II.

EXPERIMENTAL

II EXPERIMENTAL

II.1. Preparation of Acid Chlorides :

In a cleaned, dried 100 ml flask, calculated quantity of acid was taken and calculated quantity of Thionyl chloride was added to it. To this mixture 2-3 drops of pyridine were added. The flask was fitted with a reflux condenser and trap for moisture. The mass was kept at 70 - 80°C for 3 - 4 hours with occasional shaking. Afterwards excess of thionyl chloride was distilled off. The product was used for subsequent reaction.

This process was used for the preparation of acid chlorides from the following acids :

(i) Sebacic acid,
(ii) Terephthalic acid,
(iii) Fumaric acid,
(iv) Acrylic acid,
(v) Salicylic acid,
(vi) Isophthalic acid,
(vii) Adipic acid,
(viii) Anthranilic acid,
(ix) Glycine (Amino Acetic acid),
(x) 4 - Amino Benzoic acid and
(xi) 4 - Hydroxy Benzoic acid.

The amounts of reactants used, % yield, colour of the product, etc. are presented in Table II. 1.

Table II.1

No	Acid and its weight (g)		Vol of Thionyl Chloride (ml)	% yield	Colour of product
1	2		3	4	5
1	Sebacic acid	1.74	3.6	85	Pink
2	Terephthalic acid	1.66	3.6	85	White
3	Fumaric acid	1.16	3.6	87	Black
4	Acrylic acid	1.00	3.6	84	Pale brown
5	Salicylic acid	1.38	3.6	95	Pink
6	Isophthalic acid	1.6	3.6	85	White

(Table II.1 Contd.)

1	2		3	4	5
7	Adipic acid	1.46	3.6	88	Red
8	Anthranilic acid	1.37	3.6	95	Brown
9	Amino acetic acid	1.00	3.6	85	Brown
10	4 -Amino Benzoic acid	1.30	3.6	95	Pale brown
11	4 -Hydroxy Benzoic acid	1.30	3.6	95	Pink

The abbreviations used for various chemicals, etc. are shown in Table II.2.

II.2. Preparation of Polyesters :

(using K - grade PVA)

2(a) Using acid chloride :

In a cleaned, dried 250 ml flask, fitted with a reflux condenser, calculated quantity of Polyvinyl alcohol (PVA) of Koch-Light make (K - grade) was dissolved in Dimethyl formamide (DMF) and calculated quantity of acid chloride was added to it. Five ml of pyridine (PY) was added to the mixture. The reaction mixture was refluxed on sand bath for 6 hours with occasional shaking. Formation of polyester was taking place during the reaction. The product was removed from the flask and washed with water. It was dried at 80 - 85°C on water bath. The details regarding the amounts of reagents used, etc. are given in Table II.3.

2(b) Using acid and acetic anhydride :

In a cleaned, dried 250 ml flask, fitted with a reflux condenser, calculated quantity of polyvinyl alcohol (PVA) of Koch-Light make (K - grade) was dissolved in Dimethyl formamide (DMF), and calculated quantity of Trichloro acetic acid (TCAA) was added to it. One ml of Acetic anhydride (AAN) was also added to the mixture. The reaction mixture was refluxed on sand bath for 6 hours

Table II.2

Abbreviations

DP - degree of polymerization

K - Koch-Light make

S - SD Chem make

- solid content per g of sample

P - poly(vinyl alcohol)

PVA - poly(vinyl alcohol)

A.V.H. - acid value (meq/g) determined after hydrolysis

A.V.I. - acid value (meq/g) determined immediately

$(A.V.H.)_m$ - AVH determined using methyl red

SBA - Sebacic acid

TPA - terephthalic acid

IPTA - isophthalic acid

FMA - fumaric acid

ACA - acrylic acid

SAA - salicylic acid

ADA - adipic acid

ANA - anthranilic acid

AAA - glycine

ABA - p-amino benzoic acid

HBA - p-hydroxy benzoic acid

TCAA - trichloroacetic acid

TMAN - trimellitic anhydride

DMF - dimethyl formamids

Py - pyridene

AAN - acetic anhydride

Chm - chloroform

w - water

PS - partly soluble

S - soluble

I - Insoluble

q - water content/g. of sample

W_{BS} - wt of sample before sorption

W_{AS} - wt of sample after sorption (also $W_{AR(I)}$, $W_{AR(II)}$, $W_{AR(III)}$ on recycling)

W_{DS} - wt of sample after drying the swollen

Table II.2(contd.)

sample (also $W_{DR(I)}$, $W_{DR(II)}$, $W_{DR(III)}$ on recycling)

W_{WD} - wt of sample after washing and drying the swollen sample

W_W - wt of water

W_{WS} - wt of water and sample

W_{WSA} - wt of water and sample after 24 hrs.

Z - wt proportion of PVA to acid chloride

D - additional acid component present in the product molecule.

Sol - solubility of product

Sol_w - solubility in water

Sol_s - solubility in salt solution

DSO_c - degree of salting out

SD - swelling degree

DS - degree of swelling

E_F - ester group/g sample

W_{aq} - water content/g of sample (formula basis)

$W_{F(a)}$ - formula wt of anhydrous product

W_d - wt of sample before drying

W_i - wt of sample after drying

W_R - equivalent fraction of vinyl alcohol to acid chloride used

W_V - equ wt/ester group (used wt basis)

E_V - ester group (meq/g) (used wt basis)

DE - degree of esterification

V_{BS} - volume of water or solution used in sorption experiment.

E - ester unit

A - vinyl alcohol monomer

Q - water molecule

X - no. of vinyl alcohol monomers

y - no.of water molecules.

Table II.3(a)

No.	Product	Wt of PVA (K - grade) (g)	Wt of Sebacic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-SBA(1)	1	1	DMF,Py	150	6	1.1
2	K-P-SBA(2)	2	1	DMF,Py	150	6	2.3
3	K-P-SBA(3)	3	1	DMF,Py	150	6	3.9
4	K-P-SBA(5)	5	1	DMF,Py	150	6	5.8
5	K-P-SBA(10)	10	1	DMF,Py	150	6	10.6

Table II.3(b)

No	Product	Wt of PVA (K - grade) (g)	Wt of Terephthalic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-TPA(1)	1	1	DMF,Py	150	6	1.1
2	K-P-TPA(2)	2	1	DMF,Py	150	6	2.7
3	K-P-TPA(3)	3	1	DMF,Py	150	6	3.7
4	K-P-TPA(5)	5	1	DMF,Py	150	6	5.7
5	K-P-TPA(10)	10	1	DMF,Py	150	6	10.5

Table II.3(c)

No	Product	Wt of PVA (K - grade) (g)	Wt of Fumaric acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-FMA(1)	1	1	DMF,Py	150	6	1.3
2	K-P-FMA(2)	2	1	DMF,Py	150	6	2.8
3	K-P-FMA(3)	3	1	DMF,Py	150	6	3.7
4	K-P-FMA(5)	5	1	DMF,Py	150	6	5.7
5	K-P-FMA(10)	10	1	DMF,Py	150	6	10.5

Table II.3(d)

No	Product	Wt of PVA (K - grade) (g)	Wt of Acrylic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-ACA(1)	1	1	DMF,Py	150	6	1.1
2	K-P-ACA(2)	2	1	DMF,Py	150	6	2.9
3	K-P-ACA(3)	3	1	DMF,Py	150	6	3.9
4	K-P-ACA(5)	5	1	DMF,Py	150	6	5.7
5	K-P-ACA(10)	10	1	DMF,Py	150	6	10.5

Table II.3(e)

No	Product	Wt of PVA (K - grade) (g)	Wt of Salicylic acid chloride (g)	Medium	Temp of reaction (°C)	Time of reaction (hr)	Yield (g)
1	K-P-SAA(1)	1	1	DMF,Py	150	6	1.2
2	K-P-SAA(2)	2	1	DMF,Py	150	6	2.9
3	K-P-SAA(3)	3	1	DMF,Py	150	6	3.9
4	K-P-SAA(5)	5	1	DMF,Py	150	6	4.9
5	K-P-SAA(10)	10	1	DMF,Py	150	6	9.0

Table II.3(f)

No	Product	Wt of PVA (K- grade) (g)	Wt of Isophthalic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-IPTA(1)	1	1	DMF,Py	150	6	1.1
2	K-P-IPTA(2)	2	1	DMF,Py	150	6	2.8
3	K-P-IPTA(3)	3	1	DMF,Py	150	6	3.4
4	K-P-IPTA(5)	5	1	DMF,Py	150	6	5.7
5	K-P-IPTA(10)	10	1	DMF,Py	150	6	10.9

Table II.3(g)

No	Product	Wt of PVA (K - grade) (g)	Wt of Adipic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-ADA(1)	1	1	DMF,Py	150	6	1.9
2	K-P-ADA(2)	2	1	DMF,Py	150	6	2.7
3	K-P-ADA(3)	3	1	DMF,Py	150	6	3.9
4	K-P-ADA(5)	5	1	DMF,Py	150	6	5.9
5	K-P-ADA(10)	10	1	DMF,Py	150	6	10.9

Table II.3(h)

No	Product	Wt of PVA (K - grade) (g)	Wt of Anthranilic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-ANA(1)	1	1	DMF,Py	150	6	1.9
2	K-P-ANA(2)	2	1	DMF,Py	150	6	2.9
3	K-P-ANA(3)	3	1	DMF,Py	150	6	3.9
4	K-P-ANA(5)	5	1	DMF,Py	150	6	5.9
5	K-P-ANA(10)	10	1	DMF,Py	150	6	10.9

Table II.3(j)

