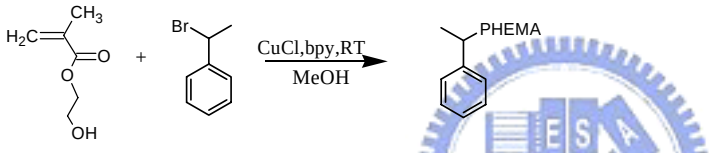
ν_f : wavenumber of free C=O of PVP； ν_b : wavenumber of hydrogen bonded carbonyl of PVP； A_f : fress C=O area fraction of PVP； A_b : C=O area fraction of hydrogen bonded PVP. fb[a] : fraction of hydrogen bonded PVP=$(A_b/1.3)/(A_b/1.3+A_f)$.

Table 2.4. *Relaxation times, $T_{1\rho}^{H}$, and domain size for (a) blends and (b) diblock copolymers at the magnetization intensities of 60 ppm.*

Samples(wt%)	$T_{1\rho}^{H}$ (ms)	Domain size (nm)	Samples(wt%)	$T_{1\rho}^{H}$ (ms)	Domain size (nm)
(a)PHEMA/PVP			(b)PHEMA-b-PVP		
90 /10	7.63	1.51	56 /44	6.81	1.42
70 /30	7.46	1.49	50 /50	5.43	1.27
50 /50	7.18	1.46	44 /56	4.46	1.15
30 /70	6.06	1.34	37 /63	3.25	0.98
10 /90	5.71	1.30	33 /67	3.10	0.96

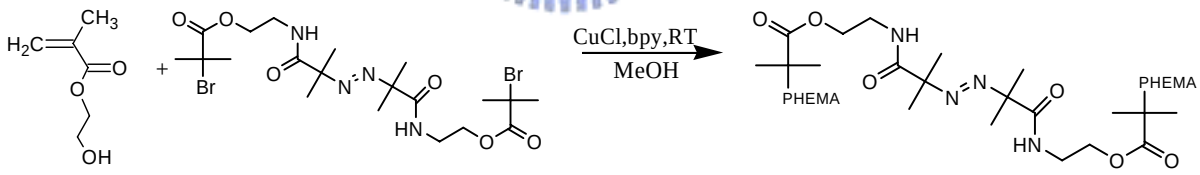
Pure PHEMA: $T_{1\rho}^{H}$ = 5.59 ms; domain size = 1.29 nm. Pure PVP: $T_{1\rho}^{H}$ = 8.28 ms; domain size = 1.57 nm.

(a)



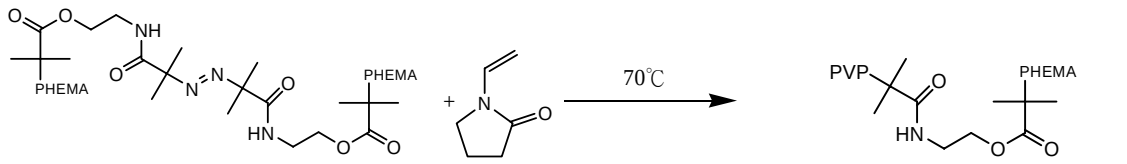
HEMA BrB PHEMA

(b)



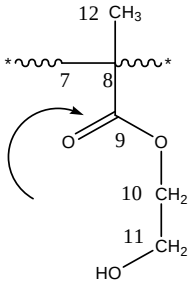
HEMA AMBEP PHEMA-AMBEP-PHEMA

(c)

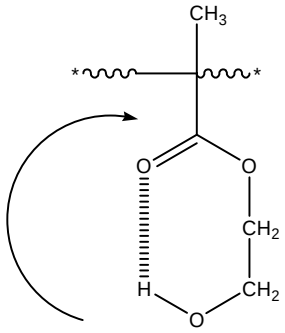


PHEMA-AMBEP-PHEMA NVP PVP-AMBEP-PHEMA

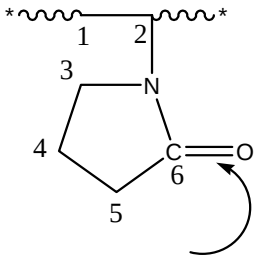
Scheme 2.1. *The synthesis of homopolymer and diblock copolymer.*



