

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・秋募集)

# 英語

試験時間 : 10:30～12:00

配点 : 150 点

## 【注意】

- (1) 問題冊子（1部）と解答用紙（3枚）を配布する。  
各解答用紙には，解答すべき問題番号があらかじめ記されている。  
手元に上記のすべてが所定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) すべての解答用紙に受験番号と氏名を必ず記入すること。
- (3) 解答は，指定された解答用紙に記入すること。

- 1 次の英文は、医薬品の開発プロセスに関して述べたものである。文章を読み、下記の設問に答えよ。

While clinical trials do not involve chemists directly, we will provide a brief outline here (ア) the sake of completeness. <sup>(1)</sup>These trials must produce objective evidence of the safety and efficacy of the new drug, as well as its advantages over existing treatments, before regulatory authorities can approve it for general clinical use. There are three phases of clinical trials. In phase I clinical trials, the drug is given to a small group of healthy subjects to determine safe and tolerable dosage levels and investigate drug metabolism. Phase II clinical trials typically involve several hundred patients, and are used to establish effective doses. If the trials so far have been successful, the candidate drug then enters Phase III clinical trials, usually involving several thousand patients at various sites. The new treatment is compared to existing treatments and sometimes to a placebo, usually in double-blind studies in which even the doctor does not know which treatment is being used. Following analysis of all the data collected during trials, the regulatory authorities, such (イ) the Federal Drug Administration (FDA) in the United States, decide whether to approve the new drug. <sup>(2)</sup>Many treatments fail during clinical trials, a rather unfortunate and costly occurrence, considering the years of effort that have already been investigated to discover and advance the drug candidate to this stage by the pharmaceutical company. Those that get through, however, can make all the difference, often between life and death, for patients who receive them. Post-marketing studies (Phase IV clinical trials) may also be a condition of product approval, but are typically undertaken by companies even (ウ) the absence of a regulatory mandate. Phase IV studies provide information on the effects of the drug over a much larger patient population and longer time scale than is possible during Phase II and III trials. <sup>(3)</sup>Adverse side effects detected during Phase IV studies can result in the restriction or withdrawal of a drug.

clinical trials : 臨床試験 (治験), phase I clinical trials : 第一相臨床試験, subjects : 被験者, regulatory authorities : 規制当局, placebo : 偽薬, double-blind studies : 二重盲検試験, approval : 承認

問1 (ア) ~ (ウ) に当てはまる最も適切な前置詞を記せ。

問2 下線部 (1) ~ (3) を日本語に訳せ。

問3 Phase I ~ IV の内容を本文に則して説明せよ。

2 次の英文の下線部 (a) ~ (f) を日本語に訳せ。

- (1) In 1953, James D. Watson and Francis C. Crick used X-ray diffraction patterns of DNA fibers to determine the molecular structure and conformation of DNA. (a) They found that DNA contains two complementary polynucleotide chains held together by the hydrogen bonds of the paired bases. They also discovered that the two complementary strands of DNA are coiled into a herical conformation about 20 Å in diameter, with both chains coiled around the same axis. (b) The helix makes a complete turn for every ten residues, or about one turn in every 34 Å of length.
- (2) Like the S<sub>N</sub>2 reaction, the E2 reaction follows a concerted mechanism: (c) Bond breaking and bond formation take place at the same time, and the partial formation of new bonds lower the energy of the transition state. (d) Concerted mechanisms require specific geometric arrangements so that the orbitals of the bonds being broken can overlap with those being formed and the electrons can flow smoothly from one bond to another. The geometric arrangement required by the S<sub>N</sub>2 reaction is a back-side attack; with the E2 reaction, a coplanar arrangement of orbitals is needed.
- (3) (e) Avogadro's constant is the number of particles (atoms or molecules) in one mole of any pure substance. Avogadro's constant has been determined by many methods including measurements of Brownian movement, electronic charge and the counting of α-particles.
- (4) (f) Diffusion is a phenomenon that in any gaseous mixture or liquid solution which is kept at a uniform temperature, the composition eventually becomes uniform throughout the system, no matter what was the original distribution.

- 3 Fox 先生の研究室を見学するため、塚太郎君が電子メールを書こうとしている。次の文章の内容を英訳せよ。

拝啓

先日、日本ご訪問の際、私どものために時間を割いて頂きましてありがとうございました。おかげさまで、楽しい時間を過ごすことができました。

本日はお願いがありましてメールを差し上げました。この度、シカゴで開催されるアメリカ化学会に出席するため、9月にイリノイ州を訪問する予定です。そのときに、是非とも先生の研究室を見学させて頂きたいと思っております。先生のご都合はいかがでしょうか。

お忙しいところを誠に恐縮ですが、お返事を頂ければ幸いです。

敬具