Promoting Chemistry

A history of the Chemistry Education Association

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by

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The Chemistry Education Association Incorporated (CEA) is a non-profit association that promotes the teaching and learning of chemistry in schools, particularly at the higher secondary level.

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Introduction

'Unique' is an appropriate word to describe the Chemistry Education Association. No other school subject in Australia has an independent body that is solely committed to supporting its teaching and learning.

This is a history that is dedicated to those who founded and developed the CEA; it explains how the CEA came into being and how it has prospered;

Two individuals who made major contributions to the CEA should be especially honoured. They are Alan Buchanan and Ken Mappin.

Alan Buchanan, as Head of the Chemistry School of Melbourne University, initiated the writing of a new school chemistry text in 1963 and organised that royalties from the book sales should be held in trust to support future school chemistry teaching. These decisions were made in the days when the Victorian Universities and Schools Examination Board (VUSEB) controlled the syllabus and examining of secondary school chemistry through its Chemistry Standing Committee. The changes were carried through with active cooperation from the secondary schools and also with the agreement of the new book's authors. A major driver of the school support was Ken Mappin, at that time the Senior Chemistry Master at Geelong Grammar School.

Some years later, in 1977 and 1978, Ken Mappin's initiative became pivotal and led directly to the formation of the CEA. Over those two years the Victorian State Government was assuming full control of the syllabus and examining of all secondary school subjects. Mappin was then the Chair of the VUSEB Chemistry Standing Committee that controlled the textbook royalty funds. He proposed the creation of a quite new organisation – independent of both Universities and Government – that could provide long term support for chemistry teaching and learning for all schools. He succeeded in winning agreement for his idea from the members of the Standing Committee. The whole Committee then joined him in establishing the CEA as the body to continue with independent management of the textbook royalty funds.

We have developed this story in the context of the evolution of chemistry teaching at the higher secondary level in Victoria since the mid-1850. It covers CEA's first 25 years (1977 - 2002) together with its important activities during the first decade of the 21st century.

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Chapter 1

Prologue: before 1977

Early chemistry teaching in Victoria. The early role of Melbourne University in controlling the teaching and examining of secondary school chemistry. Creation of the Victorian Institute of Secondary Education and the origins of the Chemistry Education Association.

1. In the beginning

When, in 1855, The University of Melbourne first opened its doors to students, the urgent need for the teaching of science in Victoria had already been acknowledged when Redmond Barry, the first Chancellor of the University, provided instructions regarding the appointment of the first four professors of the University that included the statement:

'....the great necessity for instruction in Geology, Mineralogy, Metallurgy, Chemistry, Natural Science and Physiology, is best proved by the fact that questions of the most ordinary character are daily being referred to England…'

Around that time, secondary Private Schools, some based on the English Public School model, were being established in the young colony; but it was not until 1905, following Federation, that the Victorian Government began to establish its own secondary schools.

In those early years around the mid 1850s, there was clearly little enough chemical knowledge available in Melbourne. Such information as was available lay with the members of the medical profession, the small number of school masters and the increasing numbers of mineralogists and analysts moving into the colony following the discovery of gold in Victoria in 1851 – but the total number of individuals in Victoria with any knowledge of science, let alone chemistry, at that time probably could not have exceeded fifty.

Throughout the later years of the 19th century, entry to the University was via an examination (later called a Matriculation examination), conducted by a University Board that included representation from secondary Private Schools and the Schools of Mines. During this time, Melbourne University exerted no formal direct influence on the syllabuses of Victorian secondary schools, although there was always the indirect effect of the University entrance examination. In 1879, chemistry was introduced for the first time as a subject in the University's Matriculation examination, so we might presume that schools began to take a special interest in the teaching of chemistry from that time.

During the 1860s and 70s the University had no independent Science Faculty. Chemistry was taught separately in the Medical degree course and in the Natural Science component of the Arts course. Some knowledge of chemistry was clearly needed by the Colony's

booming mining industry and, by the late 1870s, in-service chemistry courses were being given to local school teachers by both the Ballarat and Bendigo (Sandhurst) Schools of Mines. By this time, the teaching of chemistry was clearly established as a subject in secondary schools.

The school teachers on the University Council, led by Charles Pearson the Headmaster of the Presbyterian Ladies' College, helped drive the University to finally agree to appoint its first professor of chemistry. In 1881, John Kirkland took up this position, but he suffered from ongoing poor health and died soon after in 1885. Due no doubt to Kirkland's illnesses, his term as professor had not been successful and it was nearly another 20 years before David Masson was appointed, in 1903, as the second chemistry professor of Melbourne University.

Major change came with Federation in 1901 when Victoria became a sovereign State within the Commonwealth of Australia with clear responsibilities for education. Junior and Senior Public examinations were established in 1904 and, by 1906, the right to matriculate was judged by performance in a final Senior Public Examination. This exam was generally known as the Matriculation examination. The nature of all these public exams was determined and controlled by University Staff. In the case of chemistry, the chief examiner was invariably a staff member of the University's Department of Chemistry. The conduct of these examinations was further formalised by 1912 with the creation of a University Schools Board with equal representation from the University, the Private Schools and State Education Department Government nominees.

During the early years of the century, Victoria had begun to establish a State secondary school system, beginning with Melbourne Continuation School (later Melbourne High School) in 1905, a number of country Agricultural High Schools (Ballarat in 1907, Sale in 1907 and Shepparton in 1909) and then the University Practising School (later University High School) in 1910. New schools continued to be established steadily as the need for secondary education increased so that, by the end of the 20th century, over 80% of the student population in the State was completing the final year of secondary schooling with some two thirds of these students being processed within the State school system.

However, it is worth stressing again that, until the educational reforms of the mid-1970s, 'the University' (after the early 60s, it was 'the Universities') had effective control of the Schools Board and therefore remained in control of the content and assessing of all Junior and Senior public examinations.

2. New beginnings

In 1948 Alan Buchanan, a newly appointed lecturer in physical chemistry in the Chemistry School of Melbourne University, was given by his Professor, Ernst Hartung, the task of managing the Matriculation chemistry curriculum and examination. One of his tasks was to chair the Chemistry Standing Committee (CSC) of the Schools Board; this committee was composed of a small group of the state's senior secondary teachers of chemistry, some

State Education Department officials and a small number of interested academics. This CSC was essentially an advisory committee for the Professor of Chemistry (via his nominee if he had chosen not to chair it himself) who had the responsibility for setting the syllabus and content of the Senior Public exam (ie the Matriculation exam) in chemistry and reviewing the ongoing state of secondary chemistry. Throughout the first half of the 20th century, success in the Matriculation exam had been perceived primarily as a qualification for entry to the University. It is worth noting that, during the 1930s and 1940s, less than 5% of seventeen year olds attempted the Matriculation examination so that this test, in those years, was relevant only to the small proportion of the population aiming to enter the University.

As Buchanan warmed to his task during the 1950s, he formed the view that chemistry teachers in Schools were becoming increasingly concerned - even irritated - by the arbitrary way in which the University exercised its control of both the curriculum and examining of Matriculation chemistry. The only feedback for schoolteachers was via this CSC, but there was no formal mechanism for delivering the feedback. Following the Second World War, complaints from the schools were rapidly becoming more insistent. The *status quo* may have been justifiable 'before the war' when the sole purpose of the Matriculation examination was University entrance. But this role was becoming decreasingly relevant to a student population that now contained returned servicemen and others who were merely looking for an appropriate general education before launching themselves onto the job market. In short, by the 1960s an increasing proportion of 17 year olds were beginning to use 'the Matriculation examination' as an end in itself – simply as a qualification for a job. An even more important issue then surfacing concerned the quality of the syllabus itself; the style and content of the syllabus had changed little for many years, over times when scientific knowledge had been rapidly evolving. The syllabus needed to be seriously 'modernised'.

In the 1950s, Buchanan's CSC contained committed teachers from the Private, Catholic and State systems with a sprinkling of interested academics. Early prominent members included Mark Stump (Scotch College), Alan Gess (Wesley), Jack Stove (Melbourne Boys' High) and Rev. Bro. Mortensen (CBC St. Kilda). Later additions included Ken Mappin (Geelong Grammar), Graham Withers (Melbourne Grammar) and Keith Phillips (Melbourne Boys' High). Interested tertiary academics, many of whom became examiners setting and controlling the marking of the Public exams, included Tom O'Donnell, Bob Craig and Don Stranks. In the early 1960s, the CSC finally found itself caught up in the period of rapid development and innovation in school science that infected all science disciplines and occurred in most of the English-speaking world. This period of change presumably had its roots in the post World War 2 economic growth and its accompanying population boom. But there can also be little doubt that the new developments in school science in what we then called 'the Free World', received great impetus from the launch of Sputnik by the Soviet Union on the 4th of October 1957. The fear of being eclipsed scientifically by the Russians led to huge developments in science education, particularly in the United States and the United Kingdom. It followed that, in the 1960s, quite a raft of modern new science courses were on display in the bookshops. From the USA we had: from the Physical Science Study Committee the text, PSSC physics; in chemistry, Chem Study and the Chemical Bond

Approach (CBA); and a biology text from the Biological Sciences Curriculum Study (BSCS). From the UK we had the new courses generated by the Nuffield Project. Ultimately these new courses found their way to Australia and many of them fell into widespread use as our State education system became caught up in this need to modernise science teaching. This was particularly urgent as the first fruits of the post-war baby-boomers were now filling the upper levels of secondary school. In Victoria, one early sign of change was the creation of Monash University, which admitted its first students in 1961. It quickly became obvious that Melbourne University could no longer retain sole control of the syllabus and the examining of the final year of secondary school in the State. In 1962, the various subject Standing Committees of the University Schools Board changed their titles to 'Victorian Standing Committees' with the addition of Monash University representatives. But this was only a temporary solution and, in 1965, a new bureaucracy, the Victorian Universities and Schools Examination Board (VUSEB), replaced the old 'Schools Board'. This new Board established joint University participation in the control of the school Year 12 public exams.

Under the VUSEB, the former system of subject Standing Committees was continued, with appropriately modified changes to membership. Buchanan, now Professor of Physical Chemistry and Head of the School of Chemistry at Melbourne University, had maintained his close interest in school chemistry. Now Chair of the new VUSEB Chemistry Standing Committee, he confronted its members with the need to make rapid decisions about the direction the subject of chemistry should take in schools. The most obvious choice was to select one of the American or Nuffield courses available 'off the shelf', possibly adapting it for the local environment. The alternative was to create a totally new course and syllabus, together with our own teaching materials, specifically adapted to local needs. The perceived advantage of creating a local course was held to lie in the fact of 'ownership'. It was believed by a majority of both the tertiary and secondary committee members that 'ownership' of a new homegrown course would lead to its more ready acceptance in schools. A problem with such a project was its comparatively high potential cost and also the need to find writers with the necessary skills. Despite the risks, Buchanan became a strong proponent of such a 'homegrown' project and he was strongly supported by many of the State's best-known chemistry teachers. One particularly strong supporter was the young Ken Mappin, Senior Chemistry Master at Geelong Grammar. The CSC finally made the decision to try to obtain the financial support to proceed with a chemistry course-writing project, with both Buchanan and Mappin leading the charge. Particularly strong supporters from the private schools were Brian Hone, Headmaster at Melbourne Grammar, and Tommy Garnett, Headmaster at Geelong Grammar (Ken Mappin's school). Enthusiastic supporters from within the Government system were Doug McDonell, Principal of the Secondary Teachers College, and Don Neale, a Secondary Inspector with the Education Department. Between them, these individuals were responsible for gaining enough support from both public and private sources by late 1963 to allow a book and syllabus-writing project to proceed in 1964.

The CSC, under the guidance of Buchanan, appointed a writing team that met in space made available within the Chemistry Department of Melbourne University under the direction of Don Stranks, then a Reader in Inorganic Chemistry at Melbourne University.

The writing team consisted of Michael Heffernan from Monash University, Kwong Lee Dow from the Secondary Teachers College, Graham Withers from Melbourne Grammar School and Peter McTigue from Melbourne University with all salaries being paid by their respective institutions. In May 1964, Stranks moved to Adelaide University as Professor of Inorganic Chemistry, but retained a role as adviser and critic to the remaining working group. Under Stranks, this group had produced a first draft of a new syllabus in early 1964 and then launched into a major writing exercise during that year. Withers also wrote a laboratory manual and associated teachers' notes to accompany the text. The new texts, 'Chemistry: A Structural View' (CSV) and the accompanying laboratory manual, were completed and published by Melbourne University Press in 1965. The new syllabus was finally approved by the CSC and introduced into schools in 1966. The book and the associated syllabus represented a dramatic change from the content-rich chemistry course that it replaced. The major thrust of the change is well described in the Preface of CSV –

'…it was decided to introduce into the course a completely new approach to elementary chemical bonding theory, using ideas developed during the last decade. These ideas have been presented in a form which we hope makes possible their integration with most of the descriptive chemistry subsequently presented in the book.'.

