CHEMISTRY (US)

Paper 0439/11
Multiple Choice

Question Number	*Key*	*Question Number*	*Key*
1	**B**	21	**D**
2	**B**	22	**C**
3	**A**	23	**A**
4	**A**	24	**D**
5	**D**	25	**B**
6	**C**	26	**D**
7	**A**	27	**B**
8	**A**	28	**B**
9	**D**	29	**B**
10	**D**	30	**C**
11	**D**	31	**A**
12	**D**	32	**C**
13	**D**	33	**B**
14	**B**	34	**B**
15	**A**	35	**B**
16	**D**	36	**C**
17	**B**	37	**D**
18	**D**	38	**C**
19	**A**	39	**D**
20	**A**	40	**C**

General Comments

Candidates performed quite well on this paper.

Questions 1, 2, 14, 15, 16 and **39** proved particularly straightforward with the majority of candidates choosing the correct response.

Questions 8, 11, 12 and **27** proved to be difficult for candidates.

Comments on specific questions

The following responses were popular **wrong** answers to the questions listed.

Question 8 Response **B**. This was the most popular response, although incorrect. Roughly equal numbers of candidates chose responses **A** and **C**. Candidates clearly thought that only one of the methods should work, although both would.

Question 11 Response **C**. This response was more popular than the correct one. Candidat remembered the experiments they had seen, rather than thinking about the actual results whic obtained.

Question 12 In this question all of the responses were similarly popular, with response **C** being margin the most popular.

Question 18 Response **B**. Candidates seemed reluctant to decide that neither was correct, although they knew that the litmus answer was wrong.

Question 19 Response **C**. Candidates knew that the oxides were covalent, but not of what type they were.

Question 27 Response **A**. This was by far the most popular response, although wrong. Candidates clearly thought that two 'no' answers meant least reactive, but not fully understanding the implications of the oxide reacting with carbon.

Question 34 Response **D**. Most candidates chose the correct alternative, but some were distracted by the mention of washing clothes in both the question and one of the responses.

Question 37 Response **B**. Candidates understood what the question was about but, perhaps, misread ethane for ethene.

CHEMISTRY (US)

Paper 0439/21
Paper 2

Key Messages

- Many candidates showed a good ability in extracting and analysing data.
- More practice is needed in answering questions about structure and bonding, especially when comparing structures.
- Many candidates would benefit from learning definitions of chemical terms with greater accuracy.
- It is important that candidates read the question carefully in order to understand what is exactly being asked.
- Many candidates need more practice in learning organic chemistry, especially with respect to organic formulae and combustion of hydrocarbons.
- Some candidates would benefit from more revision in qualitative tests for ions and specific molecules.
- Some candidates need more practice in answering questions where comparisons are required, especially relating to changes of state.

General comments

Some candidates tackled this paper well, showing a good knowledge of core Chemistry. Good answers were seen to many parts of **Questions 1**, **2** and **5**. Nearly all candidates were entered at the appropriate level. The rubric was occasionally misinterpreted or not read properly. For example, in **Question 1(a)(iv)** many did not take any notice of 'single electron shell', whilst in **Question 4(a)** many wrote about properties and uses rather than structure. Some candidates disadvantaged themselves by writing conflicting statements. This was most obvious in **Question 6(a)**, where some candidates wrote conflicting statements about the properties of liquids and vapours. Fewer candidates tried to write symbol equations instead of word equations compared with previous sessions. A considerable number of candidates left blank spaces in **Questions 2(a)(i)** (electronic structure), **5(c)** (chromatography) and **6(b)(ii)** (naming ethanol from its formula) and **6(c)** (endothermic change). The extraction of information from tables of data was generally well done. Many candidates need to spend more time learning definitions of terms such as element and solvent. When writing these definitions, many candidates wrote vague or conflicting statements. Many candidates need more practice in answering questions about structure and bonding, especially when comparing structures such as diamond and graphite. Many candidates would also benefit from further revision of organic chemistry, especially organic structures and the products of combustion of organic compounds. The standard of English was generally good. As in previous sessions, chemical tests for specific substances e.g. for zinc ions in **Question 7(d)** and chlorine in **Question 7(f)** were not well known. A considerable proportion of the candidates did not know the test for carbon dioxide. Many candidates could do simple chemical calculations involving ratios of masses.

Comments on specific questions

Question 1

Most candidates gave correct responses for this question, especially in parts **(a)** and **(c)** involving basic inorganic chemistry. However, only a few candidates were able to give a sufficiently accurate definition of an element in part **(b)**. Candidates need to pay more attention to a proper understanding of terms in Chemistry when revising.

