［英　語］（全４題）

注意：　解答は問題ごとに別の解答用紙を用いること．

［問題 1］

以下の文章（Michael Munowitz 著 “Principles of Chemistry”より）を読み，次の問に答えよ．

問 A　著者は科学の研究を行うことを他の３種の行いと比較し，似ている点，あるいは異なる点を述べている．それらについて合わせて 250～350 字程度の日本語で説明せよ．

問 B　著者は自然科学を一言で定義付けている．それは何か．その関連で化学をどう定義付けているか．それぞれ日本語で簡潔に答えよ．

The pursuit of science has been likened to watching a chess match without knowing the rules. Silently the observer looks on, seeking to learn how the game is played. The players know, but they aren't talking.

The game is nature, long the object of human inquiry and wonder. There is a belief, deeply rooted, that natural events conform to a pattern, and our goal has always been to decipher the code. We want to see how things are put together and thereby gain a measure of control over the world.

We look on. With disciplined ***observation*** we begin to recognize some of the pieces and how they move. Patterns and relationships start to appear, enabling us to guess at the rules. An educated guess, called a ***hypothesis***, is tested against reality through an ***experiment***: a limited, systematic manipulation of nature designed to confirm or deny a proposed explanation. Successful hypotheses might be woven into a broader picture of related occurrences, and the resulting ***theory*** may then be challenged further to predict new phenomena. Still there is doubt, though, even if the current challenge is met, because any theory is only as good as its last prediction. It is a temporary model of some part of nature, never the final word.

Observation, hypothesis, experiment, theory. Therein is our ***scientific method***, but every child does the same thing. Small children reach out to probe their surroundings, developing personal theories through observation and experiment. Matter of a certain shape comes to be recognized as a chair, and soon the toddler learns to use such objects without detailed reconsideration at each encounter.

Science differs from child's play mostly in its more systematic approach, its discipline, and its reliance on measurement. Science is a quantitative business, concerned with numbers and exactness, and it deals only with events that can be treated accordingly. Not to

be lost amidst the numbers, certainly, is a qualitative, nonnumerical understanding of nature, but ultimately something must be measured.

Everything we know comes from observation and measurement. For although the mechanism of nature is beautiful, it is not a beauty born of human design. Pursuing science is not like writing poetry; our ideas of beauty and of how things *ought* to be count for nothing. Lacking a full set of data, Aristotle mistakenly believed that the heavenly bodies move in circles. He liked the mathematical symmetry of circles, but he was wrong. Two thousand years elapsed before Kepler, Galileo, and Newton used quantitative observations first to describe and then to predict the elliptical orbits of the planets. With that giant stride, a mere 400 years ago, the modern age of science began.

Our initial task is to become better acquainted with some of the key players and rules of the game: matter and energy, mass, charge, force, momentum, and a few more. These concepts are fundamental to nature in all her manifestations. What is the universe if not a swirl of matter and energy? All the natural sciences are studies of matter in motion, differing mainly in scale and focus. Each, in its own way, is concerned with the forces that move matter and with the special endowments (like mass and charge) that enable matter to move. We could watch a comet fly and call it astronomy. We could watch a fish swim and call it biology. We could watch photosynthesis occur in a green plant and call it chemistry. But always it is matter in motion, whether such matter be a planet or an electron. When the matter happens to be electrons and atoms and molecules—tossed about by the electric forces of the microworld—*that* we shall call chemistry.

［問題 2］

次の文章は，ある物質やその種類を説明したものである（The Cambridge Encyclopedia をもとに作成）．(A)～(D)にあてはまる物質の名称を英単語で書け．また，下線部①, ②を日本語に訳せ．

(　A　)： Organic substances present in minute quantities in natural foods that are essential for health, classified as either water soluble or fat soluble. ①When absent from the diet or present in insufficient amounts, they result in specific abnormalities, due to the derangement of particular metabolic processes.

(　B　)： A non-nitrogen-containing compound based on carbon, hydrogen, and oxygen, generally with two hydrogen atoms per atom of oxygen. The molecules may be small (glucose) or large (cellulose, starch). Starch is a polymer of glucose, digestible by humans, whereas cellulose is a polymer of glucose, digestible only by ruminants.

(　C　)： Originally any soft, formable materials; now commonly used for synthetic organic resins which can be softened by heating, and then shaped or cast. ②They may be designed with almost any desired property, ranging from great heat stability to rapid natural decomposition in soil, and from being a good electrical insulator to a conductor.

(　D　)： A state midway between a suspension and a true solution. It is classified in various ways, particularly into sols (e.g. milk), in which liquid properties predominate, and gels (e.g. gelatine), which are most like solids.

［問題 3］

次の文を英訳せよ.

液体はその表面積を最小にする形をとる傾向がある．したがって，液滴は球形をとろうとする．なぜなら，球が体積に対する表面積の比を最小にする形だからである.

［問題 4］

次の問に 40～60 語の英文で答えよ.

あなたは化学のどのような分野に関心を持ち，その分野のどのような問題を解き明かしたいと考えているか．また，そのためにあなた自身についてどのようなことが必要だと思うか.