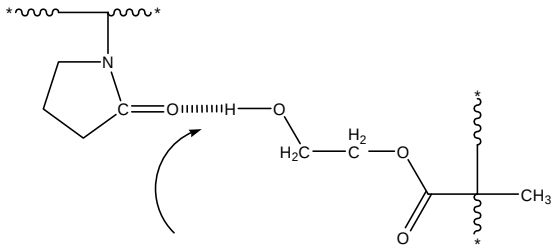
(a) Free carbonyl at 1730 cm^{-1}



(b) Hydrogen-bonded carbonyl at 1710 cm^{-1}



(c) Free PVP carbonyl in pure PVP homopolymer at 1680 cm^{-1}



(d) Hydrogen-bonded carbonyl of PHEMA/PVP at 1665 cm^{-1}

Scheme 2.2. *Schematic representation of hydrogen bonding.*

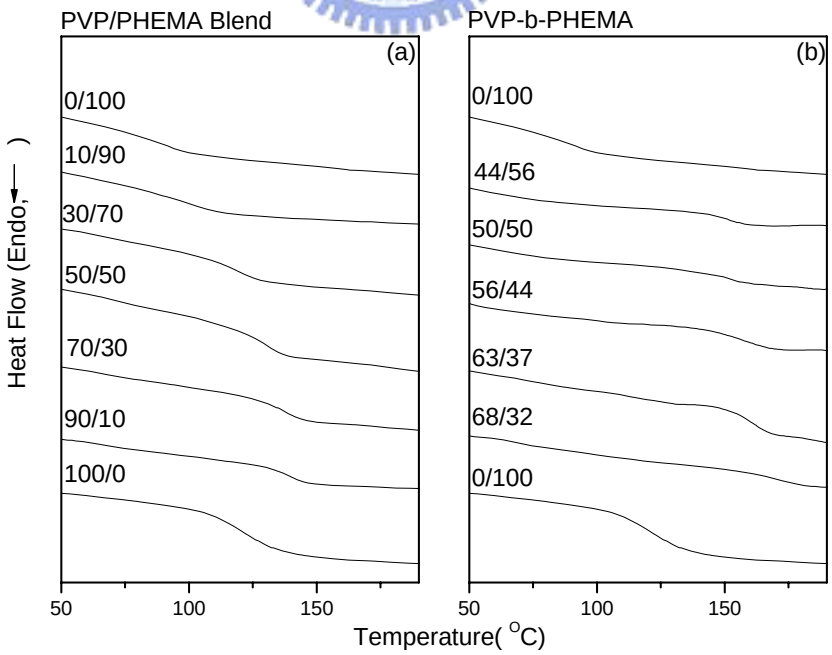


Figure 2.1. *The DSC curves of the (a) blends and (b) diblock copolymers with different compositions (weight ratio).*

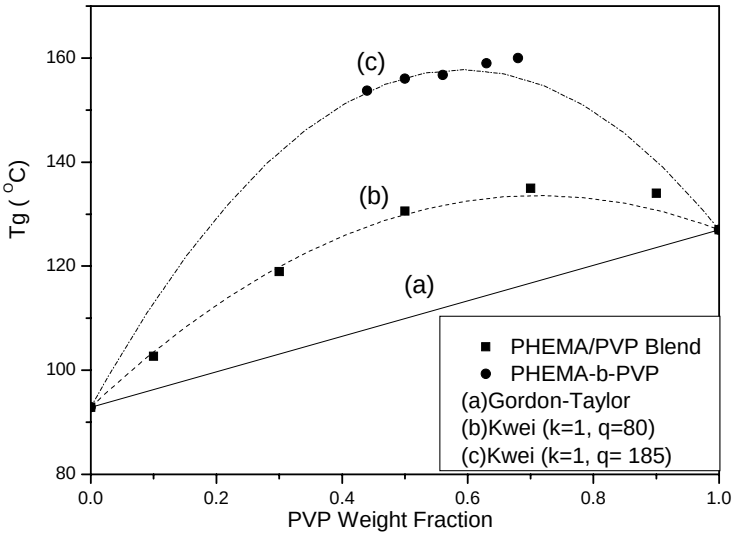


Figure 2.2. *The T_g vs. composition curves based on (a) the Gordon-Taylor equation, (b) the Kwei equation for blends system, (c) the Kwei equation for diblock copolymers system, (■) experimental date of the blends, and (●) experimental date of the diblock copolymers system.*