(a) (i) Many candidates knew that nitrogen is present in fertilisers. The commonest erro suggest sodium or calcium.

(ii) Nearly all candidates realised that sulfur is in Group VI of the Periodic Table. A few suggested answer 'iodine', through a mistake in interpreting Roman numerals. Candidates would be advised to refer to the Periodic Table provided whenever answering this type of question.

(iii) Most candidates identified iodine correctly. Some candidates confused Group number with Period number and gave the incorrect answer of nitrogen.

(iv) Many candidates recognised helium as having a single electron shell containing two electrons. The commonest incorrect answer was calcium. This error arose because candidates did not read the question carefully enough and did not take any notice of the phrase 'single electron shell'.

(v) Nearly all candidates realised that nickel is a transition element. The commonest incorrect answer was calcium.

(vi) This was the least well answered of the part **(a)** questions. Nickel, sodium or calcium were commonly seen as incorrect responses.

(b) Very few candidates gave a convincing definition of the term 'element'. Many answers were vague and referred to 'pure substances', 'solids, liquids and gases' or 'natural substances'. Few mentioned that elements were made up of the same type of atom.

(c) This question was well answered by most candidates, who gained credit for selecting suitable physical properties of metals.

Question 2

Parts **(b)** and **(c)** about pH values and word equations were generally done well. However, many candidates would benefit from more revision in writing electronic structures (part **(a)(i)**), understanding bonding (part **(a)(ii)**) and in understanding which factors to keep constant when repeating experiments (part **(d)(iii)**).

(a) (i) Few candidates gained full credit for the correct electronic structure of hydrogen chloride. Candidates who made errors, often made mistakes in the placement of the bonding pair of electrons. Common errors included giving too many electrons in the outer shell of chlorine, giving a single electron as a bonding electrons, placing a bonding electron just outside the overlap region on the diagram and adding extra electrons to the hydrogen shell. A considerable number of candidates did not respond to this question.

(ii) Many candidates realised that hydrogen chloride is covalent because of a shared electron pair. The commonest errors were to suggest 'ionic because it's a combination of a metal + a non-metal', to suggest covalent but give a wrong reason (commonly metal + non-metal), state 'has a single bond' or provide references to state.

(b) Most candidates gave the correct pH value. The commonest incorrect answer was pH 7.

(c) (i) Many candidates completed the equation correctly. Most gained at least partial credit. The commonest errors were to replace carbon dioxide or water with hydrogen or oxygen or to suggest hydrogen carbonate instead of carbon dioxide. A considerable number of candidates did not respond to this question.

(ii) Most candidates recognised magnesium chloride as the name of the salt. The main errors were 'magnesium chlorine' or giving made up names such as 'hydromagnesium oxide'. A small number of candidates did not respond to the request to balance the equation.

(d) (i) A majority of the candidates gave a correct answer within the range in the mark scheme. 225 cm^3 was the commonest correct answer. The commonest error was to give a value of 250 cm^3 or above. Fewer suggested values below the acceptable range of temperatures.

(ii) This was invariably correct.

(iii) Many candidates chose two suitable factors which could be kept constant. [illegible] temperature constant was the correct answer most frequently seen. A large propo[illegible] candidates wrote about the apparatus or the volume of gas. Other common errors were [illegible] the time intervals the same or measure the same volume of hydrogen.

Question 3

Many candidates gained partial credit on this question. Most candidates selected 3 or 4 of the correct words in part **(a)** and gave a correct example of an area of everyday life where purity is important in part **(c)(iii)**. Few gained full credit. Parts **(b)** and **(c)** were least well done. Most candidates would benefit from revising organic structures.

(a) Most candidates partial credit for this question. The commonest errors were to suggest 'different' in the third space instead of 'similar' and 'elements' in the fourth space instead of 'functional'.

(b) (i) Few candidates could write the structure of ethanol correctly, showing all atoms and bonds. A significant proportion of the candidates who did know the structure, went on to omit the O–H bond. Common errors included adding C=O at the end, C–O without the H of the O–H or giving the structure of ethane.

(ii) Few candidates gained full credit for the products of complete combustion of ethanol. A wide range of incorrect answers was seen e.g. CO, H_2 or C. Many incorrect answers included atoms which were not present in the reactants e.g. HCl or N_2. A further subsection of incorrect answers included the reactants e.g. O_2 or ethanol (sometimes changed to methanol).

