다음으로는 Ca 372.9 mg%이었다. 유기산 함량은 건물량 기준으로 formic acid가 19,478 mg/100 g으로 가장 그 함량이 높았으며, 그 다음으로는 succinic acid (18,167 mg/100 g), malonic acid (14,487 mg/100 g), malic acid (13,018 mg/100 g) 순이었다.

[P-3]

## Characterization and distribution of phenolics in carrot cell walls

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The purpose of this study was to investigate the release of *p*-hydroxybenzoic acid and other compounds from cell wall materials(CWM) and their cellulose fraction from carrot with chemical and enzymatic hydrolysis. To investigate this effect on cell wall chemistry of carrot, alcohol insoluble residue(AIR) of CWM were prepared and were extracted sequentially with water, imidazole, CDTA(-1, -2), $Na_2CO_3$(-1, -2), KOH(0.5, 1.0 and 4 M), to leave a residue. These were analysed for their carbohydrate and phenolic acids composition. Arabinose and galactose were the main noncellulosic sugars. Phenolics esterified to cell walls in carrot were found to consist primarily of *p*-hydroxybenzoic acid with minor contribution from vanillin, ferulic acid and *p*-hydroxybenzaldehyde. *p*-Hydroxybenzoic acid was quite strongly bound to the cell wall. The contents of *p*-hydroxybenzoic acid in 0.5M KOH, $Na_2CO_3$-2, 1M KOH, and $\alpha$-cellulose were 2,097, 1,360, 1,140, and 717 $\mu$g/g AIR from CWM, respectively. Alkali labile unknown aromatic compound($C_7H_{10}O_2$) was found in $\alpha$-cellulose hydrolyzate digested with driselase and cellulase. This compound was also found in hydrolyzate of 2 M trifluoroacetic acid at 120℃ for 2 hours. Driselase treatment solubilized only 46.6 $\mu$g/g of the *p*-hydroxybenzoic acid from carrot AIR. These results indicate that *p*-hydroxybenzoic acid was associated with neutral polysaccharides, long chain galactose and branched arabinan from graded alcohol precipitation.

[P-4]

## 지초뿌리 유래의 기능성 물질의 탐색

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지초(*Lithospermum erythrorhizon*)뿌리는 예로부터 한방약제로 이용되어져 왔으며, 지초 뿌리에 함유된 naphtoquinon계 색소물질인 shikonin은 항암, 항균, 항바이러스, 항염증 등의 효과가 있다고 보고되었다. 그러나 지초뿌리에 함유된 기능성 물질에 관한 연구는 미비한 실정이다. 이에 본 연구에서는 지초뿌리에서 기능성 물질의 탐색 및 기능성 해명연구를 위하여 지초뿌리를 ethanol로 추출한 후 이 추출물을 *n*-hexane, EtOAc, MeOH로 순차적으로 추출하여 MeOH 추출물을 얻었다. 이 MeOH 추출물을

silica gel adsorption column chromatography, ODS column chromatography, Sephadex LH-20 column chromatography로 순차 정제한 후 Shodex Asahipak column을 이용한 GPC-HPLC에 의해 활성 물질을 분리하였다. 분리된 물질들은 $^{1}$H-NMR, $^{13}$C-NMR, COSY, HSQC, HMBC, FAB-MS 등의 기기분석을 통해 당 관련 화합물인 것으로 판명되었다.

[P-5]

## Effect of gamma-irradiation on the Physicochemical Properties of Hemoglobin

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To elucidate the effect of gamma-irradiation on the molecular properties of hemoglobin, the secondary, tertiary structure, and the molecular weight size of the protein were examined after irradiation at 0.5, 1, 5, and 10 kGy. Gamma-irradiation of hemoglobin solutions caused the disruption of the ordered structure of the protein molecules, as well as degradation, cross-linking, and aggregation of the polypeptide chains. A SDS-PAGE study indicated that irradiation caused initial fragmentation of the proteins and subsequent aggregation due to cross-linking of the protein molecules. The effect of irradiation on the protein was more significant at lower protein concentrations. Ascorbic acid decreased the degradation and aggregation of proteins by scavenging oxygen radicals that were produced by irradiation. A circular dichroism study showed that irradiation decreased the helical content of hemoglobin with a concurrent increase of the aperiodic structure content. Fluorescence spectroscopy indicated that irradiation decreased the emission intensity that was excited at 280 nm.

[P-6]

## Purification and Characterization of an Angiotensin Converting Enzyme Inhibitor from Squid Ink

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Angiotensin converting enzyme (ACE) converts angiotensin I into angiotensin II by cleaving C-terminal dipeptide of angiotensin I and inactivates bradykinin. ACE inhibitors have been screened from various food sources since the inhibitors decrease blood pressure. Therefore, in this study, an ACE inhibitor was isolated and purified from squid ink using membrane filtration, gel permeation chromatography, normal phase HPLC, and fast protein liquid chromatography. The purified inhibitor was identified to be a molecular mass of 294 by mass spectrometry, and to have $IC_{50}$ value of 4.9 $\mu$g/mL.