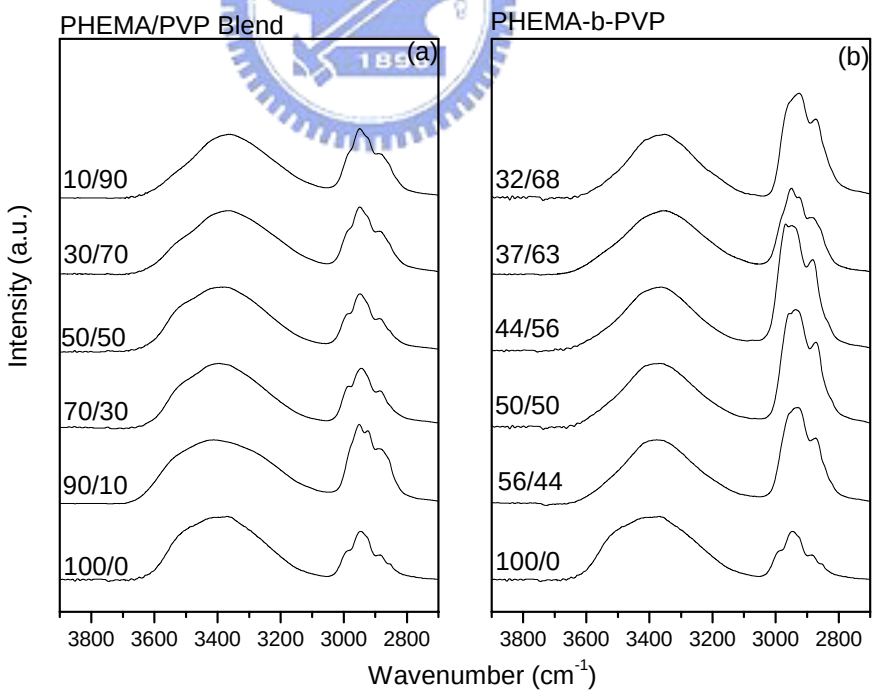


Figure 2.3. *FTIR spectra at room temperature in the 2700-3900 cm^{-1} region for (a) blends and (b) diblock copolymers with different compositions (weight ratio).*

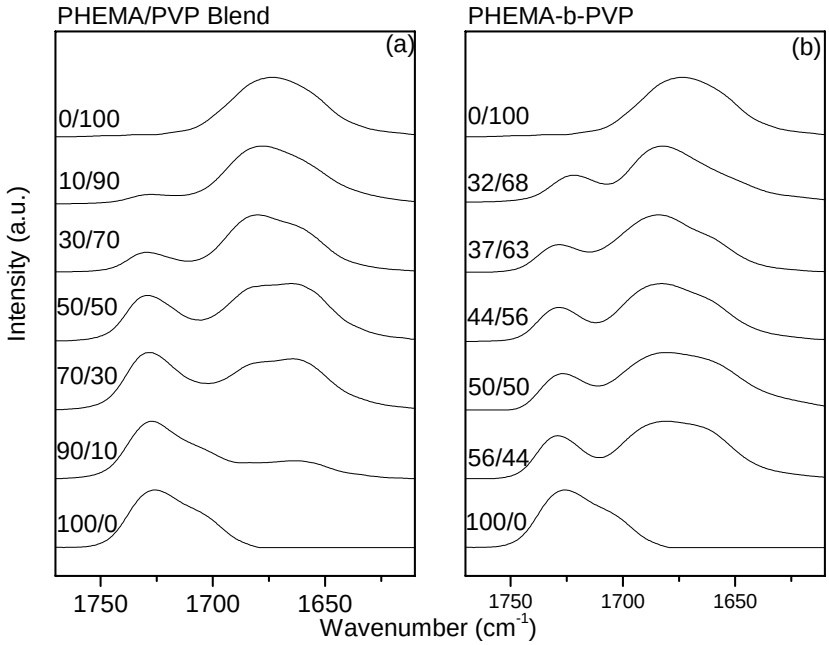


Figure 2.4. *FTIR spectra at room temperature in the 1620-1780 cm^{-1} region for (a) blends and (b) diblock copolymers with different compositions (weight ratio).*

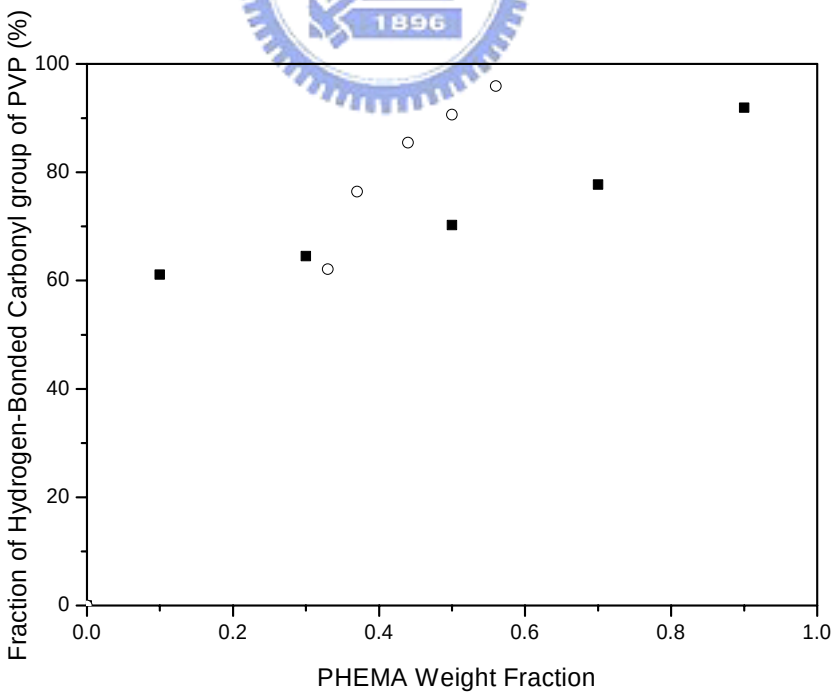


Figure 2.5. *The fraction of hydrogen bonded carbonyl vs. PHEMA content for (a) blends (■) and (b) diblock copolymers (○) from FTIR spectra.*

