（様式 5）

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(Doctoral thesis abstract)

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論 文 題 目 (Title)	Applicability of ^{1}H Spin-spin relaxation time to evaluate polymer degradation.

Abstract(400 words)

This thesis has described the applicability ^{1}H of spin-spin relaxation time (T_2), which is measured by using low field nuclear magnetic resonance (NMR) techniques, to evaluate the degradation of polymeric materials.

Chapter 1 has explained the necessity of useful parameters for evaluating the degradation behaviors of polymeric materials, and the expectations of T_2, previous studies and the contents of this thesis.

Chapter 2 has shown the applicability of T_2 to quantify the degree of degradation for rubber materials. It has revealed that T_2 is a useful parameter to quantify gradually degreased sealability. Sealability is an important performance of rubber parts.

Chapter 3 has also suggested that T_2 is useful to quantify the degree of degradation of rubber materials, even in cases where several different degradation phenomena occur simultaneously. In addition to this, this chapter has suggested the methods to determine the different limiting values of T_2 with large and small margins. The limiting values correspond to the heavy damage of materials, and they are usually unknown. Chapter 3 also demonstrated that the temperature dependence of T_2 enables us to predict the ultimate lifetime until losing sealability at each aging temperature with no margin. These findings clearly show that T_2 is highly effective not only to quantify the degree of degradation but also to assess the lifetime corresponding to various safety margins for thermally aged rubber over a very long period.

In Chapter 4, it has been shown that T_2 measurements are effective to specify the degradation sites of poly (urea-urethane), which are not easily reveal with conventional analysis methods, such as Fourier-transform infrared spectroscopy and high resolution NMR spectroscopy.

Chapter 5 has summarized the chapters 2, 3, and 4, and it also has shown the capability of T_2 to evaluate the degradation of various polymeric materials.