The book also set out to present chemistry as a quantitative science, rather than as one that was based mainly on the recall of qualitative organic and inorganic substances and reactions, as the old course had been.

In a major departure from the writing of most University-based texts, Buchanan decided that royalties from the sale of the text should be directed to a trust fund under the control of the VUSEB Standing Committee in Chemistry, to be used for future support of the teaching of chemistry in Victorian secondary schools. The consequences of this decision unintentionally paved the way for the formation of the Chemistry Education Association over a decade later. Each of the initial authors was acknowledged with an honorarium and each acknowledged that he had no further claims on the book. The text proved particularly successful; it was translated into Spanish and was released in the United Kingdom by Cambridge University Press.

In 1969 it was finally agreed to change the name of the Year 12 exam from the Matriculation exam to the Higher School Certificate (HSC) exam. This was an acknowledgment that the exam was no longer a 'matriculation' exam. It was no longer an automatic passport to a University course of choice, since by this time the most sought-after University courses were the subject of stringent quotas. It was now a final Year 12 school exam, the pass in which was a necessary, but not sufficient, condition for entry to the most highly sought after University courses.

In 1970, a substantially modified second edition of CSV was released, largely prepared by Peter McTigue and Kwong Lee Dow. One important change in this new edition was the introduction of the International System of Units (usually called the 'SI' system following its French name, the *Systeme Internationale d'Unite*), probably for the first time in an elementary chemistry text. In addition, more organic chemistry was added, together with an

introduction to nomenclature for organic molecules, as recommended by the International Union of Pure and Applied Chemistry (IUPAC). This second edition continued to be used as the primary text for Year 12 Chemistry in Victoria until 1979.

3. The arrival of VISE

Between the introduction of CSV in 1966 and its successor in 1979, major political changes marked the end of the overt University domination of secondary school syllabuses. At the beginning of the 1960s there were still three publicly set and marked examinations in Victoria, although by this time many of the schools in the State were being permitted to set and mark their own Year 10 and Year 11 exams. The Intermediate Certificate (Year 10) exam was finally abolished in 1966 and the Leaving Certificate (Year 11) exam was abolished in 1972. At the time of writing CSV in the mid 1960s, approximately 20% of all enrolled school students were being retained to the Year 12 level. This retention rate was increasing rapidly and had already risen to over 35% by the late 1970s, and had extended to nearly three-quarters of the total cohort by 2000.

Accompanying these increases in Year 12 student numbers, there was widespread debate and argument concerning the need for major change to the Year 12 exam and accompanying demands for a more 'democratic' teaching environment. Among many secondary school teachers, particularly those employed in the State system, there was strong support for the abolition of all externally-controlled and examined public examinations. Such a change would, of course, have raised the vexed question of the nature of entry into the increasingly restrictive University quotas, particularly those for Medicine and Law.

One solution to this problem, recommended in 1973 by the Victorian Secondary Teachers Association (VSTA), was a requirement that student entry to quota-ed tertiary courses be determined by a random ballot of all those with a 'pass' in the current HSC exam. Although this radical view did not have wide community support, it did put added weight to the need to broaden the role of the final year of secondary schooling, since it was clear that VUSEB was slowly losing control of Year 12 assessment. Indeed, by 1976, two alternatives were already established in the final year of secondary schooling - the Tertiary Orientation Program (TOP) and the Sixth Form Schools Tertiary Entrance Certificate (STC). The TOP had been initiated by the Education Department's technical schools, to provide a year of study leading to entrance into Teachers' Colleges and Colleges of Advanced Education (CAEs). STC, on the other hand, was a school-based program that had been accredited by some State High Schools with active support from the VSTA, but had only limited support from tertiary institutions.

Finally, in 1976, a State Government Committee produced recommendations to Lindsay Thompson, the Minister of Education, which led directly to the creation of the Victorian Institute of Secondary Education (VISE). This Committee had been chaired by Alan Buchanan, who had retired in 1973 from Melbourne University to take a State Government appointment. VISE had a very wide brief, one aspect of which was to create syllabuses and public exams for the Higher School Certificate, and another to support school-based

programs for those favoring this latter approach. The first Chair of this newly-created VISE Board was Kwong Lee Dow, now a Professor of Education at Melbourne University and one of the original authors of CSV.

VISE, which finally assumed responsibility for Year 12 from VUSEB in 1979, established two different types of Year 12 subject: externally-examined Group 1 subjects, closely similar to pre-existing VUSEB subjects, and school-assessed Group 2 subjects. Tertiary institutions were to be free to use whichever of the approved VISE Year 12 subjects they wished in deciding on their entry requirements. Chemistry, naturally enough, remained as a Group 1 subject.

While these political debates were raging in the wider community, members of the VUSEB Chemistry Standing Committee had been actively debating the future of their discipline. It was clear to most committee members, both secondary and tertiary, that there was a pressing need to reform both the syllabus and the examining at Year 12. Student and teacher bodies were both demanding some relief from a syllabus that was increasingly seen as being excessively 'academic' – a syllabus that may have been suitable even a decade earlier when a more modest percentage of students were aiming to attend University.

A significant blow was struck in 1975 at the annual chemistry teachers' conference of the Science Teachers' Association of Victoria (STAV), where a motion was passed urging the creation of a more student-friendly chemistry syllabus with a greater emphasis on 'everyday' chemistry. The CSV materials were then over ten years old and plans were already afoot to develop a syllabus with a much more 'real life' approach to chemistry. Even more importantly, it was acknowledged that any new materials should be developed in close collaboration with practising secondary teachers, so as to ensure that the content was appropriate to student needs.

The initial practical moves towards these changes came during the CSC chairmanship of Monash University academic, Ivan Wilson, in 1976. At a time when many tertiary academics in chemistry were fearful of a loss of 'standards' in their discipline should secondary teachers ever get their hands on Year 12 chemistry syllabuses, Ivan Wilson understood the inevitability of the coming changes and had confidence that a 'letting go' by the Universities could lead to fruitful cooperation between secondary and tertiary teachers as the changes evolved. One extreme view of this inability to 'let go' was provided by Sir Louis Matheson, a former Vice-Chancellor of Monash University, who asserted ('The Age' newspaper, 29/09/1976) that teachers could not be trusted to maintain high educational standards and the State should return to the use of public exams at Years 10 and 11 as well as in Year 12.

Wilson, unlike his former Vice-Chancellor, saw that secondary teachers were in the best positions to understand the needs and abilities of their students; they could provide unique advice of how to best work within the practical and political milieu of a rapidly growing secondary school system. He also saw that tertiary academics, on the other hand, were able to best identify the future trends of the discipline and could often weave ways through the presentation of difficult concepts, finding a satisfactory balance between necessary

simplifications and 'correctness'. As a final recognition of this change in attitude, members of the VUSEB Chemistry Standing Committee in 1977 and 1978 elected Ken Mappin, now Senior Chemistry Master at Scotch College, as its Chairman. This appointment ended over a century of University control of the committee responsible for driving the nature and direction of chemistry in Victorian Schools. These two years were the final two years of the old VUSEB before it handed over to the new VISE in early 1979. However, the decision to embark on an entirely new syllabus and associated textbook program, to be used by the new VISE, had been taken by Ivan Wilson's committee in 1976 – a decision that led, both directly and indirectly, to the creation of the Chemistry Education Association as well as to the creation of a brand new Year 12 chemistry course that served the State until 1991.

4. Chemistry: Key to the Earth and the Origins of the CEA

As with the previous new syllabus and text writing project back in 1964, when CSV was written, financial backing was crucial for ultimate success of a new course-writing exercise. This time however, the CSC already had the advantage of ownership of the trust fund built up from the CSV royalties. Given the impending demise of VUSEB and its takeover by VISE, the CSC members were concerned by the possible effects of this change of control of the chemistry trust fund. The thought of having this money absorbed by a Government statutary body that might raise questions about its ownership was a worry to some. The original intention was that the money would be held in perpetual trust by the then Chemistry Standing Committee to be used for the support of the teaching of chemistry in Victorian secondary schools. But there were no ironclad guarantees that individual subject Standing Committees would survive under VISE. (Interestingly enough, they did – but they *did* disappear in the mid 1980s under the VISE replacement, The Victorian Curriculum and Assessment Board - VCAB).

Clearly, the members of the existing Standing Committee formed the view that this not inconsiderable sum of money must remain the property of those whose concerns were the teaching of secondary school chemistry and, in 1977, they acted decisively when, at a meeting chaired by Ken Mappin, a group (Appendix 1) of 13 secondary teachers and 4 tertiary academics met and formed the Chemistry Education Association (CEA). The CSC then subsequently transferred control both of the trust fund and the management of what had come to be called the 'Newchem' project, to the newly-formed CEA.

The 'Newchem' project had begun in 1976, when the Standing Committee, under Ivan Wilson's leadership, appointed an original working group chaired by Peter McTigue. This working group was given the task of preparing a first draft of a new syllabus and the plan for an accompanying text. The group consisted of 5 secondary teachers - 3 from Private Schools and 2 from State secondary schools – and 2 tertiary academics from Melbourne University. Six of the seven members of the group were foundation members of the CEA and they shared the commitment to collaborate in creating an entirely new syllabus that could be 'owned' by the teachers in the State of Victoria.

As it became clear that this group was to manage the writing of a new major text, it morphed into an editorial board with Peter McTigue as Chief Editor (Appendix 2). Strong support came from the State Education Department who provided the salary of a young teacher, Don Hyatt, who was seconded for the duration of the writing and trialling of a new text named Chemistry: Key to the Earth (CKE). Production of the text was now fully in the hands of the CEA on behalf of the CSC and it was finally released for sale in 1979 by its publisher, the Melbourne University Press. Sixteen individuals contributed to the writing of the book. These names are all listed in Appendix 3, but special note should be made of Alan Smith, from Carey Baptist Grammar School, who wrote nearly all of the content of Unit 6, The Biosphere. This drew heavily on Alan's enormous store of chemical knowledge and contributed just over 50% of the total content of the book.

This new text differed considerably from CSV. CKE was designed to support the new Year 12 syllabus and its content and structure reflected at least some of these demands. In the Preface we read:

'...we have stressed the role of chemistry in modern industrial society, and also the understanding chemistry can give to biological processes. In a word, we deal with chemistry that is relevant to our existence'.

This text and its accompanying syllabus reduced the strong 'physical chemistry' (academic?) flavor of CSV and simultaneously provided a clearer and more explicit balance between the *science* of chemistry and *the applications* of the science. It thus aimed to provide some insights into how chemistry could provide some understanding of the workings of modern society. The book was developed primarily as a source book, with the content going considerably beyond a single Year 12 syllabus, so it would be capable of supporting future syllabus extensions and developments.

Chapter 2

Consolidation: 1977-1991

The writing and financing of Year 11 and Year 12 chemistry texts for the HSC. CEA's legal status clarified and its relationships with Government bodies established. From VISE to VCAB.

1. The birth of the CEA

The Chemistry Education Association (CEA) was born on 31 March, 1977, being the child of a group of secondary and tertiary chemical educators. The birth took place at an extraordinary meeting of the Chemistry Standing Committee of the Victorian Universities and Schools Examination Board, chaired by Ken Mappin. The meeting lasted less than 15 minutes – just long enough to unanimously approve three motions (Appendix 4) that declared the Association to be a body that would *'... promote the study and general knowledge of chemistry at the secondary education level.'*

The seventeen foundation members (Appendix 1) of the CEA, all present at that initial meeting, each paid a $1.00 joining fee and, two months later on the 1st of June, all signed the agreed Deed of Trust (Appendix 5). Within three weeks, on the 19th of April 1977, the five initial Trustees, Peter McTigue, Anne Meehan, Ken Mappin, Ivan Wilson and Graham Withers, met at Scotch College for the first trustees meeting of CEA. At that meeting several key procedures were put in train that together established the criteria for the future success of the CEA by ensuring its financial viability. These were that:

- the Chemistry Standing Committee of VUSEB be asked to transfer to CEA the contents of its chemistry trust fund containing the accumulated royalty payments from the text Chemistry: A Structural View (CSV).
- all future royalties from CSV (from Melbourne University Press) be directed to this new account.
- full management and ownership of the emerging 'Newchem' text, including all future royalty payments, be vested in CEA.

