894 (1961), in Japanese.—The conventional techniques for the infrared analysis are not available for the cured rubber compounded with filler. In the present work, a microtome of freezing type is used for the preparation of thin section of cured rubber compounded with filler as the sample for infrared analysis. The microtome technique here has been applied to a rubber analysis, and, at the same time, this makes it possible to identify the filler contained in rubber. Several examples of infrared spectra of those thin sections, such as natural rubber and SBR-filler systems, are shown.

Polymer Chemistry

Das scheinbare spezifische Volumen von fadenmolekularen Polyelektrolyten in Lösung. Hiroshi Inagaki nud Akio Teramoto. *Makromol. Chem.* **47,** 185 (1961).—Durch die Schwimmermethode wurden die scheinbaren spezifischen Volumina von celluloseglykolsäuren Natrium und Methylcellulose im Wasser bestimmt, um das Verhalten des Wassermoleküls um das Makroion aufzuklären. Der Wert für Methylcellulose stimmte mit dem nach der Additivitätsregel von Cohn et al. berechneten ziemlich gut überein, während er für das Polyelektrolytmolekül, d. h. das celluloseglykolsäure Natrium, etwa 10 % kleiner war als der berechnete. Es wurde auch festgestellt, daß das scheinbare spezifische Volumen des celluloseglykolsäuren Natriums mit Zunahme der Zusatzsalzmenge (NaCl) allmählich zunimmt. Diese Befunde wurden im Vergleich mit dem Fall der Proteine und auch auf Grund der thermodynamischen Theorie für die Dichte, die bisher von uns entwickelt wurde, diskutiert. Durch diese Erörterung führten wir einen neuen Begriff, nämlich „das gesamte Covolumen", zur systematischen Deutung der von der Additivitätsregel abweichenden zusätzlichen Volumina ein, welche als Elektrostriktions und Endgruppeneffekte, sowie als ausgeschlossenes Volumen im Sinne von Charlwood bekannt sind.

Dynamic viscoelastic behavior of concentrated polymer solutions. 1. Results of some preliminary tests and comparison of dynamic and steady shear data. Tadao Kotaka and Kunihiro Osaki. *Bull. Inst. Chem. Res., Kyoto Univ.,* **39,** 331 (1961).

Lattice theory of chain polymer solutions. Michio Kurata. *Ann. New York Acad. Sci.* **89,** 635 (1961).—The lattice theory of polymer solutions is extended by including in the hypothesis a number C of intramolecular segment-segment contacts; C does not approach zero at infinite dilution. This treatment predicts a decrease of the second virial coefficient A_2 and of the theta temperature with increasing molecular weight for coiling polymers in solution. The theory agrees with the experimental data of Krigbaum and Geymer (*J. Am. Chem. Soc.* **81,** 1859 (1959)) for cyclohexane solutions of polystyrene at 34°C up to volume fraction 0.4 of polymer.

Spontaneous extension of high molecular substances. Waichiro Tsuji, Ryozo Kitamaru and Ryutoku Yosomiya. *Kobunshi Kagaku,* **18,** 205 (1961), in Japanese.—See, this Bulletin, **39,** 330 (1961).

Studies on the fibrous acetylation of cotton. III. Some properties of acetylated cotton. Waichiro Tsuji, Ryozo Kitamaru and Masazo Imai. *Sen-i Gakkaishi*, **17**, 235 (1961), in Japanese.—See, this Bulletin, **39**, 328 (1961).

Studies on the fibrous acetylation of cotton. IV. The influence of the difference in the sorts of catalyzer on the properties of acetylated cotton fabrics. Waichiro Tsuji, Ryozo Kitamaru and Masazo Imai. *Sen-i Gakkaishi*, **17**, 778 (1961), in Japanese.—The influence of the difference in the sorts of acetylating catalyzer upon the properties of the acetylated cotton fabrics was studied. Some influnces were observed, although they were not great. For example, the acetylated cotton fabrics prepared by $ZnCl_2$ catalyzer have better acid-resistance and lesser solubility in chloroform, and those prepared by $HClO_4$ catalyzer have more water-and moisture absorbency than those prepared by other catalyzers.

Studies on the fibrous acetylation of cotton. V. Influence of the rate of acetylation on the properties of acetylated cotton fabrics. Waichiro Tsuji, Ryozo Kitamaru and Masazo Imai. *Sen-i Gakkaishi*, **17**, 910 (1961), in Japanese.—The influence of the rate of acetylation in solution on the properties of acetylated cotton fabrics was studied. Cotton fabrics were acetylated to about 30 mole % at various different reaction rates by the liquid phase method in which trichloroethylene was used as diluent and sulfuric acid or perchloric acid as catalyzer. Various properties of acetylated cotton fabrics were examined. It was found that the rate of acetylation exerts generally less effect on the properties of the acetylated cotton fabrics than other reaction conditions such as the sorts of catalyzer and alkali pretreatment, etc. But by more detailed observation, some effects on the heat-resistance and acid-resistance, etc. were found.