No	Product	Wt of PVA (K - grade) (g)	Wt of Amino Acetic Acid Chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-AAA(1)	1	1	DMF,Py	150	6	1.8
2	K-P-AAA(2)	2	1	DMF,Py	150	6	2.6
3	K-P-AAA(3)	3	1	DMF,Py	150	6	3.8
4	K-P-AAA(5)	5	1	DMF,Py	150	6	5.7
5	K-P-AAA(10)	10	1	DMF,Py	150	6	10.1

Table II.3(k)

No	Product	Wt of PVA (K - grade) (g)	Wt of 4 Amino benzoic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-4ABA(1)	1	1	DMF,Py	150	6	1.5
2	K-P-4ABA(2)	2	1	DMF,Py	150	6	2.9
3	K-P-4ABA(3)	3	1	DMF,Py	150	6	3.7
4	K-P-4ABA(5)	5	1	DMF,Py	150	6	5.9
5	K-P-4ABA(10)	10	1	DMF,Py	150	6	10.6

Table II.3(1)

No	Product	Wt of PVA (K - grade) (g)	Wt of 4-Hydroxy benzoic acid chloride (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-4HBA(1)	1	1	DMF,Py	120	2	1.9
2	K-P-4HBA(2)	2	1	DMF,Py	120	2	2.9
3	K-P-4HBA(3)	3	1	DMF,Py	120	2	3.9
4	K-P-4HBA(5)	5	1	DMF,Py	120	2	5.8
5	K-P-4HBA(10)	10	1	DMF,Py	120	2	10.8

with occasional shaking. Formation of polyester was taking place during the reaction. The product was removed from the flask, and washed with water. It was dried at 80 - 85°C on water bath. The details regarding the amounts of reactants used etc are given in Table II.3(m).

2(c) Using acid anhydride :

In a cleaned, dried 250 ml flask, fitted with a reflux condenser, calculated quantity of polyvinyl alcohol (PVA) of Koch-Light make (K - grade) was dissolved in Dimethyl formamide (DMF), and calculated quantity of Trimelletic anhydride (TMAN) was added to it. The reaction mixture was refluxed on sand bath for 6 hours with occasional shaking. Formation of polyester was taking place during the reaction. The product was removed from the flask, and washed with water. It was dried at 80 - 85°C on water bath. The details regarding reactants used, etc are given in Table II.3(m).

II.3 Preparation of Polyesters :

(using S - grade PVA)

In a cleaned, dried 250 ml beaker calculated quantity of polyvinyl alcohol (PVA) of SD make (S - grade) dissolved in water (W) was taken and calculated quantity of acid chloride dissolved in choloroform (chm) and 1 g of sodium carbonate (Na_2CO_3) were added to it. The reaction mixture was stirred on magnetic stirer at room temperature.

Table II.3(m)

No	Product	Wt of PVA (K - grade) (g)	Acid/Acid anhydride and its wt (g)	Medium	Temp of reaction (^{o}C)	Time of reaction (hr)	Yield (g)
1	K-P-TCAA(1/3)	1	Trichloro acetic acid - 3	DMF,AAN	150	6	1.7
2	K-P-TMAN(1/2)	1	Trimelletic anhydride - 2	DMF	150	6	1.5

During the reaction, bubble formation was observed. The product was filtered, washed with water and dried at room temperature. The details regarding the amounts of reagents used, time of reaction, etc are presented in Table II.4.

Colour solubility, melting point, etc. of these products from K-grade and S-grade PVA are presented in Table II.5 and II.6.

II.4 ANALYSIS :

These products were analysed for %C, % H and % N by microanalysis and the results are presented in Table II.7.

II.5 WATER CONTENT (q) :

0.1g of resin was kept in air-oven at 90 - 100°C for 24 hrs and weighed after cooling in the desiccator. Water content was calculated as

$$q = \frac{W_d - W_i}{W_i}$$

where W_i and W_d are the weights of the resin before and after drying. (The sample was kept in the oven for another period of 24 hrs to check the constancy of weight after drying). The results are presented in Table II.8.

Table II.4(a)

No	Product	Wt of PVA (S - grade) (g)	Wt of Sebacic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-SBA(1)	1	1	Chm,W	1	6	1.4
2	S-P-SBA(2)	2	1	Chm,W	1	4	2.5
3	S-P-SBA(3)	3	1	Chm,W	1	3	3.8
4	S-P-SBA(5)	5	1	Chm,W	1	2	5.8
5	S-P-SBA(10)	10	1	Chm,W	1	1/2	10.9

Table II.4(b)

No.	Product	Wt of PVA (S - grade) (g)	Wt of Terephthalic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-TPA(1)	1	1	Chm,W	1	4	1.4
2	S-P-TPA(2)	2	1	Chm,W	1	2	2.4
3	S-P-TPA(3)	3	1	Chm,W	1	1 $\frac{1}{2}$	3.9
4	S-P-TPA(5)	5	1	Chm,W	1	1/2	5.8
5	S-P-TPA(10)	10	1	Chm,W	1	1/2	10.9

Table II.4(c)

No	Product	Wt of PVA (S - grade) (g)	Wt of Fumaric acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-FMA(1)	1	1	Chm,W	1	6	1.4
2	S-P-FMA(2)	2	1	Chm,W	1	6	2.2
3	S-P-FMA(3)	3	1	Chm,W	1	4	2.9
4	S-P-FMA(5)	5	1	Chm,W	1	4	5.9
5	S-P-FMA(10)	10	1	Chm,W	1	1	10.9

Table II.4(d)

No	Product	Wt of PVA (S - grade) (g)	Wt of Acrylic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-ACA(1)	1	1	Chm,W	1	$2\frac{1}{2}$	1.9
2	S-P-ACA(2)	2	1	Chm,W	1	1	2.8
3	S-P-ACA(3)	3	1	Chm,W	1	1	3.9
4	S-P-ACA(5)	5	1	Chm,W	1	1/2	5.9
5	S-P-ACA(10)	10	1	Chm,W	1	1/2	10.7

Table II.4(e)

No	Product	Wt of PVA (S - grade) (g)	Wt of Salicylic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-SAA(1)	1	1	Chm,W	1	6	1.8
2	S-P-SAA(2)	2	1	Chm,W	1	2	2.2
3	S-P-SAA(3)	3	1	Chm,W	1	$1\frac{1}{2}$	3.1
4	S-P-SAA(5)	5	1	Chm,W	1	$1\frac{1}{2}$	5.8
5	S-P-SAA(10)	10	1	Chm,W	1	1/2	10.7

Table II.4(f)

No	Product	Wt of PVA (S- grade) (g)	Wt of Isophthalic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-IPTA(1)	1	1	Chm,W	1	6	1.8
2	S-P-IPTA(2)	2	1	Chm,W	1	4	2.4
3	S-P-IPTA(3)	3	1	Chm,W	1	4	3.9
4	S-P-IPTA(5)	5	1	Chm,W	1	$2\frac{1}{2}$	5.8
5	S-P-IPTA(10)	10	1	Chm,W	1	1	10.9

Table II.4(g)

No	Product	Wt of PVA (S - grade) (g)	Wt of Adipic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-ADA(1)	1	1	Chm,W	1	3	1.9
2	S-P-ADA(2)	2	1	Chm,W	1	3	2.9
3	S-P-ADA(3)	3	1	Chm,W	3	3.5	3.9
4	S-P-ADA(5)	5	1	Chm,W	1	1	5.9
5	S-P-ADA(10)	10	1	Chm,W	1	1/2	10.7

Table II.4(h)

No	Product	Wt of PVA (S - grade) (g)	Wt of Anthranilic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-ANA(1)	1	1	Chm,W	1	6	1.8
2	S-P-ANA(2)	2	1	Chm,W	1	4	2.9
3	S-P-ANA(3)	3	1	Chm,W	1	2	3.9
4	S-P-ANA(5)	5	1	Chm,W	1	1	5.9
5	S-P-ANA(10)	10	1	Chm,W	1	1/2	10.9

Table II.4(j)

No	Product	Wt of PVA (S - grade) (g)	Wt of Amino acetic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-AAA(1)	1	1	Chm,W	1	6	1.9
2	S-P-AAA(2)	2	1	Chm,W	1	4	2.8
3	S-P-AAA(3)	3	1	Chm,W	1	2	3.8
4	S-P-AAA(5)	5	1	Chm,W	1	1	5.9
5	S-P-AAA(10)	10	1	Chm,W	1	1/2	10.9

Table II.4(k)

No	Product	Wt of PVA (S - grade) (g)	Wt of 4-Amino Benzoic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-4ABA(1)	1	1	Chm,W	1	6	1.5
2	S-P-4ABA(2)	2	1	Chm,W	1	4	2.6
3	S-P-4ABA(3)	3	1	Chm,W	1	3	3.8
4	S-P-4ABA(5)	5	1	Chm,W	1	1/2	5.8
5	S-P-4ABA(10)	10	1	Chm,W	1	1/4	10.9

Table II.4(1)

No	Product	Wt of PVA (S - grade) (g)	Wt of 4-Hydroxy Benzoic acid chloride (g)	Medium	Wt of Na_2CO_3 (g)	Time of reaction (hr)	Yield (g)
1	S-P-4HBA(1)	1	1	Chm,W	1	5	1.5
2	S-P-4HBA(2)	2	1	Chm,W	1	4	2.5
3	S-P-4HBA(3)	3	1	Chm,W	1	3	3.9
4	S-P-4HBA(5)	5	1	Chm,W	1	1	5.9
5	S-P-4HBA(10)	10	1	Chm,W	1	1/2	10.9