It all seemed to have been so very easy, but it was only made possible because this was a time of rapid change and lines of communication in the emerging VISE structures were still being established. Down the pecking order, at the CSC level (the Standing Committee was at that time, still formally a VUSEB Standing Committee), it was possible to unilaterally take quite far-reaching decisions without much fear of interference from above. In any event, by the next meeting of the CEA trustees, on 12th of August 1977 just four months later, all the above criteria had been established. It is worth noting that these arrangements would only have been possible in an environment in which there was a quite high level of mutual trust between secondary chemistry teachers, the relevant University chemists and the State's senior educational administrators. The CSC had been happy to hand over its money and control of the Newchem project in return for the assurance that the project be carried out by CEA 'in

accordance with the guidelines already laid down' by the CSC. No doubt this was made easier by the fact that the CEA trustees were at that time all members of the CSC!

2. *Chemistry: Key to the Earth* and the new VISE chemistry syllabus

During the time that CEA was being established, the Newchem book-writing project was being conducted in space provided within Melbourne University, using the CSC-approved 'guidelines' of its editorial board. Day to day management of the project was under the direction of Chief Editor Peter McTigue and the Executive Officer, Don Hyatt. Negotiation between CEA and the book's publisher, Melbourne University Press, were carried out between Peter McTigue, on behalf of CEA, and Peter Ryan, Director of Melbourne University Press (MUP). Formal reports were then provided to the CSC by Ivan Wilson on behalf of CEA. The CEA continued the principle that had been established during the writing of CSV, namely that all writers and editorial board members would be paid an honorarium and make no further personal claims for subsequent royalty payments arising from sales of the forthcoming book.

The first few years of CEA's existence were thus fully concentrated on ensuring the successful publication of the text 'Chemistry: Key to the Earth' (CKE) – indeed that publication appeared, at that time, to be the sole reason for CEA's existence. The plan was to time the release of the new text to coincide with the initial introduction of the new VISE-approved chemistry syllabus, in 1979. In order to allow for some trialling of the new text, a draft edition was released for use in a limited number of schools in 1978. This edition was printed on A4 paper and appeared as a large thick paperback, affectionately named 'The Telephone Book'.

The only glitch in the timing of final production was a copyright scare, when it was pointed out during 1978 by a teacher that several pages in 'The Telephone Book' bore a too-close comparison to several pages of a chemistry text already in existence and in limited use within Australia. Short-term panic ensued, particularly from MUP, and the decision was swiftly made to remove or rewrite the offending pages; issues of copyright breaches can be particularly embarrassing for both publishers and authors. In retrospect, it is possible that this problem was due to an accidental oversight by an inexperienced author. In any event, it was agreed by both the Editorial Board and MUP that all material provided by that author be omitted from the final version of CKE and all concerned had the good fortune to be able to correct a potentially embarrassing error before the publication of the final edition, which appeared on time in early 1979.

The book was officially launched on the 4th of May 1979 at Clunies Ross House, at a function hosted by Dr. Ivan Wilson, the Chair of the VISE CSC. The new VISE Year 12 chemistry syllabus was introduced in all Victorian schools in that year and remained in place, with minor alterations, until 1991. As is common with books of this nature, the experiences from its first year of use in schools uncovered a modest number of errors and obscurities. The editorial board was able to quickly amend the original text so that, by the time a second printing became due, it came out in 1982 as a 2nd edition that continued unchanged until the general use of the book by students in Victoria ceased at the end of 1991.

The new VISE-approved chemistry syllabus also included a set of Options, the purpose of which was to provide some long asked for freedom for teachers and students for at least a component of the course that could be teacher assessed. Options were approved by the Options sub-Committee of the CSC, and CEA began to provide financial support, as needed, to individuals prepared to write appropriate Options. The preparation and distribution of Options quickly became an area where CEA successfully collaborated with the Science Teachers' Association of Victoria (STAV), with CEA providing some source funding for the printing and STAV attending to the distribution of the Options, again with both organizations sharing the profits. A listing of Options approved and used during the 1980s is given in Appendix 6.

One characteristic of the 1979 syllabus as compared with the previous VUSEB syllabus was a reduced importance of the need for students to write up detailed laboratory reports; indeed the new syllabus had only a general requirement to conduct laboratory work and did not provide a detailed practical syllabus. Unfortunately, this aspect of the syllabus led to some uncertainties for teachers. Initially, many teachers used a 'pilot edition' practical manual, based on part of the previous CSV practical manual and enhanced with the inclusion of some additional material on gravimetric and volumetric analysis. However, since practical work was still a required component of the syllabus, many teachers were calling for the writing of a completely new practical manual. The CSC therefore asked the CEA to examine the possibility of preparing a completely new practical manual for Year 12 Chemistry.

Since the practical content of the syllabus was not closely defined, it was decided that any new practical manual should be a resource book from which a teacher could select a small group of experiments that could be freely copied as required and given to students. In early 1980, CEA agreed to provide some funding and invited Doug Moody to take the role of chief writer and editor of a new chemistry practical book. Writing was slow, since Moody remained a full time Senior Teacher at East Doncaster High School for the term of the project. Assistance was obtained from Michael Creek, also a chemistry teacher at East Doncaster, but completion was only possible when Moody was able to consume four months of his long service leave and complete the book in late 1985. Publication and distribution was organized in conjunction with the STAV, with profits to be shared between STAV and CEA.

The other important role for CEA in those early years was as a supporter of in-service training of chemistry teachers, initially by contributing some funding to the annual STAV Chemistry Teachers' Conference. CEA began to help with support for refreshments for teachers, underwriting the Conference against loss, and by assisting in both the organization and funding of some key speakers. These Conferences were, in general, very well attended by chemistry teachers, and members of the CEA and CSC were always involved in their organization. They were usually held at Monash University, where Ian McKinnon played a key role over many years in ensuring that they ran in a consistently efficient fashion.

3. CEA management

The original Deed of Trust specified that, of the five trustees, two should be practising secondary teachers, one a practising tertiary teacher and one of the other two a graduate

chemist. In the early years, this was taken to mean that three of the trustees should be secondary teachers of chemistry and the other two tertiary chemistry teachers. Furthermore, it was also agreed that there should be a regular turnover of the trustees. Consequently, following nearly four years of management by the five original trustees, they were all replaced, one at a time, over the five years from 1980 to 1984. The last of the original trustees to leave was Peter McTigue who was replaced by Peter Tregloan, who took over in 1985 as Secretary/Treasurer.

This new team of Chris Commons, Ron Dickson, Doug Moody, Bob Ross and Peter Tregloan, quickly began to modernize CEA's management, first by replacing handwritten accounts with a computer-based system and then, in 1986, by moving to establish the incorporation of CEA in order to protect the trustees from the danger of legal liability. Thus, 'CEA' became 'CEA Inc.' in 1987, with a Committee of Management of six but without any change to the Association's aims and objectives. It later transpired that, in order to ensure CEA Inc.'s tax-free status was secure; a further constitutional change was required. That was finally resolved in 1991 following discussions with the Taxation Office that led to a change in the wording in item 32 of the Constitution. A complete listing of the members of the CEA Committees of Management (or Trustees from 1977 – 1985) is given in Appendix 7.

During these early years, membership of CEA remained low. Notwithstanding CEA's annual support and collaboration in STAV's statewide chemistry teachers' conference, and its central role in support of student teaching materials, few teachers felt the need to join the CEA. It was only after many years of regular publicity at teachers' conferences, and finally the introduction of CEA's own website in 1999, that numbers finally began to climb significantly. It is important to recognize that increases in CEA membership were not intended or designed to provide a source of money from membership dues (initially $1.00 per year and, later, a flat $10 for life membership). The primary intention was always seen as engaging teachers and academics prepared to help in supporting CEA's aims and objectives to *'... promote the study and general knowledge of chemistry at the secondary education level.'* Some membership figures are shown in Figure 1. Note the quite small initial rise – to about 50 by 1990 – and the much greater increases to over 200 in the early years of the 21st century.

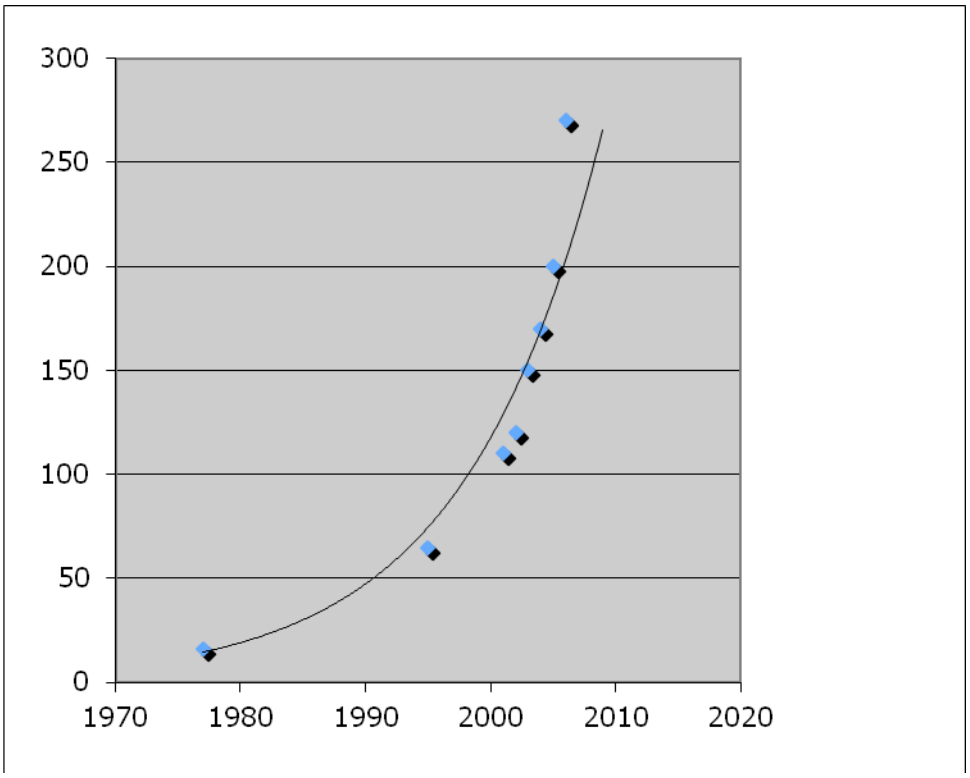

Figure 1: CEA membership numbers, 1977 - 2006

CEA's close association with the CSC that had given it birth initially survived the changes brought about by the new State Government, elected in 1982. Indeed, the relationship with the CSC continued until individual subject standing committees were finally eliminated by 1990. However, the Government-initiated changes that led to the abolition of single subject standing committees, also inevitably helped to develop the strong independence of the CEA Inc. in the 21st century. Primarily because of the breaking of this informal link with a subject committee, CEA found itself decoupled from any particular government or University body. CEA was thus fully free to act as a strong and fully independent supporter of the discipline of chemistry on behalf of all students and teachers in secondary schools.

The ability of CEA to behave independently was also due to its ownership of significant funding from the royalties fund remaining from CSV and the now ongoing accumulation of funds from the sales of CKE. Although CKE was not a 'prescribed' text for students – indeed it described itself as a 'source book' – it was at first the only suitable text available in the early years of the 1980s. Other texts became available later in the 1980s, but CKE always remained the dominant text on the HSC Year 12 chemistry market. Finally, following further major syllabus changes in the early 1990s, CEA became writer and owner of new popular chemistry texts, Chemistry One and Chemistry Two, ensuring the continuation of a regular royalty fund 'feed'. Funds available to the CEA from 1979 to 2002 are shown in Figure 2.

