平成２２年度　理学系研究科博士前期課程　入学試験問題

（分子科学専攻・冬募集）

英語

試験時間　：　10:30～12:00

配点　　：　150 点

【注意】

（１）　問題冊子（１部）、問題１，２，３の解答用紙（３枚）を配布する。
手元に上記４種類が所定の枚数配布されていることを確認すること。
過不足がある場合には速やかに申し出ること。

（２）　３枚の解答用紙の各々に受験番号と氏名とを必ず記入すること。

（３）　問題１，２，３の解答をそれぞれ指定された解答用紙に記入すること。

1　次の文章を読んで、設問に答えよ。

In general, ‘theory’ is a word with which most scientists are entirely comfortable. A theory is one or more (1)rules that are postulated to govern the behavior of physical system. Often, in science at least, such rules are quantitative in nature and expressed in the form of a mathematical equation. Thus, for example, one has the theory of Einstein that the energy of a particle, *E*, is equal to its relativistic mass, *m*, times the speed of light in a vacuum, *c* squared,

$$E = mc^2$$

The quantitative nature of scientific theories allows them to be tested by (2)experiment. This testing is the means by which the applicable range of a theory is elucidated. Thus, for instance, many theories of classical mechanics prove applicable to macroscopic systems but break down for very small systems, where (3)one must instead resort to quantum mechanics. (4)The observation that a theory has limits in its applicability might, as first glance, seem a sufficient flaw to warrant discarding it. However, if a sufficiently large number of ‘interesting’ systems falls within the range of the theory, (5)practical reasons tend to motivate its continued use. Of course, such a situation tends to inspire efforts to find a more general theory that is not subject to the limitations of the original.

問１　下線部(1)の“ rules ”とはどのようなものであるか。本文に即して説明せよ。

問２　下線部(2)の“ experiment ”を行う理由を簡単に述べよ。

問３　下線部(3)において、このようにしなければならない理由を説明せよ。

問４　下線部(4)を和訳せよ。

問５　下線部(5)の“ practical reasons ”の内容を分かりやすく説明せよ。

2 次の英文を日本語に訳せ。

(1) Ask a dozen chemists about the forces that drive innovation in high-performance liquid chromatography, and nearly all of them will agree: When it comes to chemical separations, the name of the game is speed. “Nowadays, it comes down to being able to run as many samples as possible in a given amount of time,” says Dennis Blevins, a senior manufacturing chemist at Agilent Technologies, an analytical instrument maker based in Santa Clara, California. Pointing to the pharmaceutical industry’s ever-growing and impatient hunger for data, Blevins says today’s chemists are called upon by their employers to analyze a larger number of samples—often mixtures of active drug compounds, impurities, and synthesis intermediates—more quickly than ever before.

Agilent Technologies: アジレントテクノロジー（会社名）

(2) Carbohydrates are synthesized by nearly all plants and animals, which use them to store energy and deliver it to their cells. In most living organism, glucose is oxidized to carbon dioxide and water to provide the energy needed by their cells. Plants store energy by converting glucose to starch, while animals store energy by converting glucose to glycogen, another form of starch. Cellulose makes up the cell walls of plants and forms their structural framework.

3 次の和文の中から４題を選び、英訳せよ。選択した問題番号を解答用紙に記すこと。

(1) 窒素分子カチオン(N_2^+)の結合次数は 2.5 である。

(2) 炭素(C)と酸素(O)の電気陰性度の差は大きいが、一酸化炭素(CO)の双極子モーメントは小さい。

(3) 第一イオン化エネルギーは系統的に変化し、周期表の左下に行くほど小さく、右上に行くほど大きくなる。

(4) 実験で得られたこの反応の滴定曲線は、計算によるものとよく一致することがわかった。

(5) 静電ポテンシャル図の作成は、分子中の電荷分布を調べるよい方法である。

(6) 求核置換反応は詳細に研究されており、２つの異なる反応機構が提唱されている。

(7) 今日では、分析用グレードの試薬が手頃な値段で入手できる。