Table II.5(a)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-SBA(1)	Dark Brown	I	I	I	I	I	I	PS	I	I	129
2	K-P-SBA(2)	Brown	I	I	I	I	I	I	PS	I	I	156
3	K-P-SBA(3)	Brown	I	I	I	I	I	I	PS	I	I	163
4	K-P-SBA(5)	Brown	I	I	I	I	I	I	PS	I	I	192
5	K-P-SBA(10)	Brown	I	I	I	I	I	I	PS	I	I	209

Table II.5(b)

No	Product	Colour	Solubility in									M.P. (^{o}C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-TPA(1)	Black	I	I	I	I	I	I	I	I	I	Decom-poses
2	K-P-TPA(2)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses
3	K-P-TPA(3)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses
4	K-P-TPA(5)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses
5	K-P-TPA(10)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses

Table II.5(c)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-FMA(1)	Blackish	I	I	I	I	I	I	I	I	I	198
2	K-P-FMA(2)	Blackish	I	I	I	I	I	I	I	I	I	207
3	K-P-FMA(3)	Blackish	I	I	I	I	I	I	I	I	I	257
4	K-P-FMA(5)	Blackish	I	I	I	I	I	I	I	I	I	227
5	K-P-FMA(10)	Blackish	I	I	I	I	I	I	I	I	I	237

Table II.5(d)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-ACA(1)	Dark Brown	I	I	I	I	I	I	I	I	I	128
2	K-P-ACA(2)	Reddish Brown	I	I	I	I	I	I	I	I	I	135
3	K-P-ACA(3)	Reddish Brown	I	I	I	I	I	I	I	I	I	140
4	K-P-ACA(5)	Reddish Brown	I	I	I	I	I	I	I	I	I	144
5	K-P-ACA(10)	Reddish Brown	I	I	I	I	I	I	I	I	I	166

Table II.5(e)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-SAA(1)	Blackish	I	I	I	I	I	I	I	I	I	122
2	K-P-SAA(2)	Brown	I	I	I	I	I	I	I	I	I	141
3	K-P-SAA(3)	Brown	I	I	I	I	I	I	I	I	I	167
4	K-P-SAA(5)	Pink	I	I	I	I	I	I	I	I	I	181
5	K-P-SAA(10)	Dark Brown	I	I	I	I	I	I	I	I	I	188

Table II.5(f)

No	Product	Colour	Solubility in									M.P. (^{o}C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-IPTA(1)	Black	I	I	I	I	I	I	I	I	I	Decom-poses
2	K-P-IPTA(2)	Dark Brown	I	I	I	I	I	I	I	I	I	Decom-poses
3	K-P-IPTA(3)	Dark Brown	I	I	I	I	I	I	I	I	I	Decom-poses
4	K-P-IPTA(5)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses
5	K-P-IPTA(10)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses

Table II.5(g)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-ADA(1)	Black	I	I	I	I	I	I	I	I	I	127
2	K-P-ADA(2)	Black	I	I	I	I	I	I	I	I	I	146
3	K-P-ADA(3)	Black	I	I	I	I	I	I	I	I	I	184
4	K-P-ADA(5)	Brown	I	I	I	I	I	I	I	I	I	193
5	K-P-ADA(10)	Dark Brown	I	I	I	I	I	I	I	I	I	198

Table II.5(h)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-ANA(1)	Dark Brown	I	I	I	I	I	I	I	I	I	179
2	K-P-ANA(2)	Dark Brown	I	I	I	I	I	I	I	I	I	193
3	K-P-ANA(3)	Dark Brown	I	I	I	I	I	I	I	I	I	198
4	K-P-ANA(5)	Brown	I	I	I	I	I	I	I	I	I	208
5	K-P-ANA(10)	Brown	I	I	I	I	I	I	I	I	I	213

Table II.5(j)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-AAA(1)	Black	I	I	I	I	I	I	PS	I	I	139
2	K-P-AAA(2)	Brown	I	I	I	I	I	I	PS	I	I	149
3	K-P-AAA(3)	Pale Brown	I	I	I	I	I	I	PS	I	I	158
4	K-P-AAA(5)	Reddish Brown	I	I	I	I	I	I	PS	I	I	169
5	K-P-AAA(10)	Pale Brown	I	I	I	I	I	I	PS	I	I	187

Table II.5(k)

No	Product	Colour	Solubility in									M.P. (^{o}C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-4ABA(1)	Black	I	I	I	I	I	I	I	I	I	Decom-poses
2	K-P-4ABA(2)	Black	I	I	I	I	I	I	I	I	I	Decom-poses
3	K-P-4ABA(3)	Black	I	I	I	I	I	I	I	I	I	Decom-poses
4	K-P-4ABA(5)	Dark Brown	I	I	I	I	I	I	I	I	I	Decom-poses
5	K-P-4ABA(10)	Brown	I	I	I	I	I	I	I	I	I	Decom-poses

Table II.5(1)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-4HBA(1)	Light Brown	I	I	I	I	I	I	PS	I	I	103
2	K-P-4HBA(2)	Brown	I	I	I	I	I	I	PS	I	I	110
3	K-P-4HBA(3)	Light Brown	I	I	I	I	I	I	PS	I	I	139
4	K-P-4HBA(5)	Dark Brown	I	I	I	I	I	I	PS	I	I	151
5	K-P-4HBA(10)	Light Brown	I	I	I	I	I	I	PS	I	I	163

Table II.5(m)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	K-P-TCAA(1/3)	Brown	I	I	I	I	I	I	I	I	I	87
2	K-P-TMAN(1/2)	Reddish Brown	I	I	I	I	I	I	I	I	I	102

Table II.6(a)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-SBA(1)	Brown	I	I	I	I	I	I	S	PS	PS	Not melting
2	S-P-SBA(2)	Brown	I	I	I	I	I	I	S	PS	PS	Not melting
3	S-P-SBA(3)	Light Brown	I	I	I	I	I	I	S	PS	PS	Not melting
4	S-P-SBA(5)	Brown	I	I	I	I	I	I	S	PS	PS	Not melting
5	S-P-SBA(10)	Brown	I	I	I	I	I	I	S	PS	PS	Not melting

Table II.6(b)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-TPA(1)	White	I	I	I	I	I	I	S	I	I	Not melting
2	S-P-TPA(2)	White	I	I	I	I	I	I	S	I	I	Not melting
3	S-P-TPA(3)	White	I	I	I	I	I	I	S	I	I	Not melting
4	S-P-TPA(5)	White	I	I	I	I	I	I	S	I	I	Not melting
5	S-P-TPA(10)	White	I	I	I	I	I	I	S	I	I	Not melting

Table II.6(c)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-FMA(1)	Pale Brown	I	I	I	I	I	I	S	S	S	Not melting
2	S-P-FMA(2)	Pale Brown	I	I	I	I	I	I	S	S	S	Not melting
3	S-P-FMA(3)	Brown	I	I	I	I	I	I	S	S	S	Not melting
4	S-P-FMA(5)	Pale Brown	I	I	I	I	I	I	S	S	S	Not melting
5	S-P-FMA(10)	Brown	I	I	I	I	I	I	S	S	S	Not melting

Table II.6(d)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-ACA(1)	Dark Brown	I	I	I	I	I	I	S	S	S	Not melting
2	S-P-ACA(2)	Dark Brown	I	I	I	I	I	I	S	S	S	Not melting
3	S-P-ACA(3)	Brown	I	I	I	I	I	I	S	S	S	Not melting
4	S-P-ACA(5)	Brown	I	I	I	I	I	I	S	S	S	Not melting
5	S-P-ACA(10)	Brown	I	I	I	I	I	I	S	S	S	Not melting

Table II.6(e)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-SAA(1)	White	I	I	I	I	I	I	S	I	I	Not melting
2	S-P-SAA(2)	White	I	I	I	I	I	I	S	I	I	Not melting
3	S-P-SAA(3)	White	I	I	I	I	I	I	S	I	I	Not melting
4	S-P-SAA(5)	White	I	I	I	I	I	I	S	I	I	Not melting
5	S-P-SAA(10)	White	I	I	I	I	I	I	S	I	I	Not melting

Table II.6(f)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-IPTA(1)	White	I	I	I	I	I	I	S	I	I	Not melting
2	S-P-IPTA(2)	White	I	I	I	I	I	I	S	I	I	Not melting
3	S-P-IPTA(3)	White	I	I	I	I	I	I	S	I	I	Not melting
4	S-P-IPTA(5)	White	I	I	I	I	I	I	S	I	I	Not melting
5	S-P-IPTA(10)	White	I	I	I	I	I	I	S	I	I	Not melting

Table II.6(g)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-ADA(1)	Black	I	I	I	I	I	I	S	PS	S	Not melting
2	S-P-ADA(2)	Dark Brown	I	I	I	I	I	I	S	PS	S	Not melting
3	S-P-ADA(3)	Black	I	I	I	I	I	I	S	PS	S	Not melting
4	S-P-ADA(5)	Black	I	I	I	I	I	I	S	PS	S	Not melting
5	S-P-ADA(10)	Black	I	I	I	I	I	I	S	PS	S	Not melting

Table II.6(h)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-ANA(1)	Orange	I	I	I	I	I	I	S	PS	PS	Not melting
2	S-P-ANA(2)	Orange	I	I	I	I	I	I	S	PS	PS	Not melting
3	S-P-ANA(3)	Light Orange	I	I	I	I	I	I	S	PS	PS	Not melting
4	S-P-ANA(5)	Light Orange	I	I	I	I	I	I	S	PS	PS	Not melting
5	S-P-ANA(10)	Light Orange	I	I	I	I	I	I	S	PS	PS	Not melting

Table II.6(j)

