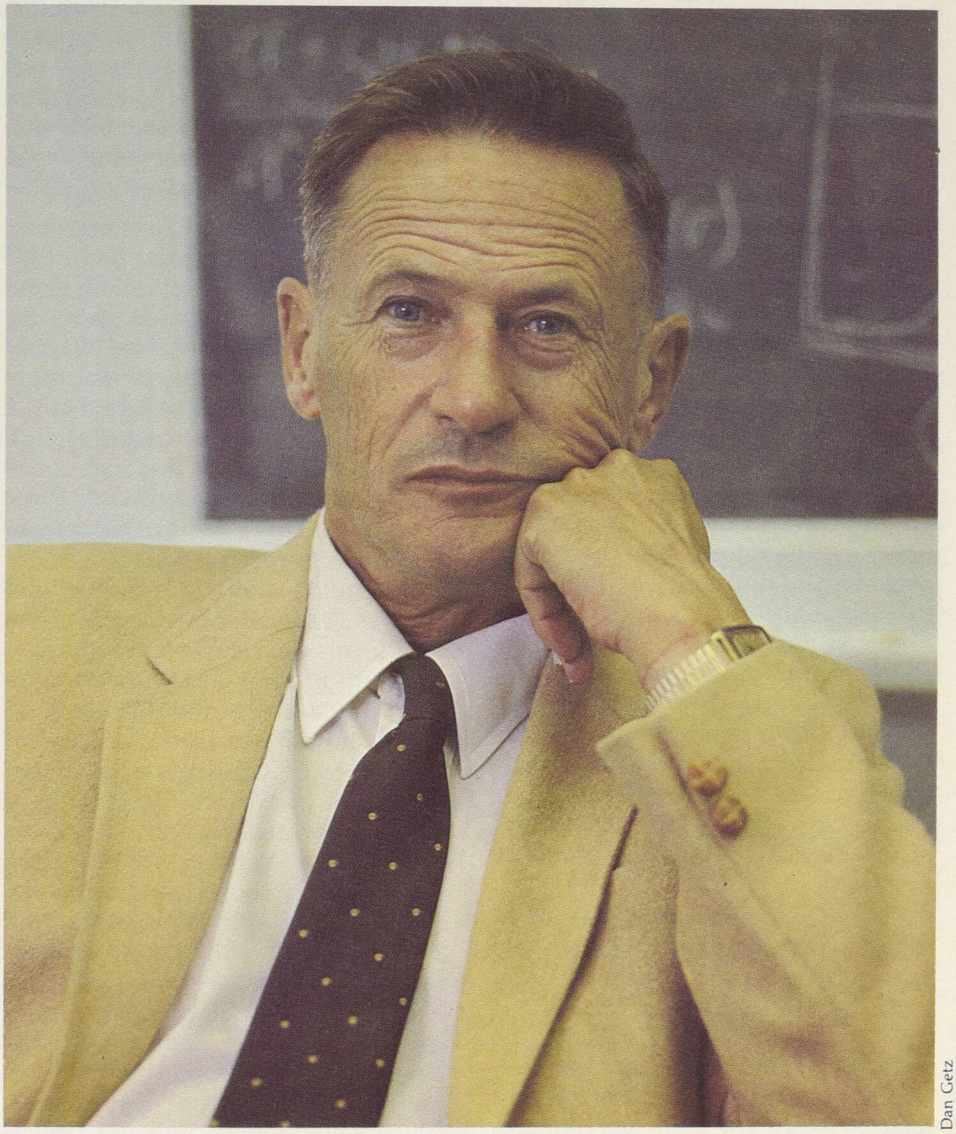
Keith Ingold

When London was being bombed during the last World War, the Chemistry Department at the University of London, then headed by Professor Sir Christopher Ingold (who had been called the father of physical-organic chemistry), was evacuated to a small town in Wales. On weekends, especially during the winter, there was little to do and so Sir Christopher's teenage son, Keith, took to visiting his father's laboratory, becoming an expert glassblower and, eventually, a chemist.

In 1946 Keith Ingold took an undergraduate degree in his father's department, then his Ph.D. at Oxford under Sir Cyril Hinshelwood. He came to Canada in 1951, working first as a postdoctoral fellow in the field of gas phase kinetics at the National Research Council, followed by a further period of research at the University of British Columbia.

In 1955, he accepted a job offer from the NRC in what was then the Division of Applied Chemistry. The NRC was by far the country's largest research establishment — largest in terms both of numbers of scientists, breadth of coverage, relative amplitude of budget and richness of scientific tools. A lean man in his mid fifties — he keeps fit by skiing and wind surfing — Keith Ingold is now associate director of its Division of Chemistry.



Dan Getz

Dr. Keith Ingold: Keeping tabs on free radicals in living organisms.

The problem he was asked to tackle when he began his work at NRC was a practical one: to investigate how the oils used to lubricate automobile engines degenerate in use, and to find ways of protecting them. The oils degrade, becoming acidic and viscous, because they react chemically with oxygen from the air; that is, they oxidize. The same chemical process accounts for fats in food going rancid on prolonged storage. Chemically, this oxidation process is a complex chain reaction involving many transient intermediate compounds.

The late Dr. Ned Steacie, a former president of NRC and arguably one of the world experts of his time in chemical kinetics, had shown along with others how to study such complex processes in the gas phase by analyzing the constituent, elementary reactions; but to do so in liquids was far harder than in gases. The elementary reactions that occur in lube oil oxidation involve what are called 'free radicals.' At the time very little was known about the reactions of free radicals in solution.

A free radical is a fragment of a molecule. It is a highly reactive group of atoms which is generally capable only of a fleeting independent existence. Nevertheless, free radicals play vital roles in many important industrial and biological processes. Ingold found them fascinating — and challenging.

"At that time," he says "the theories in vogue as to how oils oxidized and were protected from oxidation