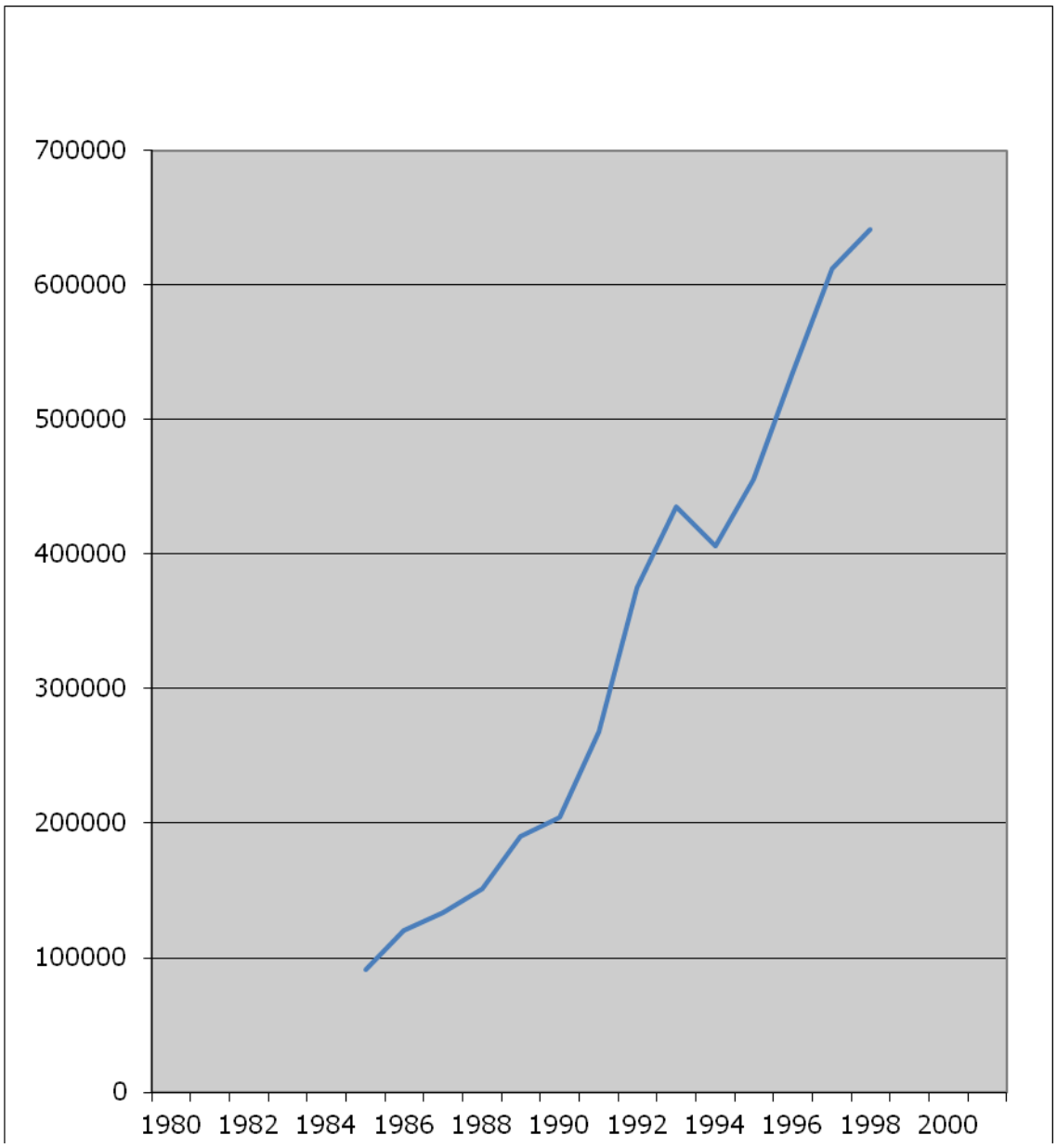

Figure 2. Growth of CEA funds, 1979 to 2002. Major contributions to the funds came from the sales of CKE during the 1980s and by the sales of Chemistry One and Chemistry Two from 1991 onwards.

4. The birth of VCAB – Chemistry One and Chemistry Two

The 1980s brought in some dramatic changes to the educational environment in Victoria that followed the election of a Labor State government in 1982. VISE had been conceived and introduced by a Liberal government under Premier Dick Hamer and Lindsay Thompson, the Minister of Education. The changes brought about by VISE represented a significant switch from University control of education in the final years of secondary schooling to a more

collaborative control involving secondary school teachers, the Universities and Government. In practice, however, the changes were modest in their effects on education and it is probably fair to assert that they were driven primarily by the political pressures generated by the rapidly increasing numbers of students swelling the final school years. It was in this environment the CEA began it operations as an independent body, but one nonetheless closely aligned to a state government chemistry subject committee.

Things began to change following the election of John Cain's Labor government in 1982, where a series of Ministers of Education became committed to a 'root and branch' reform of the final years of secondary schooling using modern educational principles. In 1983 the new government asked Jean Blackburn to conduct a public enquiry into Victorian senior secondary education. Her report was published in 1985 and provided the ideological blueprint for the formation of The Victorian Curriculum and Assessment Board (VCAB), formally created in 1986. Under the leadership of Peter Hill, VCAB began the creation of the Victorian Certificate of Education (VCE), which was finally introduced into schools at Year 11 in 1991 and Year 12 in 1992. The control of secondary chemistry was removed from a dedicated chemistry subject committee and placed in the hands of a general science committee, the Science Field of Study Committee (FOSC), which controlled six different science study areas. The major aims of this change were to

- emphasise the importance of educational principles in the Science subject areas
- stress the relationship between science and technology
- help improve the understanding of the role of science in the wider community
- minimize, where possible, the often confusing overlapping of topics that are sometimes taught differently in different related disciplines.

Accordingly, all the science studies were required to use a science/technology/society approach in their teaching. All science studies were helped by an advisory discipline-specific sub-FOSC, but all decisions were ultimately in the hands of the FOSC.

In 1987, the Science FOSC selected three writers with expertise in both education and chemistry, to develop a completely new two year Chemistry Study Design, to be used over Year 11 and Year 12. Each of the writers was seconded to VCAB part-time from his or her 'home' institution. They were:

- Associate-Professor Ian Rae from Monash University, for two years on a 0.2 contract
- Kerrie Mullins-Gunst, a lecturer from the Melbourne College of Advanced Education on a 0.8 contract
- Robert Sanders from Sunshine Secondary College, on a 0.5 contract

Ian Rae and Kerrie Mullins-Gunst left the project during 1988 and were replaced by Carolyn Elvins from Presbyterian Ladies' College (PLC) on a 0.5 secondment. Carolyn Elvins then joined Robert Sanders in order to continue and complete the Chemistry Study Design. At this point, the CEA intervened. Keen to ensure that the new course and its development was well resourced, the CEA Management Committee contacted VCAB with an offer to fund an increase in Carolyn Elvin's time fraction from 0.5 to 0.7; this offer was accepted by both VCAB and

PLC. The final version the Chemistry Study Design was published in March 1990 and the accompanying 'Course Development Support Materials' in May 1990, both then ready for the first implementation of the VCE (at Year 11) in 1991.

Despite the significant financial assistance given to the project from CEA, the CEA had no 'special relationship' with VCAB for the writing of any new teaching materials to support the new Study Design. Indeed, the relationship of CEA with VCAB was quite different from its previous cosy relationship with VISE. When, in 1977, the call had come to produce CKE to support a new chemistry course, CEA was created to do just that job. But when, in 1988, VCAB decided to produce a new Chemistry Study Design, it had no particular source in mind for the production of any teaching materials that might be needed. Nonetheless, CEA had the contacts with significant teachers who clearly understood the aims behind the new Chemistry Study Design. Further, from its experience with the previous CKE project, CEA had the professional contacts and the money, so that it could readily initiate the writing of new texts suitable to accompany the teaching and learning of this new course.

Having decided to 'take the plunge' CEA took some considerable time to decide on a commercial publisher. A contract was finally exchanged with Heinemann Publishers in late 1988 after negotiations between the President, Chris Commons, acting for the CEA, and Louise Rice acting for Heinemann. There was a series of planning meetings in 1988 and 1989 involving Chris Commons, Carolyn Elvins, John Gilson, Nicole Lukins, Doug Moody, Ian Rae and Peter Tregloan. This group, acting in regular collaboration with Heinemann, guided the project through its developmental stages and determined the general format of the two texts.

Cooperation with VCAB was established and a writing team of experienced teachers was then put together, with CEA providing initial funding for the project in return for the agreement that royalties be shared between the authors and the CEA. Carolyn Elvins was the leader of the writing team and editor of Chemistry One, while Chris Commons was the leader of the writing team and editor of Chemistry Two. All members of the writing teams, together with details of their contributions, are set down in Appendix 8. The Year 11 text, Chemistry One, was published in late 1990 and Chemistry Two, the Year 12 text, in 1991. They were both ready to be used in the State's classrooms as the new two-year Victorian Certificate of Education (VCE) finally replaced the Higher School Certificate over 1991 and 1992.

Reflecting the philosophy of the VCAB study design, the two books introduced chemical principles by first attempting to engage students' interest with descriptions of everyday materials and processes. Chapters were short to allow students to complete topics quickly and care was taken to ensure the reading level was as accessible as possible. Unlike its predecessor, 'Chemistry: A Key to the Earth', both texts focused only on the topics in the study design. Chemistry One and Chemistry Two were amongst the first locally produced student texts to be printed in full colour throughout, with many photographs, diagrams and margin annotations.

The writers of the student texts also prepared Teacher Resource Books for both Years 11 and 12. These books included a range of experiments suitable for each topic (60 experiments were provided in the Year 11 text and 69 in Year 12), teachers' guides, answers to longer questions from the texts and a range of extended and demanding exercises for students.

It is worth noting that the CEA's decision to embark on this book-writing project was not without risk. Unlike the situation prevailing when CKE was written in 1977, these new texts in the late 1980s would have no special relationship with the government body that was authorizing the Study Design and all the relevant examining. Thus the CEA Committee, with the help of its Treasurer Peter Tregloan, had quite conservatively based their financial planning of the project on an expectation that it would take three years to recoup the money invested in the project. Upon the publication of the books, this expectation was quickly found to have indeed been conservative. The texts were highly popular with teachers, capturing over 90% of the market in their first year and they remained the highest selling VCE text books in the years that followed, despite eventual competition from other texts. Both the CEA student texts were reprinted with minor corrections in 1991.

5. Other new ideas

During the 1980s, CEA was almost fully involved with the development of teaching materials for Year 11 and Year 12 students and their teachers. However, even as early as mid-1982, the trustees were considering other ways of fulfilling the aims and objectives of the association.

One immediate outcome of these early discussions was an attempt to make some contributions to the chemistry taught in Junior Science at Years 7 - 10. Initially there were consultations with the Royal Australian Chemical Institute (RACI), the VISE CSC and the STAV. This evolved in 1984 into a joint Planning Committee with STAV, examining the possibility of preparing new teaching materials or teaching aids, but these early attempts of develop Junior Science materials were not pursued.

Another initiative was followed when teachers, at the 1983 Chemistry Conference, were surveyed to find out what additional resources they would like for teaching senior chemistry. They indicated that a compilation of demonstrations suitable for classroom use and also videos to support some of the Options were most needed. As a consequence, a video describing the analytical techniques for the Option 'Analysis with a Purpose' was developed by Bob Ross with the support of CEA. The other outcome from the 1983 Conference was the initiation of a laboratory demonstration book, supported in 1985 by the CEA Trustees, using material collected from over 130 teachers. Teachers were invited to submit written descriptions of their favourite demonstrations. The demonstrations were trialled independently, assessed and collected together. Marlene Bevan trialled and improved many of the demonstrations and corrected many of the original manuscripts. Finally, Chris Commons and Bob Hogendoorn edited the material into a format suitable for classroom presentation. The resulting book was published by Heinemann in 1990 and reprinted in 1993, this time with CEA acting as the publisher. Many of the demonstrations from the book were later included in the Chemistry One and Chemistry Two Teacher Resource and Assessment Books that were published in 2006. Teachers contributing to the material in the original demonstration book are listed in Appendix 9.

Chapter 3

Maturity: 1991- 2002 and beyond

Introduction of the VCE; from VCAB to VBOS to VCAA. E-learning, the CEA website and ChemCal. The CEA Project Officer. Chemical educator awards; travel awards for teachers and tertiary student scholarships.

