Composition of Korean Green Tea

- Particle size: 520 µm
- Content of moisture: 15.2 wt%
- Catechin (EGCG: epigallocatechin gallate, EGC: epigallocatechin, ECG: epicatechin gallate, EC: epicatechin)

Caffeine

- Stimulant of central nervous system, including sleep deprivation
- Abortions and miscarriages
- Hypersensitivity

EGCG

- Antioxidation and anticancer
- Anti-inflammatory and antiaging
- Antibiotic and antiviral effects

Objectives of study

- Extracting caffeine while removing EGCG in the green tea by adjusting temperature, pressure and water contents
- Comparing the caffeine and EGCG extraction yields using SCCO₂+water with extraction yields by water and ethanol as solvents

Solubility parameter

- Solute (Caffeine, EGCG) Solubility parameter (δs) estimated by Fedek Method
  \[ \delta_s = \frac{A + B(T - T_a)}{C} \]
- Solvent (SCCO₂) Solubility Parameter (δm) estimated by Gidding Equation
  \[ \delta_m = \delta_m^0 + \frac{B(T - T_a)}{C} \]
- SCCO₂ + Co-solvent Solubility Parameter (δa) estimated by Castro et al
  \[ \delta_a = \delta_a^0 + \frac{B(T - T_a)}{C} \]

Analysis of Caffeine and Catechin in Green Tea

Result

Conclusion

- In the extraction of green tea using SCCO₂ with water as a cosolvent, the extraction yield of caffeine and EGCG increased with an increase in pressure, temperature and water contents.
- The conditions of selective removal of caffeine from the green tea were 40 °C, 400 bar, 7 wt% water contents. At these conditions, 54% of caffeine while 21% of EGCG was extracted (selectivity: 2.57).
- The selectivity of caffeine/EGCG extraction with water was 0.88 and the selectivity was 0.24 with ethanol at 40 °C.