No	Product	Colour	Solubility in									M.P. (^{o}C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-AAA(1)	Dark Brown	I	I	I	I	I	I	S	I	I	Not melting
2	S-P-AAA(2)	Brown	I	I	I	I	I	I	S	I	I	Not melting
3	S-P-AAA(3)	Brown	I	I	I	I	I	I	S	I	I	Not melting
4	S-P-AAA(5)	Brown	I	I	I	I	I	I	S	I	I	Not melting
5	S-P-AAA(10)	Brown	I	I	I	I	I	I	S	I	I	Not melting

Table II.6(k)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-4ABA(1)	Yellow-ish green	I	I	I	I	I	I	S	S	S	Not melting
2	S-P-4ABA(2)	Orange	I	I	I	I	I	I	S	S	S	Not melting
3	S-P-4ABA(3)	Light Orange	I	I	I	I	I	I	S	S	S	Not melting
4	S-P-4ABA(5)	Light Orange	I	I	I	I	I	I	S	S	S	Not melting
5	S-P-4ABA(10)	Light Orange	I	I	I	I	I	I	S	S	S	Not melting

Table II.6(1)

No	Product	Colour	Solubility in									M.P. (°C)
			Water	Alcohol	Acetone	Benzene	Xylene	Toluene	DMF	3N HCl	3N NaOH	
1	S-P-4HBA(1)	White	I	I	I	I	I	I	S	I	PS	Not melting
2	S-P-4HBA(2)	Pink	I	I	I	I	I	I	S	I	PS	Not melting
3	S-P-4HBA(3)	White	I	I	I	I	I	I	S	I	PS	Not melting
4	S-P-4HBA(5)	White	I	I	I	I	I	I	S	I	PS	Not melting
5	S-P-4HBA(10)	Pink	I	I	I	I	I	I	S	I	PS	Not melting

Table II.7(a)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1	K-P-SBA(1)	$C_{9.5}H_{20.5}O_{5.5}$	51.03	9.19	50.38	8.95
2	K-P-SBA(2)	$C_7H_{15}O_4$	51.53	9.20	50.42	9.22
3	K-P-SBA(3)	$C_8H_{17}O_{4.5}$	51.89	9.19	50.84	8.90
4	K-P-SBA(5)	$C_9H_{20}O_{5.5}$	52.43	9.71	51.40	9.24
5	K-P-SBA(10)	$C_{13}H_{28}O_{7.5}$	51.31	9.21	51.83	8.85

Table II.7(b)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1.	K-P-TPA(1)	$C_{6.5}H_8O_{3.5}$	56.52	5.80	55.80	6.32
2.	K-P-TPA(2)	$C_7H_{10}O_4$	53.16	6.33	54.44	6.75
3.	K-P-TPA(3)	$C_8H_{12}O_{4.5}$	53.33	6.67	53.20	7.68
4.	K-P-TPA(5)	$C_{10}H_{17}O_6$	51.50	7.30	52.83	7.40
5.	K-P-TPA(10)	$C_{14}H_{26}O_{8.5}$	50.91	7.88	51.10	7.76

Table II.7(c)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1	K-P-FMA(1)	$C_5H_7O_3$	52.17	6.09	52.73	6.46
2	K-P-FMA(2)	$C_6H_9O_{3.5}$	52.55	6.57	51.47	7.22
3	K-P-FMA(3)	$C_7H_{14}O_{5.5}$	45.16	7.53	44.76	7.41
4	K-P-FMA(5)	$C_9H_{16}O_{6.5}$	47.32	7.02	47.37	7.28
5	K-P-FMA(10)	$C_{14}H_{27}O_{8.5}$	5076	8.16	50.88	8.17

Table II.7(d)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1.	K-P-ACA(1)	$C_6H_8O_{2.5}$	60.00	6.67	60.18	7.24
2.	K-P-ACA(2)	$C_7H_{10.5}O_{3.25}$	57.15	7.14	58.47	7.68
3.	K-P-ACA(3)	$C_8H_{12.5}O_{3.75}$	56.80	7.40	57.44	7.80
4.	K-P-ACA(5)	$C_9H_{15}O_{4.5}$	55.39	7.69	56.19	8.15
5.	K-P-ACA(10)	$C_{14}H_{26}O_{7.5}$	53.50	8.28	53.99	8.47

Table II.7(e)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1	K-P-SAA(1)	$C_{15}H_{21}O_{6.5}$	59.02	6.89	61.18	7.41
2	K-P-SAA(2)	$C_{17}H_{25}O_{7.5}$	58.43	7.17	60.26	7.75
3	K-P-SAA(3)	$C_{21}H_{33}O_{9.5}$	57.66	7.55	59.49	8.03
4	K-P-SAA(5)	$C_{29}H_{50}O_{14}$	55.95	8.04	58.14	8.24
5	K-P-SAA(10)	$C_{43}H_{77}O_{20.5}$	56.03	8.37	57.85	7.92

Table II.7(f)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1.	K-P-IPTA(1)	$C_{6.5}H_8O_{3.25}$	56.52	5.80	56.38	5.90
2.	K-P-IPTA(2)	$C_7H_{10}O_4$	53.16	6.33	52.85	6.20
3.	K-P-IPTA(3)	$C_8H_{12}O_{4.5}$	53.33	6.67	51.55	6.76
4.	K-P-IPTA(4)	$C_{10}H_{17}O_6$	51.50	7.30	50.80	7.58
5.	K-P-IPTA(10)	$C_{14}H_{27}O_9$	49.56	7.96	50.05	8.10

Table II.7(g)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1	K-P-ADA(1)	$C_{5.5}H_{10}O_{3.25}$	51.86	7.81	52.20	8.54
2	K-P-ADA(2)	$C_6H_{11}O_{3.5}$	51.80	7.91	51.98	8.85
3	K-P-ADA(3)	$C_7H_{13}O_4$	52.17	8.14	50.83	8.10
4.	K-P-ADA(5)	$C_9H_{18}O_{5.5}$	50.47	8.41	50.10	9.01
5	K-P-ADA(10)	$C_{11}H_{23}O_7$	49.44	8.61	49.98	8.50

Table II.7(h)

No.	Product	Formula	Analysis					
			% Calculated			% Found		
			% C	% H	% N	% C	% H	% N
1	K-P-ANA(1)	$C_{10}H_{12}NO_3$	61.86	6.19	7.22	60.50	6.35	7.44
2	K-P-ANA(2)	$C_{13}H_{18}NO_{4.5}$	60.00	6.92	5.38	58.59	7.68	5.54
3	K-P-ANA(3)	$C_{19}H_{31}NO_8$	56.86	7.73	3.49	55.28	8.13	3.53
4	K-P-ANA(5)	$C_{27}H_{47}NO_{12}$	56.15	8.15	2.43	55.00	8.45	2.28
5	K-P-ANA(10)	$C_{49}H_{93}NO_{24}$	54.49	8.62	1.30	53.68	8.58	1.24

Table II.7(j)

No.	Product	Formula	Analysis					
			% Calculated			% Found		
			% C	% H	% N	% C	% H	% N
1	K-P-AAA(1)	$C_5H_{9.5}N_{1.5}O_3$	43.16	6.83	15.11	43.58	6.75	15.75
2	K-P-AAA(2)	$C_{4.5}H_9NO_{2.75}$	44.63	7.44	11.57	45.90	7.90	11.37
3	K-P-AAA(3)	$C_5H_{10}NO_3$	45.45	7.58	10.60	47.54	7.23	9.54
4	K-P-AAA(5)	$C_8H_{16}NO_{4.5}$	48.48	8.08	7.07	49.37	8.19	7.00
5	K-P-AAA(10)	$C_{16}H_{31}NO_{8.5}$	51.47	8.31	3.75	51.83	8.22	3.58

Table II.7(K)

No.	Product	Formula	Analysis					
			% Calculated			% Found		
			% C	% H	% N	% C	% H	%N
1.	K-P-4ADA(1)	$C_{10}H_{12}NO_3$	61.86	6.19	7.22	59.98	6.43	7.29
2.	K-P-4ABA(2)	$C_{16}H_{24}NO_6$	58.98	7.36	4.30	58.52	7.78	4.52
3.	K-P-4ABA(3)	$C_{19}H_{31}NO_8$	56.86	7.73	3.49	56.68	8.28	3.85
4.	K-P-4ABA(4)	$C_{27}H_{47}NO_{12}$	56.15	8.15	2.43	56.05	8.76	2.52
5.	K-P-4ABA(10)	$C_{49}H_{93}NO_{24}$	54.49	8.62	1.30	55.57	8.58	1.34

Table II.7(1)

No.	Product	Formula	Analysis			
			% Calculated		% Found	
			% C	% H	% C	% H
1	K-P-4HBA(1)	$C_{15}H_{23}O_{7.5}$	55.73	7.12	56.35	7.72
2	K-P-4HBA(2)	$C_{17}H_{28}O_{9}$	54.25	7.45	53.32	7.95
3	K-P-4HBA(3)	$C_{21}H_{36}O_{11}$	54.31	7.76	52.45	8.26
4	K-P-4HBA(5)	$C_{29}H_{54}O_{16}$	52.89	8.20	51.49	8.45
5	K-P-4HBA(10)	$C_{41}H_{80}O_{23}$	52.34	8.51	50.44	8.76

Table II.7(m)

No.	Product	Formula	Analysis			
			% Calculated		% found	
			% C	% H	% C	% H
1	K-P-TCAA(1/3)	$C_4H_4O_{2.5}Cl_3$	24.3	2.02	23.4	2.15
2	K-P-TMAN(1/2)	$C_{5.5}H_6O_{312}$	52.0	4.72	51.5	5.15