1. Introduction of the Victorian Certificate of Education (VCE)

The VCE, introduced over 1991 and 1992, brought with it dramatic changes to the teaching and examining for Year 11 and Year 12 chemistry students. All science studies were now described, not by a syllabus, but by a 'Study Design', the application of which was to be guided by focal questions. The focal questions were designed to direct teachers and students to take account of the science/technology/society (STS) requirement; it was intended that all assessment be clearly engaged, where possible, with the intent of these focal questions. The study of chemistry was covered by two units (Units 1 and 2) in Year 11 and another two units (Unit 3 and Unit 4) in Year 12. In all six science Studies (chemistry, physics, biology, agricultural and horticultural studies, environmental science and psychology), assessment in Year 12 was by three Common Assessment Tasks (CATs), designated as CATs 1, 2 and 3. CAT 1, which tested the material of Unit 3, was taken in June; CAT 3, which tested the material of Unit 4, was taken in November. CATs 1 and 3 were both externally set and assessed, while CAT 2 was school assessed. The tests for CATs 1 and 3 were both of 90 minutes duration, so that the total of 3 hours of external assessment was equivalent to the single three-hour November external exam that had been normal for the VISE chemistry exam.

The introduction of the VCE in Year 12 in 1992 was followed less than a year later by Victorian State elections that saw a landslide victory for Jeff Kennett's Liberal Party. The new Education Minister was Phil Gude and he set in train a series of changes to the final two years of secondary schooling, including the replacement of VCAB by the Victorian Board of Studies (VBOS); VBOS replaced VCAB in 1994. While various changes were made for Year 11 and 12 studies over several years, the general structure of the original VCE remained effectively intact. Despite the apparent ideological differences between the Kennett government and its predecessor, the alterations were in the detail rather than in the overall structure. The new VBOS version of the VCE that was in place in 2000 still retained the same general structure of the original VCAB version of the VCE: a two year credential of four Units with two external tests in Year 12 together with a school assessed component. Some of the most obvious differences lay in the names used. For example, in 2000, the term 'examination' replaced the term 'common assessment task' on all Year 12 test papers while CAT2 was replaced with a 'School Assessed Task' (SAT). This basic structure continued with little change following the election of the Steve Bracks Labor government in 2000 and the subsequent replacement of VBOS by the Victorian Curriculum and Assessment Authority (VCAA) in 2001.

The first editions of Chemistry One and Chemistry Two were published to coincide with the initial introduction of the VCE; Resource Books for both texts were also prepared as an aid to teachers at the same time. By early 1991 over 16 000 copies of Chemistry One had been sold and by early 1992 over 12 000 copies of Chemistry Two, together with over 1000 copies of the accompanying Resource Books. Early plans for second editions of the texts, including the inevitable corrections and clarifications, were quickly prepared but final revisions had to be delayed until the forthcoming re-accreditation process, instituted by VBOS, had been completed. As a short-term alternative to a second edition, a 16-page supplement for Chemistry One was prepared by Bob Ross and distributed by the publisher.

Demand for the Demonstration book, originally published by Heinemann in 1990, was insufficient for the publisher to continue supporting it. In response to requests from teachers, CEA agreed, in 1994, to continue the publication from its own resources with advertising and sales carried out through the STAV. The book thus continued to be used by teachers as a source of safe, interesting and educationally relevant demonstrations that supported student understanding of many important chemical concepts. By the end of the first decade of the 21st century, all copies had been sold and the book was, by 2010, 'out of print'.

The second editions of Chemistry One and Two were published in 1994. Third editions of both books were planned in 1998, taking the opportunity of correcting all residual errors and, more importantly, improving and extending those study areas where there had been modifications to the Study Structures. Both third edition texts were released in 1999. Publication dates of all editions of these books up to 2010 are given in Appendix 10.

The completion of the major productions of Chemistry One and Chemistry Two at the beginning of the 1990s left the CEA with a regular royalty source with which to fulfil its role as a supporter of chemistry teaching in schools. The time for the writing of new major chemistry paper-based texts seemed to have passed, at least for the immediate future. It followed that, in the early 1990s, there were many discussions in the CEA Management Committee about how best to use its now growing funds. The existence and role of CEA was still not widely known or understood, even among chemistry teachers, and there was clearly a need to improve the effectiveness of its advertising. One obvious source of publicity among teachers had always been through the annual Chemistry Conference, organised by the STAV. CEA thus continued to support this activity by providing help in arranging suitable keynote speakers and by supporting for STAV's annual Science Talent Search Prize. Another important service was support for annual 'question and answer' sessions between Year 12 chemistry examiners and teachers, both during the annual teachers' conference and on other public occasions.

Important as the Chemistry Conference support was, it was only a once-a-year opportunity and further CEA support activities were needed. The Committee of Management thus began to 'try its hand' with a range of grants and activities, both large and small, with which to support both teachers of chemistry and their students. Some of these activities have now been developed into major programs, particularly centering on the late 20th century global shift into the use of the internet for modern teaching and learning. Other

activities were aimed at supporting awards and sponsorships for both teachers and students – in some cases as 'one offs', in other cases as regular or semi-regular commitments. The more important of these developments are now described in some detail, while others are noted in appropriate Appendices. Updated information may always be found on the CEA website at www.cea.asn.au/

2. E-learning and the internet

By the closing decade of the 20th century, most educational institutions worldwide were becoming seriously interested in the use of computer aided learning (or E-learning) to provide additional teaching and learning support for both teachers and students. Early work in this field began, first in the United States as long ago as the 1960s, on main-frame computers. Initially this E-learning generally took the form of on-screen information followed by testing in the form of multiple choice questions which could be readily scored automatically. By the 1990s, dramatically increasing improvements in the cost, speed and capacities of computers were making personal computers both cheaper and much more powerful. This led to important increases in the range and sophistication of the teaching and testing styles available. In 1994, CEA began to develop an item bank, based on the multiple choice questions from past CAT tests, with copyright provided by VBOS. Then, along with the rapid improvement in the cost, speed and capacities of personal computers, CEA began to share in the development of some of the more sophisticated computer-based tutorials that were then being developed within the Chemistry School of the University of Melbourne. This work had begun during the late 1980s and, by the early 1990s, was being increasingly used to provide tutorial help for University first year chemistry students. The original concept was developed by Paul Fritze, a physicist, who was Head of the Melbourne Chemistry School's electronics workshop. The interactive teaching program developed by Fritze was initially developed for Macintosh computers using the Hypercard software package. Early material trialled within the Melbourne Chemistry School had proved so successful that Peter McTigue and Peter Tregloan, both chemistry academics at Melbourne, collaborated with Paul Fritze and others to extend and expand the system with the aid of two successive Federal Government funded Computer-Aided University Teaching (CAUT) grants in 1993 and 1994.

It soon became apparent that ChemCal, as this new system came to be called, could have a useful role in chemistry teaching at the secondary school level. In December 1993, Peter McTigue, Bob Hogendoorn and Robert Sanders proposed that CEA should support a joint CEA/Melbourne University project to develop chemistry teaching software for use in secondary schools, using the ChemCal model. Preliminary agreement with the University, including copyright agreement, was finally reached in late 1994. Originally, ChemCal was in the form of software that was delivered from individual Macintosh desktop computers and planning began to produce all materials on both Mac and PC format. However it became quickly apparent that, to become a successful commercial product suitable for widespread use in schools, the material needed to be deliverable over the rapidly-growing internet. Consequently, work soon began on the conversion of stand-alone personal computer tutorial packages, into a form suitable for internet delivery.

Thus, in late 1996, Peter Tregloan and Ian McKinnon, a Monash University academic, recommended that a CEA website be created. The intention was for the proposed website to have a three-fold purpose, to:

- provide a vehicle for the CEA to become better known
- act as an information source for chemistry teachers
- allow the delivery of ChemCal materials to chemistry students

The work on the website was carried out under Peter Tregloan's direction by Matt Coller, a Research Fellow in the Melbourne University Chemistry School. By mid-1998, Tregloan was able to demonstrate the new draft website to the Committee and a first 'official' version was demonstrated about a year later on a University of Melbourne server.

The arrival of the CEA website provided the major impetus to appoint, in 1999, a part-time Project Officer to take responsibility for its maintenance. The Project Officer began work with Tregloan and Coller, managing CEA's home page and helping in the development of the Year 12 internet version of ChemCal. A ChemCal module on chemical bonding, suitable for VCE students, finally went online on CEA's website in 2004, ten years after the original joint project with Melbourne University had been initiated. By this time, satisfactory *in principle* royalty agreements had been reached between the University and all other interested parties. ChemCal remained on the CEA website for a further 2 years, managed by Peter Tregloan along with his management of the Chemistry School's own ChemCal modules. Then, in 2005, Robert Sanders suggested to Heinemann Publishing that CEA and Heinemann jointly fund development of three additional ChemCal modules for schools on Atomic Structure, Equilibrium and Stoichiometry. Heinemann would use its technical computing expertise and CEA would provide the writers and chemical content for the project. In 2006, the University of Melbourne, Heinemann (by then Hartcourt) and CEA collaborated in the adaptation of ChemCal Online for the purposes of producing the modules. Harcourt, by now Pearson Publishing, now hosted and administered the ChemCal site with royalties going to Melbourne University and CEA. CEA's own website has continued to be managed by the CEA Project Officer and is still maintained on one of the University's servers.

3. The CEA Project Officer

The original proposal for a CEA support person, or Project Officer, was put forward by Peter Tregloan and David McFadyen, a Melbourne University academic, in 1998. The widening range of CEA activities had long been putting increasing pressures on members of the Committee of Management, all of whom were appointed in an honorary capacity, and all of whom had full time jobs. The Management Committee therefore agreed to fund a joint Melbourne University/CEA appointment of a person who would be able to contribute to the teaching of first year University chemistry as well as service the needs of the CEA. David McFadyen played a major role in negotiations between CEA and the University's Chemistry School. Agreement was reached with the Chemistry School for such an appointee, who

would be 80% funded by the University and 20% by CEA. It was agreed that the appointee would spend 20% of time working on CEA matters – effectively for one day a week. In addition to the CEA website responsibilities, there were ongoing needs for organising regular CEA functions and other activities.

The position was publicly advertised and applicants were subsequently interviewed by members of both the Chemistry School and CEA. Finally, Bob Charlesworth was appointed as the first CEA Project Officer in early 1999, seconded from his role as Head of Chemistry at University High School. During his term of office, Bob Charlesworth initiated a survey examining the use of practical work in Year 12 chemistry; he also took a major role in establishing the regular 'November Lectures' series for secondary teachers and introduced the on-line delivery of multiple choice questions.

In 2005, Bob Charlesworth retired as Project Officer and was replaced by Penny Commons. She was an experienced chemistry teacher whose previous position had been at Southwood Boys' Grammar and she continued with all the work started by her predecessor. The role of the Project Officer has continued to expand and now includes helping organize the annual STAV Chemistry Conference. Interactive workshops have been added to the November Lectures, allowing teachers to enhance their knowledge of chemistry techniques. The CEA website has been further updated to give teachers and students better access to information about professional development activities, past exam papers and other relevant resource materials. The Project Officer has also organized workshops for teachers on topics of interest and introduced a series of lectures to help prepare Year 11 students for competition in the National Qualifying Examination for the Chemistry Olympiad.

4. Activities and awards for teachers

***Chemical Educator Award*.** Following a proposal put forward by John Gilson, the CEA Management Committee agreed, in 1993, to provide an award for individuals who had made outstanding contributions to chemical education in Victoria. The first award was presented to Ken Mappin in 1994 and the award has continued annually since that time. The appropriateness of this first award looks even more striking in retrospect, bearing in mind the obvious effectiveness of the structure of the CEA. There is no doubt that Ken Mappin was indeed the 'father' of the CEA and this was publicly acknowledged in his obituary in 'The Age' newspaper on 14/10/2010, which included the following:

'…from the early 1960s, he was a member of the Victorian Universities and Schools Education Board's chemistry standing committee and was elected chairman over the final two years of existence – the first and only secondary teacher to fill that role. He was instrumental in establishing the Chemistry Education Association, and served on the original committee of management from 1977 until 1982. He was the first of the CEA's chemical educators when the award was established in 1994 and also served with the Volunteers for Isolated Students' Education. In 1979 he was inaugural chairman of the VISE accreditation committee and later awarded life membership of the Science Teachers Association of Victoria…'

Of the eighteen awards given by 2010, seven were to tertiary academics, including Professor Peter Fensham, a world renowned chemical educator who had played a major role in the development of the new science courses in Victoria following the acceptance of the 1985

Blackburn report into senior secondary education. Of the other eight awards, five were to teachers from public schools and seven from the private school sector. Since 2000, the Annual Dinner of the CEA has been held on the evening of the final VCE external examination in chemistry. All CEA members are invited to attend this annual dinner and be present as the Chemical Educator of the year is announced. Chemical Educator awards from 1994 to 2011 are given in Appendix 11.

