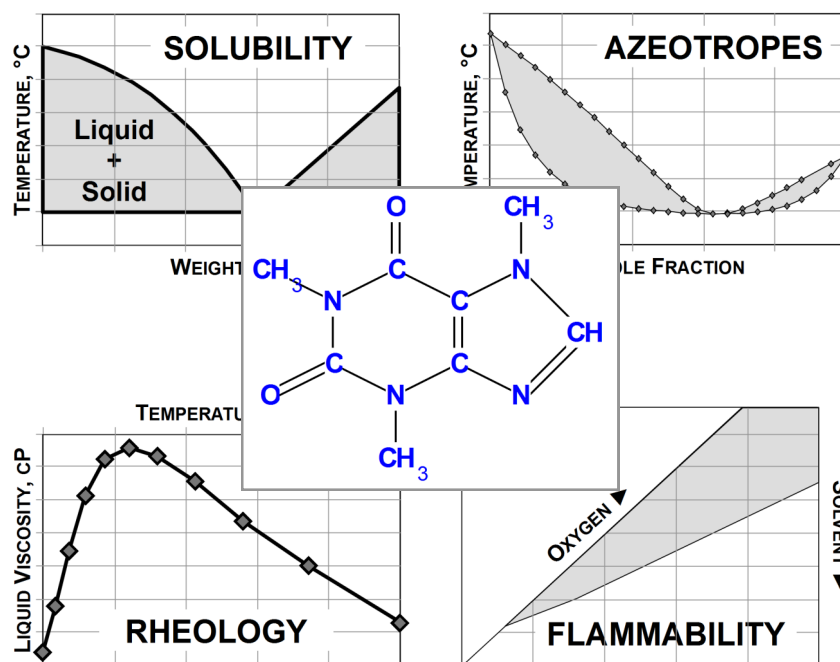


CONSULTING

**WE HELP OUR
CUSTOMERS
DESIGN
BETTER
CHEMICAL
PRODUCTS**



We are experts at understanding the relationships between molecular structure and physical properties and understanding how to take advantage of these relationships to design better chemical products

Molecular Knowledge Systems' consulting services use our expertise in physical property estimation and chemical product design to help customers design better chemical processes and products. In a typical consulting project we:

- Compile relevant prior research focusing on thermodynamic, rheological, environmental, and safety properties
- Develop detailed, quantitative constraints on physical properties and molecular structure
- Compile or develop physical property estimation techniques tailored for the specific chemicals and processes being investigated
- Use these estimation techniques to computationally generate and test thousands of molecular structures or mixture formulations searching for those that satisfy our constraints
- Assist in the development of experimental procedures needed to evaluate these initial candidates
- Analyze experimental results to improve constraints and estimation techniques
- Recommend updated sets of candidates for experimental testing

By using these steps we provide a rapid, cost effective, and highly efficient search for the chemicals and mixtures possessing the physical properties you need.

We work as a member of your team contributing expertise in chemical product design, molecular design, physical property estimation, and structure property relationships.

We give our customers a deeper, often molecular level, understanding of their processes and products.

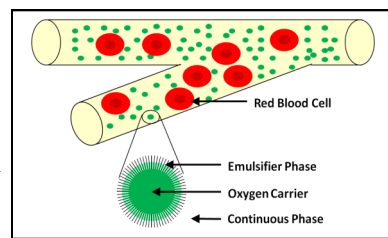
EXAMPLE PAST PROJECTS

We have worked on projects identifying replacement refrigerants, improved liquid lubricants, non-hazardous separation solvents, environmentally friendly aircraft deicing fluids, automobile windshield washer fluid, working fluids, and jet fuel additives.

**VISIT OUR WEBSITE
TO RECEIVE MORE
INFORMATION**

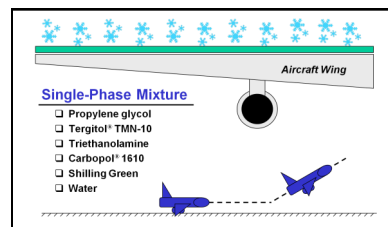
CHEMICAL BLOOD SUBSTITUTES

Blood substitutes can potentially eliminate the need to collect and store human blood. Being chemically based, they could be produced in large quantities and be inherently free of disease. Substitutes must have high oxygen solubility, be compatible with the human body, and be more easily stored than human blood. Emulsions containing highly fluorinated chemicals are currently the most promising class of blood substitutes. Although these substitutes have promising performance, their main deficiency is limited shelf life due to emulsion instability. In this project we recommended several chemical methods to improve emulsion stability including density matching and modifying the viscosity of the emulsion to slow coalescence.



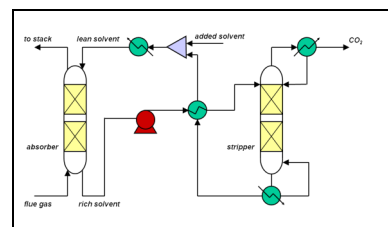
AIRCRAFT DEICING FLUIDS

Ice and snow must be removed from aircraft before takeoff. Currently ethylene or propylene glycol is heated to a high temperature and sprayed onto the aircraft. Much of the applied fluids can find their way into the environment where they have considerable impact. In this project we used Synapse®, our chemical product design software package, to design a new generation of deicing fluids having improved performance and improved biodegradation rates. The novelty of these new fluids enabled our customer to apply for a patent.



CO₂ ABSORPTION SOLVENTS

Solvent absorption is currently considered to be the best method for removing CO₂ from flue gases. The absorption solvent must balance high affinity for CO₂ with the ability to release CO₂ under certain conditions. In addition the solvent must be non-toxic, low cost, thermally and chemically stable, safe and have a low environmental impact. In this project we are developing models for candidate absorption solvents, using group contribution techniques to computationally screen candidates, and working with process simulators to evaluate performance.



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