Table II.8(a)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. (A.V.H.)
1	K-P-SBA(1)	0.202	0.798	2.2	6.9
2	K-P-SBA(2)	0.211	0.789	-	6.2
3	K-P-SBA(3)	0.183	0.817	-	5.6
4	K-P-SBA(5)	0.224	0.776	-	4.8
5	K-P-SBA(10)	0.152	0.848	-	3.2

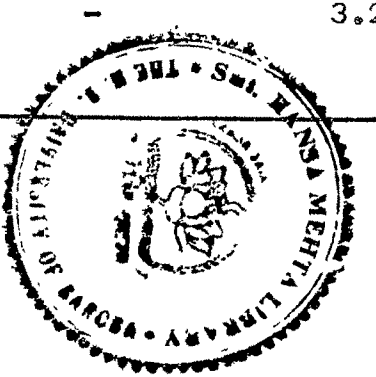

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Table II.8(b)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. (A.V.H.)
1	K-P-TPA(1)	0.112	0.888	-	7.5
2	K-P-TPA(2)	0.150	0.850	-	6.3
3	K-P-TPA(3)	0.130	0.870	-	5.6
4	K-P-TPA(5)	0.140	0.860	-	4.5
5	K-P-TPA(10)	0.110	0.890	-	2.9

Table II.8(c)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After Hydrolysis for 24 hrs. (A.V.H.)
1.	K-P-FMA(1)	0.070	0.930	-	9.0
2.	K-P-FMA(2)	0.060	0.940	-	7.1
3.	K-P-FMA(3)	0.160	0.840	-	5.6
4.	K-P-FMA(5)	0.130	0.870	-	4.6
5.	K-P-FMA(10)	0.080	0.920	-	3.1

Table II.8(d)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. (A.V.H.)
1.	K-P-ACA(1)	0.006	0.994	-	9.3
2.	K-P-ACA(2)	0.030	0.970	-	6.6
3.	K-P-ACA(3)	0.020	0.980	-	5.8
4.	K-P-ACA(5)	0.040	0.960	-	5.1
5.	K-P-ACA(10)	0.050	0.950	-	3.1

Table II.8(e)

No.	Product	Water Content (q) (g/g)	Solid Content (s) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. $(A.V.H.)_m$
1.	K-P-SAA(1)	0.030	0.970	-	3.0
2.	K-P-SAA(2)	0.020	0.980	-	2.6
3.	K-P-SAA(3)	0.020	0.980	-	2.3
4.	K-P-SAA(5)	0.030	0.970	-	1.5
5.	K-P-SAA(10)	0.010	0.990	-	1.1

Table II.8 (f)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (me g/g)	
				Immediate (A.V.I.)	After hydrelysis for 24 hrs. (A.V.H.)
1.	K-P-IPTA(1)	0.115	0.885	-	7.0
2.	K-P-IPTA(2)	0.155	0.845	-	6.4
3.	K-P-IPTA(3)	0.130	0.870	-	5.6
4.	K-P-IPTA(5)	0.135	0.865	-	4.6
5.	K-P-IPTA(10)	0.155	0.845	-	2.9

Table II.8(g)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After Hydrolysis for 24 hrs. (A.V.H.)
1	K-P-ADA(1)	0.110	0.890	-	8.1
2	K-P-ADA(2)	0.115	0.885	-	7.2
3	K-P-ADA(3)	0.085	0.915	-	5.7
4	K-P-ADA(5)	0.145	0.855	-	4.5
5	K-P-ADA(10)	0.105	0.895	-	3.3

Table II.8(h)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. $(A.V.H.)_m$
1.	K-P-ANA(1)	0.040	0.960	-	4.8
2.	K-P-ANA(2)	0.030	0.970	-	3.6
3.	K-P-ANA(3)	0.040	0.960	-	2.6
4.	K-P-ANA(5)	0.030	0.970	-	1.9
5.	K-P-ANA(10)	0.030	0.970	-	1.1

Table II.8(j)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I)	After hydrolysis for 24 hrs. (A.V.H.)
1	K-P-AAA(1)	0.056	0.944	3.5	10.6
2	K-P-AAA(2)	0.070	0.930	-	8.1
3	K-P-AAA(3)	0.060	0.940	-	7.4
4	K-P-AAA(5)	0.040	0.960	-	5.0
5	K-P-AAA(10)	0.020	0.980	-	2.9

Table II.8(k)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. $(A.V.H.)_m$
1.	K-P-4ABA(1)	0.020	0.980	-	5.3
2.	K-P-4ABA(2)	0.020	0.980	-	2.8
3.	K-P-4ABA(3)	0.040	0.960	-	2.4
4.	K-P-4ABA(5)	0.030	0.970	-	1.9
5.	K-P-4ABA(10)	0.030	0.970	-	1.1

Table II.8(1)

No.	Product	Water Content (q) (g/g)	Solid Content (S) (g/g)	Acid Value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. $(A.V.H.)_m$
1.	K-P-4HBA(1)	0.090	0.910	-	3.0
2.	K-P-4HBA(2)	0.090	0.910	-	2.6
3.	K-P-4HBA(3)	0.080	0.920	-	2.1
4.	K-P-4HBA(5)	0.080	0.920	-	1.4
5.	K-P-4HBA(10)	0.070	0.930	-	1.1

Table II.8(m)

No.	Product	Water content (q) (g/g)	Solid content (S) (g/g)	Acid value (meq/g)	
				Immediate (A.V.I.)	After hydrolysis for 24 hrs. (A.V.H.)
1	K-P-TCAA(1/3)	0.033	0.967	-	5.2
2	K-P-TMAN(1/2)	0.062	0.938	-	8.0

II.6 (a) ACID VALUE (Immediately) : (A.V.I.)

0.1g of resin was taken in a cleaned, dried conical flask. To it were added 25 ml of distilled water. The mass was stirred and titrated against std NaOH solution using suitable indicator such as phenolphthalein or methyl red. A.V.I. was calculated as

$$A.V.I. = \frac{\text{tit reading X N of NaOH}}{\text{wt of sample}}$$

The results are presented in Table II.8

II.6 (b) ACID VALUE (Hydrolysis) (A.V.H.) :

0.1g of resin was taken in a cleaned, dried conical flask. To it were added 25 ml of NaOH solution. It was kept for 24 hrs at room temperature with occassional shaving. The mass was titrated against std HCl solution using suitable indicator such as phenolphthalein or methyl red. Blank reading for 25 ml of NaOH solution (without the treatment with resin sample) was also taken. The A.V.H. values were calculated as

$$A.V.H. = \frac{(\text{tit reading} - \text{blank reading}) \text{ X N of acid}}{\text{wt of sample}}$$

The results are presented in Table II.8.

II.7 WATER SORPTION :

1g of resin was taken in a stoppered bottle. 10 ml of water were added to it and kept for 24 hours with occassional shaking. Supernatent liquid was removed by decantation

and the remaining liquid associated with the resin removed by pressing the mass between filter papers. Swollen mass of the product was weighed. It was dried on water both and again weighed. The weights are presented in Table II.9.

II.8 WATER RESORPTION (Recyling) :

0.5g of resin was taken in a stoppered bottle. 10 ml of water were added to it. After standing for 24 hours with occasional shaving, it was filtered and pressed between filter papers and weighed. It was dried on water bath and again weighed. The mass was again kept in 10 ml of water for 24 hours and filtering, weighing, drying and weighing were repeated. The residual resin was again kept in 10 ml water for 24 hours and filtering, weighing, drying and weighing were repeated. The results are presented in Table II.10.

II.9 SORPTION FROM SOLUTION :

II.9 (a) Sorption from Salt Solution :

0.5g of resin was taken in a stoppered bottle. 10 ml of NaCl solution (1 %) were added to it. The experiment was carried out as in II.7. Then the mass was washed with distilled water, dried on water both and weighed. The results are presented in Table II.11.

II.9 (b) Sorption from Urea Solution :

0.5g of resin was taken in a stoppered bottle. 10 ml

Table II.9(a)

No	Product	Weight of the resin		
		Before water sorption W_{BS} (g)	After water sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-SBA(1)	1.000	3.260	0.648
2	K-P-SBA(2)	1.000	5.620	0.665
3	K-P-SBA(3)	1.000	6.750	0.638
4	K-P-SBA(5)	1.000	3.130	0.702
5	K-P-SBA(10)	1.000	2.850	0.767

Table II.9(b)

No	Product	Weight of the resin		
		Before water sorption W_{BS} (g)	After water sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-TPA(1)	1.000	4.060	0.547
2	K-P-TPA(2)	1.000	4.090	0.558
3	K-P-TPA(3)	1.000	4.600	0.615
4	K-P-TPA(5)	1.000	3.940	0.540
5	K-P-TPA(10)	1.000	4.160	0.605

Table II.9(c)

No	Product	Weight of the resin		
		Before water sorption W_{BS} (g)	After water sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-FMA(1)	1.000	3.015	0.645
2	K-P-FMA(2)	1.000	4.990	0.672
3	K-P-FMA(3)	1.000	4.895	0.665
4	K-P-FMA(5)	1.000	4.665	0.675
5	K-P-FMA(10)	1.000	3.675	0.647

Table II.9(d)

No	Product	Weight of the resin		
		Before water sorption W_{BS} (g)	After water sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ACA(1)	1.000	4.022	0.620
2	K-P-ACA(2)	1.000	4.740	0.635
3	K-P-ACA(3)	1.000	4.330	0.628
4	K-P-ACA(5)	1.000	5.360	0.672
5	K-P-ACA(10)	1.000	5.020	0.659

Table II.9(e)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-SAA(1)	1.000	1.905	0.585
2	K-P-SAA(2)	1.000	4.745	0.625
3	K-P-SAA(3)	1.000	3.965	0.610
4	K-P-SAA(5)	1.000	3.185	0.617
5	K-P-SAA(10)	1.000	3.010	0.685