Teacher Awards. Simultaneously with his recommendation about the Chemical Educator award, John Gilson also recommended, in 1993, that CEA support a scholarship allowing a Victorian chemistry teacher to attend a suitable educational conference. The aim of this scholarship was to reward teaching excellence and to further improve the skill levels of Victorian chemistry teachers. The first scholarship was offered for attendance at an international conference in New Zealand in 1995; applications were requested and the first CEA Teacher's Scholarship was won by Robin Kronenberg. The second Scholarship, in 2000, was awarded to Elissa Huddart to attend the CONASTA Conference in Perth. In later years, other types of award for teachers were offered as alternatives to the travelling scholarships. An updated list of the various recipients is given in Appendix 12.

Support for Trainee Teachers and the Formation of the ECCN. In 1998 a Trainee Teachers' Forum was organized to introduce the CEA to Dip. Ed. students taking chemistry method in the State's Universities. This was of limited success and the event morphed into an annual cocktail party for Graduating Chemistry Teachers between 1999 and 2009**.** This took the form of a small party that included a short lecture from a well-known teacher of chemistry, speaking on why they loved teaching chemistry. Then, in 2010, a new group was formed, the Early Chemistry Teachers' Network (ECCN). This grouping is designed to support teachers new to chemistry teaching. Its hold functions where new teachers can meet and gain advice from both fellow ECCN members and from experienced teachers who can act as mentors.

In Service Education (ISE) and the Regular November Lectures. In 1994 a series of in-service seminars for chemistry teachers were advertised by CEA through the VBOS bulletin. They were held in a small number of private and public schools and offered by CEA members, with modest financial support from CEA. After a few years, these activities were extended to an annual in-service day available to all secondary chemistry teachers. Beginning in 1996, lectures and demonstrations were offered by tertiary teachers, and held in University facilities outside University semester times. These lectures were usually aimed at presenting and explaining recent developments in Chemistry that were judged to be of interest to teachers. Lectures were often designed to help the understanding of the more recent topics that had been added to the Chemistry Study Structure. By the year 2000, these lectures had settled into a regular annual series of 'November Lectures' normally held at The University of Melbourne.

Resource Material for CAT2 and SATs. The VCE chemistry course of the 1990s required students to complete the internally assessed assignment, known as CAT 2. Teachers in country areas were asking for assistance in the management of CAT 2 and, in 1997, Ron Bennett spent a week travelling to selected country areas to offer such advice. In 1998 the new CAT 2 Chair, John Maher, continued to help teachers and went to three country venues. CEA paid all associated costs for these visits until CAT 2 was terminated with the arrival of School Assessed Tasks (SATs) in 2000. In preparing for SATs, teachers had the responsibility of preparing their own materials but there was no forum available for collecting and sharing of ideas. Robert Sanders suggested a program modelled on a scheme similar to one that had been used for the preparation of the earlier Demonstration book. This new scheme came to be called the 'Implementation Kit' and Pat O'Shea agreed to act as its editor. CEA provided O'Shea with a mailing list together with some clerical support; he then approached the task of urging teachers of share ideas by describing samples of tasks that they had themselves developed. The principle was *'you will only receive feedback if you contribute samples in the first place'.*

5. Support for chemistry students

CEA's most obvious support for students has been its financial backing of the publication of the two major texts, Chemistry One and Chemistry Two. However, other opportunities for student support were tried and developed during the 1990s and 2000s. The most important of these were:

VCE Summer Schools. In 1995 the decision was taken to use available ChemCal material as the basis of a Summer School for VCE students. These Summer Schools were suggested by Peter McTigue but were offered for two years only, in 1996 and 1997. They were held in January and aimed at students about to begin Year 12 chemistry (Units 3 and 4). Lectures were given and students used the computer laboratory in the Chemistry School at the University of Melbourne for the ChemCal sessions. Although those attending appeared to find the experience useful, comparatively few seemed prepared to give up their vacation time (fewer than twenty booked for the 1997 session). It was therefore concluded that CEA's efforts were being expended on too few students and this initiative was abandoned.

Tertiary Student Scholarships. This scholarship, suggested by David McFadyen, was created in 1999 to support students of chemistry planning to become secondary teachers. The first award was made to Chris Lee in 2000. However, this scheme was discontinued in 2008 since it turned out that most of the recipients did not go on to teach chemistry in secondary schools. The focus of the scholarship was thus changed to support tertiary students who had already decided that teaching chemistry would be their vocation. The scholarship was therefore aimed at Chemistry Pre-Service teachers and was renamed 'The Ken Mappin Beginning Teacher Prize'. Appendix 13 provides a list of the recipients of these student awards.

Chemical Murder Mystery Project. This project was initiated and developed by Richard Morrison, a Monash University academic, and other staff from Monash University's

Department of Chemistry. The Project was aimed to encourage Year 10 students from all Victorian schools to continue their science education studies at senior secondary and tertiary levels; it was funded by the CEA, the Royal Australian Chemical Institute and Monash University. In 2000, CEA agreed to fund the travel of several hundred rural and isolated students to attend the Murder Mystery. The mystery began with the discovery of a dead body in the Monash University Chemistry Department. Students were provided with a 'forensic kit' including results obtained from appropriate chemical analyses taken from items found at the 'crime scene'. Short seminars and hands-on laboratory sessions provided students with all the information needed to solve the mystery. Students then discussed the results in small groups before finally presenting their conclusions at the suspect's 'trial'.

The Ozone Project. In 1998, Robert Sanders recommended that the CEA support the Ozone Monitoring Project by becoming a sponsor, with the aid of a $2000 grant. The project fitted well with the Unit 2 'Chemistry in Everyday Life', Area of Study: The Atmosphere' and addressed the Focal Question: 'How do we interact with the atmosphere?' The project engaged students in monitoring both stratospheric and troposphere ozone levels. In the original version of this project, all results were transmitted to a central database in Boston, USA for the Global Lab Project. When this initial project finished, Robert Sanders and Melinda Tuckfield from Sunshine Secondary College continued to run the project within Australia. It expanded using a grant from the Directorate of School Education and at its peak about 50 schools were involved from around Australia. A website was established and all the results were posted on the site.

6. Future activities

The most important activities of the CEA during the 1990s and the early 2000s were the:

- publications of Chemistry One and Chemistry Two
- development of the CEA website
- introduction of ChemCal online
- appointment of a CEA Project Officer in association with the Chemistry School at Melbourne University.

In addition to these major activities, all detailed in this chapter, CEA has supported dozens of smaller but significant 'one-offs' as it supports chemistry teaching in all secondary schools. A list of most of these is given in Appendix 14.

It is clear that the 1990s were a period of growing self-confidence for the Association. By 2010, CEA had become involved in preliminary discussions on the development of a new Australia-wide chemistry course for a proposed national curriculum. CEA's role as a supporter of chemistry teaching may be about to be extended Australia-wide…

Appendices

Appendix 1

Foundation members of the Chemistry Education Association, all present at the meeting in the offices of the Victorian Universities and Schools Examination Board at 4.40 pm on 31st March, 1977. The resulting Deed of Trust (Appendix 5) was signed by all the following on 1st June, 1977.

Dr. John Bagg	Dept. Of Industrial Science The University of Melbourne	University lecturer
Mr. Ted Clarke	Syndal High School	Chemistry teacher
Mr. Murray Cropley	Australian Council for Educational Research	Chemistry teacher
Sr. Patricia Crotty	Our Lady of Sion College	Chemistry teacher
Mr. Bob Fox	Carey Baptist Grammar School	Chemistry teacher
Dr. Peter Lewis	Scotch College	Chemistry teacher
Dr. Peter McTigue	School of Chemistry The University of Melbourne	University lecturer
Mr. Ken Mappin	Scotch College	Chemistry teacher
Mr. Peter Mason	Korumburra High School	Chemistry teacher
Miss Anne Meehan	Upfield High School	Chemistry teacher
Mr. Doug Moody	East Doncaster High School	Chemistry teacher
Mr. John Neal	Haileybury College	Chemistry teacher
Mr. Alistair Parkin	Marcellin College	Chemistry teacher
Dr. Mike Redwood	Department of Chemistry Swinburne College of Technology	Chemistry lecturer
Dr. Ivan Wilson	Department of Chemistry Monash University	University lecturer
Mr. Graham Withers	Melbourne Church of England Grammar School	Chemistry teacher

Appendix 2

Editorial Board of 'Chemistry: Key to the Earth'.

Chief Editor & Chairman of Editorial Board:

P. T. McTigue, MSc, DPhil, ARACI
Senior Lecturer in Physical Chemistry, University of Melbourne

Members of Editorial Board

J. Bagg, BSc, PhD, MAppSci, ARCS, DIC, FRACI
Reader in Industrial Science, University of Melbourne
E. A. W. Clarke, MSc, TSTC
Senior Teacher, Synday High School
R. N Fox, DipAppChem, CertEd, ARACI
Chemistry Master, Carey Baptist Grammar School
I. M. Ling, BSc, BEd, TTC, MACE
Senior Master (Teacher and Curriculum Development, Wesley College, Melbourne.
Anne O. Meehan, MSc, BEd
Senior Teacher, Upfield High School
G.. R. A. Withers, BSc
Deputy Headmaster, Melbourne Church of England Grammar School

Appendix 3

Contributing writers of the text of 'Chemistry, Key to the Earth'.

J. Bagg, *University of Melbourne*
E. A. W. Clarke, *Syndal High School*
R.N. Fox, *Carey Baptist Grammar School*
Leila M. Griffiths, *Kildara College*
D. J. Hyatt, *Chadstone High School*
Pauline James, *State College of Victoria*
M. B. Koenig, *Murtoa High School*
P. T. McTigue, *University of Melbourne*
P. A. Marks, *Loreto Convent, Toorak*
Anne O. Meehan, *Upfield High School*
J. A. Neal, *Hailebury College*
P. D. Norman, *State College of Victoria, Frankston*
A. L. H. Smith, *Carey Baptist Grammar School*
D. G. Williams, *Princes Hill High School*
I. R. Wilson, *Monash University*
G. R. A. Withers, *Melbourne Church of England Grammar School.*

Appendix 4

Motions establishing the Chemistry Education Association 31st March 1977, unanimously approved at a meeting of the VUSEB Standing Committee.

The first motion agreed that:

The purposes of the Chemistry Education Association are:

(i) *to establish a fund to promote the study and general knowledge of all branches of chemistry at the secondary education level.*

(ii) *to sponsor and assist the writing of text books and other educational materials and the development of teaching materials in chemistry.*

(iii) *to publish or cause to be published text books and other teaching materials in chemistry.*

(iv) *to promote and assist the professional training of teachers of chemistry by the setting up and organisation of vocational schools, inservice education, conferences and similar activities.*

(v) *to enter into agreements and arrangements with individuals or institutions to obtain written materials for publication and to assist individuals wishing to publish such materials under their own names.*

(vi) *to receive voluntary contributions and apply the same and any profits rising from the aforesaid activities in and towards the furtherance of the above objects.*

(vii) *to receive from each Member of the Association an initial contribution of $1.00.*

The second motion agreed that:

…a trust be set up and that the Deed of Trust produced at the meeting be approved.

The third motion agreed that:

The five initial trustees would be:

Dr P. McTigue, Miss A. Meehan, Mr K. J. Mappin, Dr I Wilson and Mr G. R. A. Withers.

Appendix 5

The original Deed of Trust of the Chemistry Education Association, signed on 1/6/1977

THIS DEED OF TRUST is made the 1st day of June 1977 between the several persons whose names, addresses and occupations are set out in the first schedule hereto (hereinafter called "The Members") of the one part and Kenneth John Mappin, Chemistry Teacher, Anne Olivia Meehan, Chemistry Teacher, Graham Robert Arthur Withers, Chemistry Teacher, Peter Trembath McTigue, University Lecturer and Ivan Robert Wilson, University Lecturer (hereinafter called "The Trustees") of the other part.

WHEREAS the Members at a meeting held at the office of the Victorian Universities and Schools Examination Board, St. Kilda Road, Melbourne on the 31st day of March 1977 unanimously resolved to form themselves into an association called the Chemistry Education Association (hereinafter referred to as "The Association") the purposes and conditions of which are set out in the next following recitals.