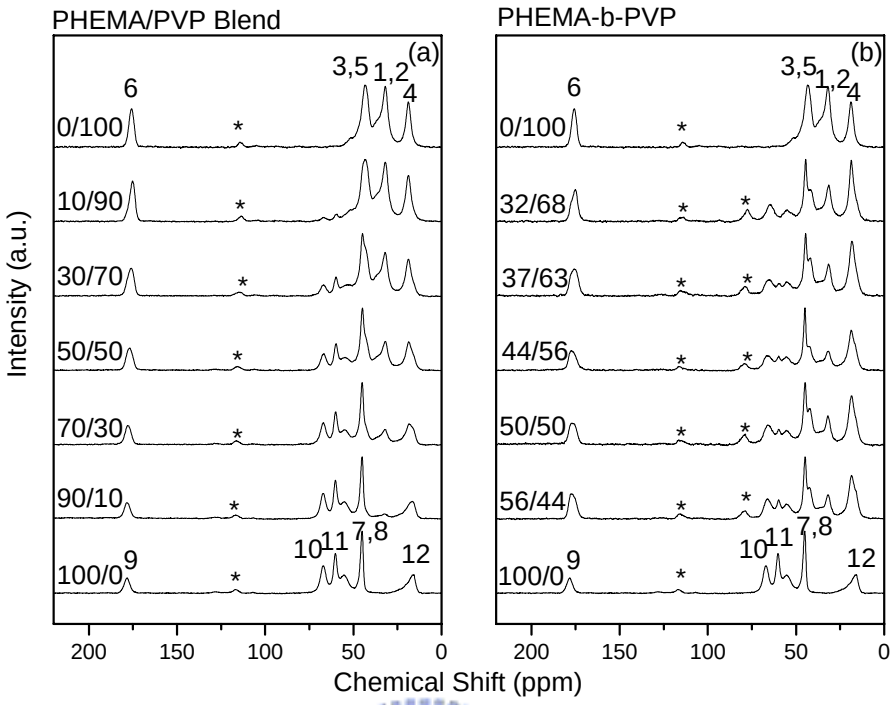


Figure 2.6. *^{13}C CP/MAS NMR for (a) blends and (b) diblock copolymers with different compositions (weight ratio).*

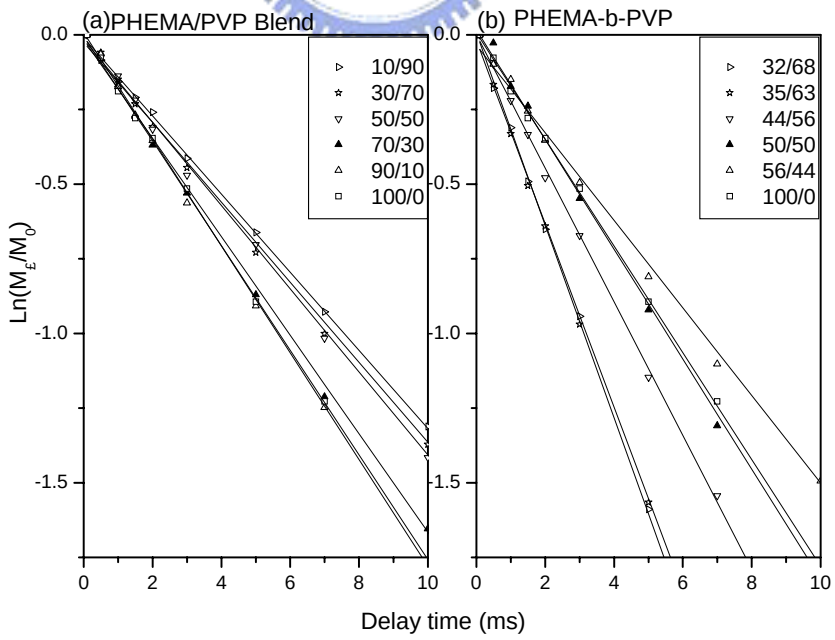


Figure 2.7. *Logarithmic plots of the intensities of 60 ppm vs. delay time for (a) blends and (b) diblock copolymers with different compositions (weight ratio).*

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