Table II.9(f)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-IPTA(1)	1.000	3.105	0.580
2	K-P-IPTA(2)	1.000	3.565	0.620
3	K-P-IPTA(3)	1.000	3.845	0.645
4	K-P-IPTA(5)	1.000	3.140	0.627
5	K-P-IPTA(10)	1.000	3.755	0.657

Table II.9(g)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ADA(1)	1.000	2.035	0.485
2	K-P-ADA(2)	1.000	2.340	0.505
3	K-P-ADA(3)	1.000	3.305	0.527
4	K-P-ADA(5)	1.000	3.500	0.515
5	K-P-ADA(10)	1.000	2.115	0.595

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Table II.9(h)

No	Product	Weight of the resin..		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ANA(1)	1.000	1.815	0.635
2	K-P-ANA(2)	1.000	2.985	0.655
3	K-P-ANA(3)	1.000	2.640	0.640
4	K-P-ANA(5)	1.000	3.020	0.678
5	K-P-ANA(10)	1.000	3.625	0.702

Table II.9(j)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-AAA(1)	1.000	4.050	0.537
2	K-P-AAA(2)	1.000	2.170	0.525
3	K-P-AAA(3)	1.000	2.185	0.517
4	K-P-AAA(5)	1.000	2.562	0.630
5	K-P-AAA(10)	1.000	2.812	0.642

Table II.9(k)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-4ABA(1)	1.000	1.750	0.615
2	K-P-4ABA(2)	1.000	2.515	0.632
3	K-P-4ABA(3)	1.000	2.575	0.658
4	K-P-4ABA(5)	1.000	1.995	0.625
5	K-P-4ABA(10)	1.000	2.072	0.678

Table II.9(1)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-4HBA(1)	1.000	1.565	0.528
2	K-P-4HBA(2)	1.000	1.878	0.520
3	K-P-4HBA(3)	1.000	1.802	0.510
4	K-P-4HBA(5)	1.000	1.646	0.480
5	K-P-4HBA(10)	1.000	1.998	0.530

Table II.9(m)

No	Product	Weight of the resin		
		Before water Sorption W_{BS} (g)	After water Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-TCAA(1/3)	0.500	0.865	0.200
2	K-P-TMAN(1/2)	0.500	0.775	0.260

Table II.10(a)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-SBA(3)	0.500	2.028	0.302	1.770	0.278	1.630	0.272
2	K-P-SBA(5)	0.500	1.159	0.339	1.022	0.337	0.885	0.335
3	K-P-SBA(10)	0.500	1.010	0.352	0.885	0.350	0.878	0.348

Table II.10(b)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-IPA(3)	0.500	2.409	0.285	1.690	0.268	1.568	0.261
2	K-P-IPA(5)	0.500	1.685	0.275	1.260	0.248	1.078	0.234
3	K-P-IPA(10)	0.500	1.930	0.273	1.715	0.254	1.252	0.240

Table II.10(c)

No	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-FMA(3)	0.500	1.172	0.285	0.977	0.262	0.969	0.261
2	K-P-FMA(5)	0.500	1.590	0.284	1.125	0.245	0.799	0.224
3	K-P-FMA(10)	0.500	1.659	0.295	1.240	0.286	1.226	0.285

Table II.10(d)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-ACA(3)	0.500	2.130	0.302	1.810	0.288	1.799	0.279
2	K-P-ACA(5)	0.500	2.186	0.292	1.370	0.270	1.242	0.263
3	K-P-ACA(10)	0.500	1.062	0.283	1.320	0.267	1.300	0.265

Table II.10(e)

No.	Product	Weight of the resin						
		Before water Sorption	After water Sorption	After drying	After first Resorption	After first drying	After second Resorption	After second drying
		W_{DS} (g)	$W_{AR(I)}$ (g)	$W_{DR(I)}$ (g)	$W_{AR(II)}$ (g)	$W_{DR(II)}$ (g)	$W_{AR(III)}$ (g)	$W_{DR(III)}$ (g)
1	K-P-SAA(3)	0.500	1.835	0.278	1.330	0.248	1.285	0.228
2	K-P-SAA(5)	0.500	1.166	0.315	0.980	0.276	0.954	0.270
3	K-P-SAA(10)	0.500	1.742	0.275	1.130	0.234	1.055	0.230

Table II.10(f)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-IPTA(3)	0.500	1.598	0.315	1.340	0.290	1.325	0.275
2	K-P-IPTA(5)	0.500	1.177	0.305	1.275	0.300	1.165	0.295
3	K-P-IPTA(10)	0.500	1.292	0.315	1.010	0.312	0.978	0.310

Table II.10(g)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-ADA(3)	0.500	0.995	0.240	0.790	0.212	0.760	0.210
2	K-P-ADA(5)	0.500	0.940	0.255	0.725	0.200	0.590	0.192
3	K-P-ADA(10)	0.500	1.117	0.314	0.850	0.302	0.858	0.300

Table II.10(h)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-ANA(3)	0.500	1.015	0.317	1.020	0.250	1.004	0.242
2	K-P-ANA(5)	0.500	1.560	0.295	1.426	0.213	1.315	0.185
3	K-P-ANA(10)	0.500	1.112	0.312	0.970	0.302	0.940	0.296

Table II.10(j)

No.	Product	Weight of the resin						
		Before Water Sorption W_{DS} (g)	After Water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resprption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-AAA(3)	0.500	0.760	0.220	0.367	0.150	0.385	0.145
2	K-P-AAA(5)	0.500	0.924	0.275	0.734	0.253	0.682	0.240
3	K-P-AAA(10)	0.500	1.214	0.280	0.888	0.226	0.814	0.222

Table II.10(k)

No.	Product	Weight of the resin						
		Before water Sorption W_{DS} (g)	After water Sorption $W_{AR(I)}$ (g)	After drying $W_{DR(I)}$ (g)	After first Resorption $W_{AR(II)}$ (g)	After first drying $W_{DR(II)}$ (g)	After second Resorption $W_{AR(III)}$ (g)	After second drying $W_{DR(III)}$ (g)
1	K-P-4ABA(3)	0.500	1.002	0.296	1.058	0.284	1.038	0.274
2	K-P-4ABA(5)	0.500	0.788	0.200	0.518	0.107	0.514	0.103
3	K-P-4ABA(10)	0.500	0.912	0.286	0.847	0.244	0.835	0.240

Table II.10(1)

No.	Product	Weight of the resin						
		Before water Sorption	After water Sorption	After drying	After first Resorption	After first drying	After second Resorption	After second drying
		W_{DS} (g)	$W_{AR(I)}$ (g)	$W_{DR(I)}$ (g)	$W_{AR(II)}$ (g)	$W_{DR(II)}$ (g)	$W_{AR(III)}$ (g)	$W_{DR(III)}$ (g)
1	K-P-4HBA(3)	0.500	0.558	0.230	0.572	0.217	0.535	0.206
2	K-P-4HBA(5)	0.500	0.504	0.162	0.214	0.148	0.218	0.138
3	K-P-4HBA(10)	0.500	0.670	0.238	0.648	0.217	0.638	0.212

Table II.11(a)

Solution of Sodium Chloride

No.	Product	Weight of the resin			
		Before Sorption W_{BS}(g)	After Sorption W_{AS}(g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-SBA(1)	0.500	1.960	0.310	0.310
2	K-P-SBA(2)	0.500	2.125	0.283	0.283
3	K-P-SBA(3)	0.500	1.510	0.298	0.298
4	K-P-SBA(5)	0.500	1.059	0.317	0.317
5	K-P-SBA(10)	0.500	1.050	0.322	0.322

Table II.11(b)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS}(g)	After Sorption W_{AS}(g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-TPA(1)	0.500	0.516	0.205	0.205
2	K-P-TPA(2)	0.500	0.963	0.265	0.265
3	K-P-TPA(3)	0.500	0.962	0.242	0.242
4	K-P-TPA(5)	0.500	2.828	0.268	0.268
5	K-P-TPA(10)	0.500	1.317	0.313	0.313

Table II.11(c)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS}(g)	After Sorption W_{AS}(g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-FMA(1)	0.500	0.585	0.270	0.270
2	K-P-FMA(2)	0.500	1.062	0.280	0.280
3	K-P-FMA(3)	0.500	0.910	0.243	0.243
4	K-P-FMA(5)	0.500	1.080	0.287	0.287
5	K-P-FMA(10)	0.500	1.100	0.316	0.316

Table II.11(d)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-ACA(1)	0.500	0.607	0.196	0.196
2	K-P-ACA(2)	0.500	0.940	0.230	0.230
3	K-P-ACA(3)	0.500	1.170	0.257	0.257
4	K-P-ACA(5)	0.500	1.372	0.266	0.266
5	K-P-ACA(10)	0.500	0.980	0.304	0.304

Table II.11(e)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-SAA(1)	0.500	0.610	0.235	0.235
2	K-P-SAA(2)	0.500	1.506	0.270	0.270
3	K-P-SAA(3)	0.500	1.352	0.310	0.310
4	K-P-SAA(5)	0.500	1.080	0.350	0.350
5	K-P-SAA(10)	0.500	1.412	0.302	0.302

Table II.11(f)

Solution of Sodium Chloride

No.	Product	Weight of the resin			
		Before Sorption W_{BS}(g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)	After Washing and drying W_{WD} (g)
1	K-P-IPTA(1)	0.500	0.608	0.240	0.240
2	K-P-IPTA(2)	0.500	1.068	0.268	0.268
3	K-P-IPTA(3)	0.500	0.958	0.315	0.315
4	K-P-IPTA(5)	0.500	0.972	0.335	0.335
5	K-P-IPTA(10)	0.500	1.150	0.296	0.296