(i) To establish a fund to promote the study and knowledge of all branches of chemistry at the level of education;

(ii) To sponsor and assist the writing of text books and other educational materials and the development of courses in chemistry at the secondary level;

(iii) To publish or cause to be published text books and other teaching materials in chemistry:

(iv) To promote and assist the professional training of teachers of chemistry by the setting up and organisation of vocation schools, inservice education, conferences and similar activities;

(v) To enter into agreements and arrangements with individuals or institutions to obtain written materials for publication and to assist individuals wishing to publish such materials under their own names;

(vi) To receive voluntary contributions and apply the same and any profits arising from the aforementioned activities in and towards the furtherance of the above objects:

(vii) To receive from each Member of the Association an initial contribution of $1.

AND WHEREAS

(i) The Association deems it expedient and proper to appoint trustees of the Association;

(ii) That the trustees should be the trustees of the Association;

(iii) That all assets acquired for the purposes of the Association be vested in the trustees;

(iv) That all moneys contributed by the Members and all other moneys accruing to the Association should be vested in the trustees and paid to the National Bank of Australasia Ltd. at its branch situated at the University of Melbourne, Parkville, to an account to be called the Chemistry Education Association Account or such other accounts as the trustees shall from time to time deem it convenient or proper to open in the name of the Association;

(v) That the trusts and the purposes upon and for which the said assets and moneys are and should be vested in the trustees and the rights of the members therein should be set out in a Deed (being this Deed) a draft of which was produced at the said meetings and unanimously approved thereby.

AND WHEREAS

The trustees have duly accepted the office of trustees and have agreed to hold all assets and moneys vested in them as aforesaid upon the trusts hereinafter set out.

NOW THIS DEED WITNESSED AS FOLLOWS;

1. In the interpretation of this Deed unless inconsistent with the subject or context the term trustees means the body of trustees which is constituted by this Deed and which shall be comprised of Kenneth John Mappin, Anne Olivia Meehan, Graham Robert Arthur Withers, Peter Trembath McTigue and Ivan Robert Wilson the survivor or survivors of them or their successors or the trustees for the time being of the trust fund hereby created. The term property means any real and personal property and any tangible or intangible assets or any interest in the same from time to time belonging to or vested in or under the control or management of the trustees or which shall in due course of law be vested in them.
2. The trustees may by all lawful means acquire or receive property and except where special trusts are declared as mentioned below shall apply the same in or towards the furtherance of the purposes and objects they shall do and carry out all matters and things as are likely to promote the objects and purposes of these trusts PROVIDED THAT the trustees shall not be bound to accept property for any of the foregoing purposes or for any purpose unless they shall in their absolute discretion deem it expedient so to do.

3. When property is accepted by the trustees upon special trusts to be declared by the donor all the powers and provisions of this Deed shall be deemed to be incorporated in the Deed declaring such special trusts except in so far as they shell be expressly excluded or modified or be inconsistent with such special trusts.

4. The trustees shall have the following powers:
(i) To pay all expenses and outgoings as may be incurred in relation to the carrying out of the trusts set out herein or from time to time reposed in them;
(ii) To sell, buy, exchange, invest or otherwise dispose of or deal with any property vested ln them or any interest therein as fully as if they were the absolute owners;
(iii) To raise money of the security of the property of the trust fund or otherwise on such terms or conditions as the trustees shall think fit;
(iv) To appoint, employ, pay or dismiss clerks, typists, laboratory assistants or any person for or from temporary or special services as they from time to tire deem necessary;
(v) To engage writers, teachers, printers, publishers or speakers for the purpose of furthering the objects of this trust and to determine their remuneration and the terms and conditions of their engagement;
(vi) To do such other lawful acts and things as are incidental to or conducive to the attainment of the general purposes of this trust.

5. A meeting of the trustees my be held at any time or place. The Secretary shall advise the trustees in writing not less than seven days before the date of the proposed meeting. It shall not be necessary for the trustees to act unanimously but all their powers and all discretions vested in them may be exercised by the majority of those who are present and vote at any meeting. Three trustees shall form a quorum and at least one meeting shall be held each year.

6. Minutes of the proceedings of all meetings of the trustees shall be recorded in a book to be kept for the purpose by the Secretary and shall be signed by the Chairman of the meeting or of the meeting at which the Minutes are read and confirmed. Every such Minute purporting to be signed shall be prima facie evidence of the facts stated in lt.

7. The trustees shall keep an account or accounts at such bank or banks as they shall from time to time determine and cheques shall be drawn signed and endorsed by such person or persons as the trustees shall from time to time direct.

8. The trustees shall cause accounts to be kept in such manner as they think fit of all their receipts credits payments and liabilities and all other matters necessary for showing the true state and condition of their trust. The accounts shall be audited at least once a year by a qualified accountant appointed in that behalf by the trustees.

9. It shall be lawful for the trustees by unanimous resolution to revoke or vary or add to any of the provisions of this Deed so long as such revocation variation or addition is not inconsistent with the general scope of this Deed.

10. The trustees shall name one of their number as Chairman and one of their number as Secretary to hold office during the pleasure of the trustees.
The first Chairman so to hold office IVAN ROBERT WILSON
The first Secretary so to hold office is PETER TREMBATH MCTIGUE

11. The statutory powers of appointing new trustees shall apply to this Deed save and except that at all times unless prevented by circumstances beyond the control of the trustees two of the five trustees shall be practising teachers of chemistry at the secondary level one shall be a practising teacher of chemistry at the tertiary level and one of the other two shall be a graduate chemist.

12. Any moneys (whether consisting of proceeds of sale or income of the trust fund or any part thereof or moneys given to the trustees upon the trusts of this Deed) at any time in the hands of the trustees and not immediately required for any of the purposes aforesaid may be invested at the discretion of the trustees in any investments permitted by law for the investment of trust funds with power to the trustees at their discretion to vary any investment for others of any nature authorised by this Deed.

13. No trustee under this trust shall be liable for any loss not attributable:
(a) To his own dishonesty: or
(b) To the wilful commission by him of an act known by him to be a breach of trust and in particular he shall not be bound to take any proceedings against a co-trustee for any breach or alleged breach of trust committed by such co-trustee.

IN WITNESS WHEREOF the parties hereto have hereunto set their hands and seals of the day and year hereinbefore written.
SIGNED SEALED AND DELIVERED by said Trustees Kenneth John Mappin, Peter Trembath McTigue and Ivan Robert Wilson in Victoria in the presence of: *J.M. King*
SIGNED SEALED AND DELIVERED by JOHN BAGG in Victoria in the presence of: *J.M. King*
SIGNED SEALED AND DELIVERED by EDWARD CLARKE in Victoria in the presence of: *I. Wilson*
SIGNED SEALED AND DELIVERED by MURRAY CROPLEY in Victoria in the presence of: *P. Crotty*
SIGNED SEALED AND DELIVERED by PATRICIA CROTTY in Victoria in the presence of: *Peter T. McTigue*
SIGNED SEALED AND DELIVERED by ROBERT FOX in Victoria in the presence of: *K. Mappin*
SIGNED SEALED AND DELIVERED by PETER LEWIS in Victoria in the presence of: *K. Mappin*
SIGNED SEALED AND DELIVERED by PETER TREMBATH MCTIGUE in Victoria in the presence of: *J.M. King*
SIGNED SEALED AND DELIVERED by KENNETH JOHN MAPPIN in Victoria in the presence of: *Peter Lewis*
SIGNED SEALED AND DELIVERED by PETER MASON in Victoria in the presence of: *M. Redwood*
SIGNED SEALED AND DELIVERED by ANNE OLIVIA MEEHAN in Victoria in the presence of: *Peter T. McTigue*
SIGNED SEALED AND DELIVERED by DOUGLAS MOODY in Victoria in the presence of: *M.C.Cropley*
SIGNED SEALED AND DELIVERED by JOHN NEAL in Victoria in the presence of: *Peter T. McTigue*
SIGNED SEALED AND DELIVERED by ALISTAR PARKIN in Victoria in the presence of: *D.L.Moody*
SIGNED SEALED AND DELIVERED by MICHAEL REDWOOD in Victoria in the presence of: *P. J. Mason*
SIGNED SEALED AND DELIVERED by IVAN ROBERT WILSON in Victoria in the presence of: *Peter T. McTigue*
SIGNED SEALED AND DELIVERED by GRAHAM ROBERT ARTHUR WITHERS in Victoria in the presence of: *I. R. Wilson*

SCHEDULE No. 1
Names of members of association:
John Bagg, Department of Industrial Science, University of Melbourne, University Lecturer
Edward Clarke, Syndal High School, Chemistry Teacher
Murray Cropley, Australian Council for Education Research, Chemistry Teacher
Patricia Crotty, Our Lady of Sion College, Chemistry Teacher
Robert Fox, Carey Baptist Grammar School, Chemistry Teacher
Peter Lewis, Scotch College, Chemistry Teacher
Peter Trembath McTigue, University Lecturer
Kenneth John Mappin, Chemistry Teacher
Peter Mason, Korumburra High School, Chemistry Teacher
Anne Olivia Meehan, Chemistry Teacher
Douglas Moody, , Chemistry Teacher
Alistair Parkin, Marcellin College, Chemistry Teacher
Michael Redwood, Department of Chemistry, Swinburne College of Technology, Chemistry Lecturer
Ivan Robert Wilson, University Lecturer
Graham Robert Arthur Withers, Chemistry Teacher

MARILYN A. PUGLISI, LL.B
Solicitor
Hawthorn

Appendix 6

Approved Options, HSC Chemistry Syllabus, Victorian Institute of Secondary Education

Topic	Title	Author(s)
Topic 1:	Organic Reaction Mechanisms.	P. Marks (Mt Scopus) and A. Meehan (Maribyrnong High School)
Topic 2:	Analysis with a Purpose.	P. Lewis (Scotch College) and M. Redwood (Swinburne College of Technology)
Topic 3:	Preparative Chemistry.	P. Lewis and R. Slade (Scotch College)
Topic 4:	Surface Chemistry –Surfactants at Interfaces.	T.W. Healy and D.N. Furlong (University of Melbourne) and J. Ralston (Gippsland Institute of Advanced Education) Revised by K. Mullins-Gunst (Melbourne CAE) and J. Ralston
Topic 5:	Carbon and Silicon Giant Molecules.	R. Slade and P. Lewis (Scotch College) and M. Redwood (Swinburne College of Technology) Revised by C. Commons (ACER)
Topic 6:	From Minerals to Metals.	N. Gray (University of Melbourne), D. Pollard (SA Institute of Technology) and D. Hyatt (CSIRO Science Education Centre)
Topic 7:	Soil Chemistry.	Sam McCurdy RMIT Technical College
Topic 8:	Coal Chemistry. (Published by the State Electricity Commission)	D. Allardice and A.M. George (SEC), G Perry, Brown Coal Council and C. Elvins STAV
Topic 9:	Bauxite to Aluminum (Published by Alcoa)	K. L. Mullins-Gunst
Topic 10	Chemicals in Electric Fields.	I. J. Rainbow and A. F. Patti. Edited by P. Commons and J. Gilson
Topic 11	The Inorganic Chemistry of the Halogens	C. Elvins and M. Wade (PLC)

Appendix 7

CEA *Trustees (1977 – 1986)* and Committee Members (1987 – present)