Studies on the fibrous acetylation of cotton. VI. The effect of alkali pretreatment on the properties of acetylated cotton fabrics. Waichiro Tsuji and Ryozo Kitamaru. *Sen-i Gakkaishi*, **17**, 912 (1961), in Japanese.—The effect of alkali pretreatment on the properties of acetylated fabrics were studied. It was found that although the reaction of acetylation was very much accelerated by alkali pretreatment before acetic acid treatment in the liquid phase method, the sterngth of the acetylated fabrics did not be lower at all. The cotton fabrics acetylated after alkali treatment have higher strength than ordinarily acetylated ones without alkali treatment and the fabric elongations become larger with theincrease of acetylation. The moisture regain is relatively higher than ordinarily acetylated ones, although it becomes lower with the acetylation up to 50 mole %. The specific gravity becomes lower linearly with acetylation, but is in general lower than ordinarily acetylated ones. The acid resistances become better proportionally with the acetylation up to 50 mole %, although the ordinarily acetylated fabrics have almost the same acid-resistance in a wide range of acetylation beyond 30 mole %. This difference between the alkali pretreated acetylation and the ordinary acetylation would be due to the difference in the reaction mechanism. The effects of alkali pretreatment would be caused by the decrystallization effects on the cotton cellulose.

Effect of γ-ray irradiation on mechanical properties of PVA and acetalized PVA films. Ichiro Sakurada, Waichiro Tsuji and Fujiko Kimura. *Kobunshi Kagaku*, **18**, 396 (1961), in Japanese.—Effect of irradiation on tensile strength and elongation of PVA and acetalized PVA films has been studied. The filaments were irradiated at room temperature in vacuo and in air. Tensile strength of PVA films heat-treated at 140° C increases by about 15 % by irradiation and that of the films heat-treated at 200° C remains almost unchanged whereas elongation of these films decreases with increasing radiation doses. Tensile strength and elongation of acetalized PVA films decrease remarkably with increasing doses, and the decrement is larger where the films were irradiated in air than in vacuo.

Effects of cobalt-60 gamma radiation on poly(vinyl alcohol). 3. Effects of gamma radiation on water-swollen films and aqueous solutions. Ichiro Sakurada and Yoshito Ikada. *Bull. Inst. Chem. Res., Kyoto Univ.*, **39**, 99 (1961).

Effects of γ-ray irradiation on filament of isotactic polypropylene. Ichiro Sakurada and Fujiko Kimura. *Bull. Inst. Chem. Res., Kyoto Univ.*, **39**, 226 (1961).

Polymerization of ketene and diketene. Ryohei Oda, Sunao Munemiya and Masaya Okano. *Makromol. Chem.*, **43**, 149 (1961).—See, this Bulletin, **39**, 413 (1961).

Preparation of crystalline polyaldehydes. Junji Furukawa, Takeo Saegusa and Hiroyasu Fjii. *Makromol. Chem.*, **44**, 398 (1961).—See, this Bulletin, **39**, 325 (1961).

Polymerization of acetaldehyde. Junji Furukawa, Takeo Saegusa and Hiroyasu Fujii. *Bull. Japan Petrol. Inst.*, **3**, 33 (1961).—See, this Bulletin, **39**, 413 (1961).

Polymerization of alkylene oxides. Junji Furukawa, Takeo Saegusa and Teiji Tsuruta. *Bull. Japan Petrol. Inst.*, 3, 39 (1961).—See, this Bulletin, **39**, 414 (1961).

Concept of covalent and polar nature in chemical bonds and its application to radical reaction. Junji Furukawa. *Bull. Inst. Chem. Res., Kyoto Univ.*, **39**, 1 (1961).

Kinetic interpretation of rheological behavior of high polymers. Junji Furukawa. *Bull. Inst. Chem. Res., Kyoto Univ.*, **39**, 20 (1961).

Organic Chemistry

New addition reactions. I. Reaction of epoxides with ketene. Ryohei Oda, Sunao Munemiya and Masaya Okano. *J. Org. Chem.*, **26**, 1341 (1961).—See, this Bulletin, **39**, 413 (1961).

Studies on vinyl sulfonic acid. I. Synthesis of vinyl sulfonic acid and the monomer reactivity ratio and dyeability of its copolymer with acrylonitrile. Sango Kunitika and Takao Katagiri. *Kogyo Kagaku Zasshi*, **64**, 929 (1961), in Japanese.—