Table II.11(g)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-ADA(1)	0.500	0.512	0.158	0.158
2	K-P-ADA(2)	0.500	0.652	0.215	0.215
3	K-P-ADA(3)	0.500	0.814	0.262	0.262
4	K-P-ADA(5)	0.500	0.842	0.237	0.237
5	K-P-ADA(10)	0.500	0.985	0.285	0.285

Table II.11(h)

Solution of Sodium Chloride

No.	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)	After Washing and drying W_{WD} (g)
1	K-P-ANA(1)	0.500	0.586	0.212	0.212
2	K-P-ANA(2)	0.500	0.736	0.255	0.255
3	K-P-ANA(3)	0.500	0.662	0.257	0.257
4	K-P-ANA(5)	0.500	0.968	0.324	0.324
5	K-P-ANA(10)	0.500	1.010	0.317	0.317

Table II.11(j)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)	After Washing and drying W_{WD}(g)
1	K-P-AAA(1)	0.500	1.055	0.255	0.255
2	K-P-AAA(2)	0.500	0.990	0.245	0.245
3	K-P-AAA(3)	0.500	0.770	0.225	0.225
4	K-P-AAA(5)	0.500	0.915	0.280	0.280
5	K-P-AAA(10)	0.500	1.096	0.298	0.298

Table II.11(k)

Solution of Sodium Chloride

No.	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)	After Washing and drying W_{WD} (g)
1	K-P-4ABA(1)	0.500	0.652	0.262	0.262
2	K-P-4ABA(2)	0.500	0.790	0.244	0.244
3	K-P-4ABA(3)	0.500	0.788	0.260	0.260
4	K-P-4ABA(5)	0.500	0.870	0.263	0.263
5	K-P-4ABA(10)	0.500	0.840	0.302	0.302

Table II.11(1)

Solution of Sodium Chloride

No.	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)	After Washing and drying W_{WD} (g)
1	K-P-4HBA(1)	0.500	0.552	0.202	0.202
2	K-P-4HBA(2)	0.500	0.618	0.218	0.218
3	K-P-4HBA(3)	0.500	0.620	0.230	0.230
4	K-P-4HBA(5)	0.500	0.528	0.192	0.192
5	K-P-4HBA(10)	0.500	0.722	0.265	0.265

Table II.11(m)

Solution of Sodium Chloride

No	Product	Weight of the resin			
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS}(g)	After Washing and drying W_{WD}(g)
1	K-P-TCAA(1/3)	0.500	0.722	0.205	0.205
2	K-P-TMAN(1/2)	0.500	0.735	0.280	0.280

of Urea solution (1 %) were added to it. The experiment was carried out as in II.7. The results are presented in Table II.12 .

II.9 (c) Sorption from Copper (II) Solution :

0.5g of resin was taken in a cleaned, dried stoppered bottle. 25 ml of Copper sulphate (ammonia , 0.1 N) solution were added to it. The experiment was carried out as in II.7 . The results are presented in Table II.13.

II.10 AREA SWELLING :

A small resin piece was taken. Its dimensions (length and breadth) were measured by using a travelling microscope. Then it was moistened with water and immediately its dimensions (length and breadth) were measured. Afterwards it was kept in water for 24 hours and again its dimensions (length and breadth) were measured. The results are presented in table II.14.

II.11 VOLUME SWELLING :

A cleaned, dried specific gravity bottle with stopper was filled with water and weighed. The water was removed, the bottle was dried, and weighed 0.1g . Sample was introduced into the bottle and its weight was taken. The bottle with sample was filled with water and weighed first immediately and then after standing for 24 hours. The results are presented in Table II.15.

Table II.12(a)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS}(g)	After drying W_{DS}(g)
1	K-P-SBA(3)	0.500	2.454	0.240
2	K-P-SBA(5)	0.500	1.183	0.332

Table II.12(b)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS}(g)	After Sorption W_{AS}(g)	After drying W_{DS}(g)
1	K-P-TPA(3)	0.500	2.426	0.165
2	K-P-TPA(5)	0.500	1.790	0.200

Table II.12(c)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS}(g)	After Sorption W_{AS}(g)	After drying W_{DS}(g)
1	K-P-FMA(3)	0.500	1.283	0.305
2	K-P-FMA(5)	0.500	1.918	0.276

Table II.12(d)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ACA(3)	0.500	2.018	0.285
2	K-P-ACA(5)	0.500	2.338	0.350

Table II.12(e)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-SAA(3)	0.500	1.832	0.342
2	K-P-SAA(5)	0.500	1.132	0.295

Table II.12(f)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-IPTA(3)	0.500	1.682	0.286
2	K-P-IPTA(5)	0.500	1.120	0.286

Table II.12(g)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ADA(3)	0.500	1.305	0.290
2	K-P-ADA(5)	0.500	1.049	0.266

Table II.12(h)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ANA(3)	0.500	0.980	0.243
2	K-P-ANA(5)	0.500	1.145	0.314

Table II.12(j)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-AAA(3)	0.500	0.952	0.230
2	K-P-AAA(5)	0.500	0.992	0.268

Table II.12(k)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-4ABA(3)	0.500	1.090	0.312
2	K-P-4ABA(5)	0.500	0.725	0.207

Table II.12(1)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-4HBA(3)	0.500	0.980	0.308
2	K-P-4HBA(5)	0.500	0.508	0.148

Table II.12(m)

Solution of Urea

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-TCAA(1/3)	0.500	0.810	0.230
2	K-P-TMAN(1/2)	0.500	0.842	0.260

Table II.13(a)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-SBA(1)	0.500	2.261	0.290
2	K-P-SBA(2)	0.500	2.275	0.260
3	K-P-SBA(3)	0.500	1.556	0.305
4	K-P-SBA(5)	0.500	0.982	0.315
5	K-P-SBA(10)	0.500	0.535	0.325

Table II.13(b)

Cu(II) ion Solution

No	Production	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-TPA(1)	0.500	0.772	0.165
2	K-P-TPA(2)	0.500	1.108	0.225
3	K-P-TPA(3)	0.500	1.288	0.260
4	K-P-TPA(5)	0.500	1.198	0.280
5	K-P-TPA(10)	0.500	0.645	0.295

Table II.13(c)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-FMA(1)	0.500	0.860	0.328
2	K-P-FMA(2)	0.500	1.218	0.290
3	K-P-FMA(3)	0.500	1.293	0.335
4	K-P-FMA(5)	0.500	1.008	0.330
5	K-P-FMA(10)	0.500	0.950	0.355

Table II.13(d)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ACA(1)	0.500	0.970	0.175
2	K-P-ACA(2)	0.500	1.133	0.255
3	K-P-ACA(3)	0.500	0.956	0.365
4	K-P-ACA(5)	0.500	1.745	0.360
5	K-P-ACA(10)	0.500	0.682	0.390

Table II.13(e)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-SAA(1)	0.500	1.452	0.270
2	K-P-SAA(2)	0.500	1.883	0.295
3	K-P-SAA(3)	0.500	1.573	0.245
4	K-P-SAA(5)	0.500	0.940	0.290
5	K-P-SAA(10)	0.500	0.730	0.305

Table II.13(f)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-IPTA(1)	0.500	0.667	0.205
2.	K-P-IPTA(2)	0.500	1.988	0.255
3	K-P-IPTA(3)	0.500	1.682	0.350
4	K-P-IPTA(5)	0.500	1.130	0.365
5	K-P-IPTA(10)	0.500	1.290	0.380

Table II.13(g)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ADA(1)	0.500	0.893	0.225
2	K-P-ADA(2)	0.500	0.746	0.205
3	K-P-ADA(3)	0.500	1.230	0.285
4	K-P-ADA(5)	0.500	1.068	0.275
5	K-P-ADA(10)	0.500	1.015	0.290

Table II.13(h)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-ANA(1)	0.500	0.755	0.195
2	K-P-ANA(2)	0.500	0.720	0.240
3	K-P-ANA(3)	0.500	1.258	0.252
4	K-P-ANA(5)	0.500	0.965	0.255
5	K-P-ANA(10)	0.500	1.016	0.270

Table II.13(j)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-AAA(1)	0.500	1.050	0.265
2	K-P-AAA(2)	0.500	0.925	0.295
3	K-P-AAA(3)	0.500	0.682	0.210
4	K-P-AAA(5)	0.500	0.875	0.315
5	K-P-AAA(10)	0.500	1.005	0.335

Table II.13(k)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-4ABA(1)	0.500	0.735	0.260
2	K-P-4ABA(2)	0.500	1.065	0.250
3	K-P-4ABA(3)	0.500	1.778	0.215
4	K-P-4ABA(5)	0.500	1.148	0.255
5	K-P-4ABA(10)	0.500	0.828	0.270

Table II.13(1)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-4HBA(1)	0.500	0.670	0.190
2	K-P-4HBA(2)	0.500	0.518	0.167
3	K-P-4HBA(3)	0.500	0.768	0.265
4	K-P-4HBA(5)	0.500	0.705	0.245
5	K-P-4HBA(10)	0.500	0.744	0.262

Table II.13(m)

Cu(II) ion Solution

No	Product	Weight of the resin		
		Before Sorption W_{BS} (g)	After Sorption W_{AS} (g)	After drying W_{DS} (g)
1	K-P-TCAA(1/3)	0.500	0.630	0.110
2	K-P-TMAN(1/2)	0.500	1.227	0.145

