平成 19 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。

⑶　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. 次の英文を読んで，下記の設問に答えよ。

Chemotherapy is the use of chemicals to treat disease. Chemotherapy began with the work of Paul Ehrlich who had the idea(a) that it might be possible to find chemicals which kill the micro-organisms which cause disease without harming healthy living cells. Paul Ehrlich worked as an assistant to Robert Koch who pioneered the use of dyes to stain and identify bacteria. Ehrlich was particularly interested in selective dyes.(b) Some dyes, for example, take well on cotton but not on wool. Ehrlich found that methylene blue would dye nerve cells well but not other parts of the body. This inspired him to research for chemical 'magic bullets' to target micro-organism and diseased cells. After a long series of experiments Ehrlich and his Japanese colleague, Sahachiro Hata finally discovered an arsenic compound which cured syphilis. For the first time a synthetic chemical was used to cure a bacterial disease.

The high hopes raised by Ehrlich's work let to many disappointments until 1932 when Gerhard Domagk was involved in testing the medical effects of new dyes produced by a German chemical company. He found that the dye Prontosil red was remarkably effective against streptococcal infections in mice. Domagk served his daughter's life with the new drug when she accidentally picked up a serious infection by pricking her finger in his laboratory.(c) This led to the development of sulfonamide drugs which were used to treat bacterial diseases until the discovery of antibiotics.

Today chemotherapy is widely used to treat cancer but few drugs are 'magic bullets'.(d) If they are effective in destroying cancerous cells they are generally toxic and damage other parts of the body too.

chemotherapy : 化学療法
syphilis : 梅毒
streptococcal : 連鎖球菌
prick : ちくりと刺す

問１　どのような idea(下線部 a)か。
問２　dye(下線部 b)に注目したのはなぜか。
問３　Ehrlich と Hata が発見した化合物に含まれる特徴的な元素は何か。
問４　下線部(c)を和訳せよ。
問５　細菌感染に対し sulfonamide に代わって広く用いられるようになったものは何か。日本語で答えよ。
問６　ここで 'magic bullets'(下線部 d)とはどのような意味か。

2. 次の英文を読んで，①～⑳に適当な記号あるいは英語を入れよ。

The Periodic Table represents one of the outstanding organizational developments of the physical sciences. Amongst the 100 or so elements, there are groups which have very similar chemical and physical properties; the halogens (①, ②, ③, ④) and the alkali metals (⑤, ⑥, ⑦, ⑧, ⑨) are typical of such groups. There were many attempts in the middle of the 19th century to find some property of the elements which could be the basis for an ordering in which these groups would naturally appear. The solution is generally credited to Mendeleef who in 1869 pointed out that the physical and chemical properties of the elements and their compounds are a periodic function of their atomic weights.

With this classification he was able to postulate the existence of some elements unknown at that time (e.g. germanium) and to predict some of their properties with what proved to be remarkable precision. Apart from the replacement of atomic weight by atomic number (charge on the nucleus) as the basis of the ordering, and the insertion of new elements, the modern periodic table is basically that of Mendeleef.

Bohr, in 1921, was the first to give a satisfactory explanation of the periodic table in terms of the electronic theory of the atom. He introduced what is now known as the *aufbau* or *building-up* principle.

This states that the electronic structure of an element is built up from that of the preceding element by adding (⑩) electron to the (⑪) energy orbital (orbit in Bohr theory) which can accept an electron. However, to obtain periodicity Bohr found it necessary to postulate that there is a (⑫) to the number of electrons that could occupy an orbital. The first orbital (⑬) can take only (⑭) electrons (these make up the so-called (⑮)-shell of the atom). The next group of orbitals (⑯, ⑰) may take (⑱) electrons, which make up the (⑲)-shell, and so on. A justification of this postulate was offered later by Pauli in his famous (⑳).

3. 次の和文を英訳せよ。

日本人には，洋食を食べるとき，ライスをフォークの背にのせて食べる人がときどきいる。だが，欧米人でそのような食べ方をしている人を見かけることはない。