Year	Chair/ President	Secretary	Treasurer	Committee Members	Project Officer
1977	*Ivan Wilson*	*Peter McTigue*	*Peter McTigue*	*Ken Mappin* *Anne Meehan* *Graham Withers*	*Not Applicable*
1978	*Ivan Wilson*	*Peter McTigue*	*Peter McTigue*	*Ken Mappin* *Anne Meehan* *Graham Withers*	*Not Applicable*
1979	*Ivan Wilson*	*Peter McTigue*	*Peter McTigue*	*Ken Mappin* *Anne Meehan* *Graham Withers*	*Not Applicable*
1980	*Ivan Wilson*	*Peter McTigue*	*Peter McTigue*	*Ken Mappin* *Anne Meehan* *Graham Withers*	*Not Applicable*
1981	*Graham Withers*	*Peter McTigue*	*Peter McTigue*	*Ken Mappin* *Anne Meehan* *Ron Dickson*	*Not Applicable*
1982	*Ken Mappin*	*Peter McTigue*	*Peter McTigue*	*Anne Meehan* *Ron Dickson* *Doug Moody*	*Not Applicable*
1983	*Anne Meehan*	*Peter McTigue*	*Peter McTigue*	*Chris Commons* *Doug Moody* *Bob Ross*	*Not Applicable*
1984	*Ron Dickson*	*Peter McTigue*	*Peter McTigue*	*Chris Commons* *Doug Moody* *Bob Ross*	*Not Applicable*
1985	*Ron Dickson*	*Peter Tregloan*	*Peter Tregloan*	*Chris Commons* *Doug Moody,* *Bob Ross*	*Not Applicable*
1986	*Chris Commons*	*Peter Tregloan*	*Peter Tregloan*	*Doug Moody* *Bob Ross* *John Gilson*	*Not Applicable*
1987	Chris Commons	Bob Ross	Peter Tregloan	Nicole Lukins John Gilson Doug Moody	Not Applicable
1988	Chris Commons	Bob Ross	Peter Tregloan	Nicole Lukins John Gilson Doug Moody	Not Applicable
1989	John Gilson	Bob Hogendoorn	Peter Tregloan	Nicole Lukins Carolyn Elvins, Peter McTigue	Not Applicable
1990	John Gilson	Bob Hogendoorn	Peter Tregloan	Nicole Lukins Carolyn Elvins, Peter McTigue	Not Applicable
1991	John Gilson	Bob Hogendoorn	Peter Tregloan	Nicole Lukins Carolyn Elvins, Peter McTigue	Not Applicable
1992	John Gilson	Bob Hogendoorn	Peter Tregloan	Nicole Lukins Carolyn Elvins, Peter McTigue	Not Applicable

1993	Nicole Lukins	Bob Hogendoorn	Peter Tregloan	Carolyn Elvins, (D Chair) John Gilson Peter McTigue	Not Applicable
1994	Carolyn Elvins	Robert Sanders	Peter McTigue	Heather Schnagl Bob Hogendoorn Ian McKinnon	Not Applicable
1995	Heather Schnagl	Robert Sanders	Peter McTigue	Ian McKinnon, (D Chair) Carol McKenzie Ann Osman	Not Applicable
1996	Heather Schnagl	Robert Sanders	Peter Tregloan	Ian McKinnon, (D Chair) Ann Osman Carol McKenzie	Not Applicable
1997	Heather Schnagl	Robert Sanders	Peter Tregloan	Ian McKinnon, (D Chair) Ann Osman Carol McKenzie	Not Applicable
1998	Carol McKenzie	Robert Sanders	John Gilson	Ian McKinnon, (D Chair) Ann Osman Steve Bigger	Not Applicable
1999	Carol McKenzie	Ann Osman	John Gilson	Ian McKinnon, (D Chair) Steve Bigger David Mc Fadgen	Bob Charlesworth
2000	Robert Sanders	Chris Dwyer	John Gilson	Steve Bigger Penny Commons Leon Spicca	Bob Charlesworth
2001	Robert Sanders	Chris Dwyer	Penny Commons	Leon Spicca Robyn Kronenburg, David McFadyen	Bob Charlesworth
2002	Robert Sanders	Chris Dwyer	Penny Commons	Leon Spicca Robyn Kronenburg, David McFadyen	Bob Charlesworth
2003	Robert Sanders	Chris Dwyer	Penny Commons	Leon Spiccia David McFadyen Elissa Huddart	Bob Charlesworth
2004	Robert Sanders	Chris Dwyer	Penny Commons	Leon Spiccia, David McFadyen, Elissa Huddart	Bob Charlesworth
2005	Robert Sanders	Elissa Huddart	Penny Commons	Richard Morrison Chris Dwyer David McFadyen	Bob Charlesworth
2006	Bob Hogendoorn	Elissa Huddart	David Mc Fadyen	Bob Charlesworth, Richard Morrison Chris Dwyer	Penny Commons
2007	Robert Sanders	Elissa Huddart	Bob Hogendoorn	Jennie Eggleston, Brendan Abrahams, Chris Dwyer	Penny Commons
2008	Robert Sanders	Jennie Eggleston	Bob Hogendoorn	Elissa Huddart Richard Morrison, Jonathan White.	Penny Commons

2009	Robert Sanders	Jennie Eggleston	Bob Hogendoorn	Elissa Huddart Richard Morrison, Jonathan White.	Penny Commons
2010	Robert Sanders	Jennie Eggleston	Bob Hogendoorn	Elissa Huddart Richard Morrison, Jonathan White.	Penny Commons
2011	Robert Sanders	Jennie Eggleston	Bob Hogendoorn	Lanna Derry, Chris Thompson, Jonathan White.	Penny Commons
2012	Robert Sanders	Lanna Derry	Chris Thompson	Jonathan White, Seamus Delaney, Mick Moylan	Penny Commons

Appendix 8

Authors of Chemistry One and Chemistry Two

Chemistry One		**Editions**	**Editor**
Carolyn Elvins	Presbyterian Ladies' College	1, 2, 3, 4 and Enhanced 4th	1, 2 and 3
David Jones	Victoria University of Technology	1, 2 and 3	
Philippa Lohmeyer	St Catherine's School	4 and Enhanced 4th	
Nicole Lukins	Lauriston Girls' School	1, 2, 3, 4 and Enhanced 4th	4 and Enhanced 4th
Joan Miskin	Strathmore Secondary College	1, 2 and 3	
Bob Ross	Eltham College	1, 2, 3, 4 and Enhanced 4th	
Robert Sanders	Sunshine College	1, 2, 3, 4 and Enhanced 4th	
Gordon Wilson	Camberwell Grammar School	4 and Enhanced 4th	
Chemistry Two			
Chris Commons	Scotch College	1, 2, 3, 4 and Enhanced 4th	1, 2 and 3
Bob Hogendoorn	Retired Principal and Chemistry Teacher	4 and Enhanced 4th	4 and Enhanced 4th
Susan Jarrett	Methodist Ladies' College	1, 2, 3, 4 and Enhanced 4th	
Carol McKenzie	Taylors College	1, 2, 3, 4 and Enhanced 4th	
Warren Moseley	Whitefriars College	1, 2, 3, 4 and Enhanced 4th	
Maria Porter	Wesley College	1, 2, 3, 4 and Enhanced 4th	
Mark Williamson	Monbulk College	1, 2, 3, 4 and Enhanced 4th	

Appendix 9

Demonstration Book, 1990

Editors: Chris Commons and Bob Hogendoorn

Planning Committee: John Gilson, Trish McNamee, Bob Prosser, Eric Friedman, Gail Hildebrand, Anne Molloy, Bob Ross, Neil Furlong, Bob Hogendoorn, Kerrie Mullins-Gunst and John Sullivan.

Contributors:

C Andrewartha	**I Dias**	**J Herington**	**A Michell**	**I Saric**	**K Westrope**
P Armitage	**C Dobb**	**V Hildditch**	**J Miskin**	**I Sauro**	**P White**
C Arnold	**R Drew**	**J Ho**	**A Molloy**	**D Schoenfeld**	**K White**
D Aurnann	**C Dwyer**	**P Holper**	**K Mullins**	**H Schnagl**	**S Williams**
A Barlee	**J Eager**	**D Hopkins**	**Gunst**	**D Scollary**	**R Wilson**
R Bennett	**C Elvins**	**A Hunt**	**R Newbury**	**M Scott**	**G Wilson**
C Bentley	**W Esman**	**E loannou**	**M Nour**	**R Slade**	**D Wingfield**
A Bojsen	**M Finn**	**R Iozzi**	**K Osborne**	**K Slater**	**M Wong**
M.Brisbane	**B Firth**	**C Jennings**	**R Osborne**	**I Sweeney**	**R Worboys**
M Broberg	**B Fisher**	**I. Johnson**	**P O'Shea**	**M Sweeney**	**L Wright**
L Brockmuller	**E Friedman**	**K Johnston**	**B Parsons**	**F Slade**	
K Buckley	**F Gilmore**	**I. Kummerie**	**L Peters**	**P Snow**	
R Bunce	**J Gilson**	**Y Laird**	**K Phitopoulos**	**H Stevens**	
C Burn	**J Clover**	**M Learmonth**	**J Pollard**	**M Stewart**	
W Burtt	**W. Goldstraw**	**R Lewis**	**M Porter**	**R Stokes**	
B Bywater	**J Gordon**	**B Loughran**	**M Potts**	**G Stopar**	
J Carman	**R Grace**	**N Lukins**	**L Preston**	**J Sullivan**	
L Clarke	**M Gruenzel**	**I. Lynch**	**A Price**	**N Taylor**	
R Charlesworth	**A Gryllakis**	**M McLaughlin**	**R Prosser**	**T Tedesco**	
S Closter	**R Hallworth**	**P McNamee**	**R Reynolds**	**H Templer**	
D.Chit	**M Hanrahan**	**J Maffei**	**P Razos**	**L Than**	
P Commons	**C Hargreaves**	**K Klappin**	**I Riddoch**	**J Thorne**	
K Cordner	**S Hassan**	**C Maiurkieursz**	**P Rigoni**	**M Toth**	
R Davies	**J Healey**	**L Medina**	**C Ross**	**D Turner**	
P de Felice	**W Healy**	**A Meehan**	**B Ross**	**C Weisheit**	
L Deny	**S Heard**	**R Menegas**	**G Rowe**	**T Westmore**	
			B Samuel		

Appendix 10

Chemistry One and Chemistry Two publication dates

Book	Edition	Published
Chemistry One	1st	1990
Chemistry Two	1st	1991
Chemistry One	2nd	1994
Chemistry Two	2nd	1994
Chemistry One	3rd	1999
Chemistry Two	3rd	1999
Chemistry One	4th	2006
Chemistry Two	4th	2007
Chemistry One	4th Enhanced	2010
Chemistry Two	4th Enhanced	2010

Appendix 11

CEA Chemical Educators

Year	Name
1994	Ken Mappin
1995	Doug Moody
1996	Alan Smith
1997	Peter Fensham
1998	Ian Rae
1999	Ann Meehan
2000*	Peter McTigue
2000*	Peter Tregloan
2001	Ivan Wilson
2002	Ian McKinnon
2003	Nicole Lukins
2004	Chris Commons
2005	Carolyn Elvins
2006	Bob Charlesworth
2007	Robert Sanders
2008	Chris Dwyer
2009	John Gilson
2010	Bob Ross
2011	Richard Morrison
2012	Bob Hogendoorn

- Two awards were made in 2000, when the timing of the award was changes.

Appendix 12

Teacher Travelling Scholarship Awards

1995 Robyn Kroneburg
2000 Elissa Huddart
2001 Theo Read
2003 John Jackowski
2004 Gordon Wilson

Pre-Service Chemistry Teacher

2005 Tony Boffa

Plastics and Chemicals Industry Association (PACIA)

1998 Debbie Corrigan and Tony Marchisi

Appendix 13

Student Scholarship Awards

2000	Chris Lee		
2001	James Love		
2002	Brendon Ellis,	Bursary	Kate Skull
2003	Hilary Lin		
2004	Andrew Fei		
2005	James Wan		
2006	Chloe Miller	(2/3),	Alan Ngu (1/3)
2007	Eamon Byrne		

Pre Service Chemistry Teacher Scholarship

2008	Seamus Delaney and Louise Lennard
2009	Patrick Sanders and Catherine Durrant

Ken Mappin Beginning Chemistry Teacher Prize

2010	Claudia Tassone
2011	Devi Wiltshire
2012	Nicole Taylor

Appendix 14

Assorted CEA initiatives and activities, 1991 – 2002

1998 Chembank
2001 Chat Group – ongoing
2001 Green Chemistry Practical Manual Submission (Monash)

Sponsorships

1993 Swinburne Science Shop VCE Lectures
1998 Chemistry Olympiad
2000 Monash University Summer Science Experience

Peter McTigue, OAM MSc(Melb) DPhil(Oxf) FRACI was a founding member of the CEA. He carried out chemical research and teaching at The University of Melbourne from 1960 to 2000 and was Head of the Chemistry School from 1985 to 1990. He was co-author of two school chemistry texts (1967 and 1979) and was awarded the CEA Chemical Educator award in 2000.

Robert Sanders, B App Sc (Chem), Dip Ed, MRACI has been an office bearer of the CEA committee for sixteen years. He taught senior Chemistry for many years and was awarded the RACI Chemistry Centenary of Federation Teaching Award, BHP Science Teacher Award and CRA Science Teaching Fellowship. Robert was one of the original writers of the VCE Chemistry Study Design from 1987 to 1991. He was a Campus Principal at Sunshine College and is one of the authors of Chemistry One. He was awarded the CEA Chemical Educator award in 2007 and is presently working as an analytical chemist and an Educational Consultant.