Table II.14(a)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-SBA(1)	3.00	2.50	3.00	2.50	4.07	3.82
2	K-P-SBA(2)	2.50	2.20	2.50	2.20	3.98	3.60
3	K-P-SBA(3)	3.00	2.70	3.00	2.70	5.02	4.80
4	K-P-SBA(5)	2.70	2.10	2.70	2.10	4.86	3.49
5	K-P-SBA(10)	2.50	2.50	2.50	2.50	4.10	3.96

Table II.14(b)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-TPA(1)	2.40	2.00	2.40	2.00	3.15	2.66
2	K-P-TPA(2)	2.10	2.50	2.10	2.50	2.90	4.14
3	K-P-TPA(3)	2.30	2.15	2.30	2.15	4.00	2.80
4	K-P-TPA(5)	2.26	2.25	2.26	2.25	3.46	4.90
5	K-P-TPA(10)	2.30	1.76	2.30	1.76	3.50	2.75

Table II.14(c)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-FMA(1)	3.10	3.00	3.10	3.00	3.50	3.36
2	K-P-FMA(2)	2.74	2.56	2.74	2.56	4.40	4.41
3	K-P-FMA(3)	2.20	2.15	2.20	2.15	3.80	3.72
4	K-P-FMA(5)	2.72	2.24	2.72	2.24	3.70	3.56
5	K-P-FMA(10)	3.41	3.01	3.41	3.01	5.02	4.16

Table II.14(d)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-ACA(1)	2.44	2.30	2.44	2.30	2.88	2.68
2	K-P-ACA(2)	2.54	2.20	2.54	2.20	3.14	2.96
3	K-P-ACA(3)	2.65	2.45	2.65	2.45	5.16	4.08
4	K-P-ACA(5)	2.50	2.43	2.50	2.43	3.90	3.68
5	K-P-ACA(10)	2.72	2.56	2.72	2.56	4.10	4.11

Table II.14(e)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-SAA(1)	2.74	2.50	2.74	2.50	3.06	3.00
2	K-P-SAA(2)	3.08	2.82	3.08	2.82	6.20	4.42
3	K-P-SAA(3)	2.54	2.72	2.54	2.72	4.75	4.20
4	K-P-SAA(5)	2.60	2.55	2.60	2.55	4.65	3.68
5	K-P-SAA(10)	2.85	2.45	2.85	2.45	4.34	4.10

Table II.14(f)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-IPTA(1)	2.50	2.35	2.50	2.35	3.70	3.27
2	K-P-IPTA(2)	2.75	2.58	2.75	2.58	3.88	3.88
3	K-P-IPTA(3)	2.40	2.25	2.40	2.25	3.40	3.10
4	K-P-IPTA(5)	3.12	2.76	3.12	2.76	4.25	4.06
5	K-P-IPTA(10)	2.50	2.43	2.50	2.43	3.75	3.65

Table II.14(g)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-ADA(1)	2.20	2.10	2.20	2.10	2.98	2.65
2	K-P-ADA(2)	2.50	2.30	2.50	2.30	3.70	3.37
3	K-P-ADA(3)	2.58	2.50	2.58	2.50	3.94	3.27
4	K-P-ADA(5)	2.72	2.58	2.72	2.58	3.90	3.68
5	K-P-ADA(10)	2.80	2.76	2.80	2.76	4.10	3.85

Table II.14(h)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-ANA(1)	2.45	2.10	2.45	2.10	3.90	3.48
2	K-P-ANA(2)	2.84	2.00	2.84	2.00	4.24	4.08
3	K-P-ANA(3)	3.12	3.10	3.12	3.10	4.60	4.50
4	K-P-ANA(5)	2.70	2.58	2.70	2.58	3.85	3.75
5	K-P-ANA(10)	2.50	2.45	2.50	2.45	3.70	3.50

Table II.14(j)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-AAA(1)	2.80	2.76	2.80	2.76	4.25	4.15
2	K-P-AAA(2)	3.12	3.10	3.12	3.10	5.02	4.50
3	K-P-AAA(3)	2.70	2.55	2.70	2.55	4.10	3.95
4	K-P-AAA(5)	3.76	3.68	3.76	3.68	5.80	5.40
5	K-P-AAA(10)	2.50	2.43	2.50	2.43	3.95	3.72

Table II.14(k)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-4ABA(1)	2.25	2.10	2.25	2.10	3.45	3.10
2	K-P-4ABA(2)	2.54	2.42	2.54	2.42	4.12	3.68
3	K-P-4ABA(3)	3.12	2.70	3.12	2.70	4.85	3.65
4	K-P-4ABA(5)	2.50	2.50	2.50	2.50	4.10	3.74
5	K-P-4ABA(10)	3.25	2.76	3.25	2.76	3.74	2.98

Table II.14(1)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-4HBA(1)	2.25	2.15	2.25	2.15	2.78	2.65
2	K-P-4HBA(2)	2.50	2.45	2.50	2.45	2.86	2.75
3	K-P-4HBA(3)	2.20	2.10	2.20	2.10	2.65	2.52
4	K-P-4HBA(5)	2.50	2.35	2.50	2.35	2.92	2.85
5	K-P-4HBA(10)	3.00	2.81	3.00	2.81	3.94	3.88

Table II.14(m)

No	Product	Dimensions of resin piece					
		Before addition of water		Immediately after addition of water		After keeping for 24 hr in water	
		Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)	Length (mm)	Breadth (mm)
1	K-P-TCAA(1/3)	2.40	2.30	2.40	2.30	2.88	2.65
2	K-P-TMAN(1/2)	2.20	2.10	2.20	2.10	2.65	2.50

Table II.15(a)

No	Product	Weight (in Specific gr. bottle) of Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-SBA(1)	11.552	11.562	10.797
2	K-P-SBA(2)	10.450	10.455	9.917
3	K-P-SBA(3)	10.255	10.270	9.805
4	K-P-SBA(5)	10.620	10.615	9.990
5	K-P-SBA(10)	10.540	10.555	9.898

Table II.15(b)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-TPA(1)	11.507	11.520	10.405
2	K-P-TPA(2)	10.480	10.475	9.365
3	K-P-TPA(3)	9.230	9.245	8.240
4	K-P-TPA(5)	10.600	10.610	9.630
5	K-P-TPA(10)	10.525	10.520	9.265

Table II.15(c)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-FMA(1)	11.522	11.515	10.672
2	K-P-FMA(2)	10.435	10.450	9.982
3	K-P-FMA(3)	9.245	9.260	8.710
4	K-P-FMA(5)	10.630	10.637	9.807
5	K-P-FMA(10)	10.455	10.445	9.715

Table II.15(d)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-ACA(1)	11.552	11.562	10.812
2	K-P-ACA(2)	10.455	10.435	9.970
3	K-P-ACA(3)	9.250	9.242	8.635
4	K-P-ACA(5)	10.620	10.630	10.020
5	K-P-ACA(10)	10.555	10.570	9.745

Table II.15(e)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-SAA(1)	11.532	11.545	10.582
2	K-P-SAA(2)	10.435	10.422	9.747
3	K-P-SAA(3)	9.250	9.265	8.670
4	K-P-SAA(5)	10.635	10.652	10.045
5	K-P-SAA(10)	10.530	10.525	9.920

Table II.15(f)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W(g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-IPTA(1)	11.550	11.540	10.665
2	K-P-IPTA(2)	11.455	11.460	10.835
3	K-P-IPTA(3)	9.230	9.225	8.225
4	K-P-IPTA(5)	10.575	10.590	9.525
5	K-P-IPTA(10)	10.515	10.502	9.395

Table II.15(g)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-ADA(1)	11.530	11.510	10.627
2	K-P-ADA(2)	11.450	11.465	10.695
3	K-P-ADA(3)	10.230	10.245	9.410
4	K-P-ADA(5)	10.550	10.567	9.485
5	K-P-ADA(10)	10.545	10.525	9.650

Table II.15(h)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-ANA(1)	11.555	11.540	10.617
2	K-P-ANA(2)	10.480	10.495	9.850
3	K-P-ANA(3)	10.245	10.260	9.350
4	K-P-ANA(5)	10.600	10.635	9.605
5	K-P-ANA(10)	10.530	10.525	9.547

Table II.15(j)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediatelY) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-AAA(1)	11.957	11.960	11.085
2	K-P-AAA(2)	10.435	10.450	9.585
3	K-P-AAA(3)	10.255	10.240	9.237
4	K-P-AAA(5)	10.635	10.620	9.460
5	K-P-AAA(10)	10.515	10.530	9.605

Table II.15(k)

No	Product	Weight (in Specific gr. bottle) of Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-4ABA(1)	11.522	11.540	10.297
2	K-P-4ABA(2)	10.450	10.440	9.630
3	K-P-4ABA(3)	10.258	10.270	9.420
4	K-P-4ABA(5)	10.605	10.625	9.305
5	K-P-4ABA(10)	10.540	10.560	9.100

Table II.15(1)

No	Product	Weight (in Specific gr. bottle) of		
		Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-4HBA(1)	11.532	11.545	10.525
2	K-P-4HBA(2)	10.455	10.460	9.255
3	K-P-4HBA(3)	10.250	10.235	9.137
4	K-P-4HBA(5)	10.610	10.630	9.480
5	K-P-4HBA(10)	10.545	10.530	9.420

Table II.15(m)

No	Product	Weight (in Specific gr. bottle) of Water W_W (g)	Sample + Water (immediately) W_{WS} (g)	Sample + Water (after 24 hr) W_{WSA} (g)
			Weight of the sample 0.100 g	
1	K-P-TCAA(1/3)	11.540	11.555	11.280
2	K-P-TMAN(1/2)	11.545	11.535	11.060

The results of these expreiments are presented 199
and discussed in the following pages.