(c) (i) A minority of candidates identified the carboxylic acid group correctly. A wide variety of errors were seen. The commonest were to put a ring around the C=O group, the C–O–H group or the carbon atoms in the ring.

(ii) Nearly all the candidates counted the number of carbon atoms correctly. The commonest errors were to suggest 2, 3 or 6 carbons.

(iii) This was generally correct, most candidates suggesting drinking water. A few candidates suggested fertilisers or industrial chemicals or processes.

Question 4

This was the least well answered question on the Paper. Most candidates would benefit from revising structure and bonding in diamond and graphite. In part **(d)**, under half the candidates gave a convincing explanation as to why carbon monoxide is a reducing agent. In part **(e)** few recognised the raw materials required for the extraction of iron. The test for carbon dioxide (part **(b)**) was fairly well known, as was an adverse effect of carbon monoxide on health.

(a) Many candidates gained only partial credit, usually for the idea that both diamond and graphite contain carbon. Fewer candidates gained credit for the idea that both diamond and graphite are giant structures. Many candidates wrote vague statements, which did not answer the question and included comments about properties and uses.

(b) Many candidates gave the correct test for carbon dioxide. Common errors included lighted splint goes out and this is not a specific enough test, litmus paper, electrolysis and water, rather than limewater.

(c) Many candidates recognised the effect of carbon monoxide on the body in terms of toxicity or stopping respiration. A significant number of candidates did not gain credit because they wrote answers which were too vague e.g. 'affects breathing' or 'causes breathing problems'. Many candidates thought incorrectly that carbon monoxide damages the lung structure or causes cancer.

(d) Many candidates gave vague answers to this question e.g. 'not reducing', 'it reduces the amount of iron' or 'it's in the products as carbon dioxide'. The best responses referred to the removal of oxygen from the iron oxide or addition of oxygen to the carbon monoxide.

(e) Few candidates appeared to know what is meant by a raw material and gave ans
'lime' or 'carbon monoxide'. Others suggested sand or water. Bauxite was a commo
response. A considerable number of candidates did not respond to this question.

Question 5

Some parts of this question were well done, especially parts **(c)**, **(d)**, **(d)(iii)** and **(f)(i)** and **(f)(ii)**. In part **(e)** few candidates were able to identify raw materials added to the blast furnace. In part **(f)(iii)**, few candidates used the information given in the equation to explain how green nickel(II) chloride can be obtained from white nickel(II) chloride.

(a) Many candidates gained partial credit but few were awarded full credit. Common errors were litmus paper instead of chromatography or filter paper and beaker instead of solvent. A few candidates incorrectly suggested that the solvent had pigment dissolved in it.

(b) Many candidates placed the '**X**' on the base line to mark the position of the spot at the start of the experiment. Others either placed the it below the line, often in the solvent. Fewer placed the '**X**' well above the line.

(c) Most candidates identified the process as chromatography. The commonest errors were to suggest pigmentation, chlorophyll or filtration.

(d) (i) The commonest error was to suggest aqueous copper(II) sulphate, but a considerable minority also chose solid nickel(II) sulfate incorrectly.

(ii) Most candidates correctly selected nickel. The commonest incorrect answers were chlorine and sulfur.

(iii) Most candidates remembered that the negative electrode is the cathode. A few candidates made up incorrect names ending in '–ode'. Others wrote down incorrect anode or cathode products.

(e) Partial credit was awarded to some candidates, who gave one correct reason for electroplating metals. Few candidates gave two correct reasons. Many responses were vague, such as 'to protect the metal' or 'to make them more resistant'. Others suggested a range of general physical properties of metals such as 'to make them conduct better' or 'to make them stronger'. Some candidates gave uses such as 'for jewellery', rather than focussing on the idea about making the surface more attractive.

(f) (i) Most candidates balanced the equation correctly. The commonest errors were to omit the 6 or to write $H_{12}O_6$.

(ii) Most candidates recognised the equilibrium sign in terms of a reversible reaction. The commonest errors were to suggest 'it is a cycle', 'it means equals' or 'it's the same'.

(iii) Very few candidates used the information given in the equation to explain how green nickel(II) chloride can be obtained from white nickel(II) chloride. Most incorrect answers referred to heating, boiling, cooling or adding other substances such as iron.

Question 6

Some parts of this question were well done, especially parts **(d)** and the calculation in part **(e)(ii)**. In part **(a)** some candidates gave good explanations of the change of state in terms of particle theory. Others wrote too vaguely. Vague or muddled writing was also responsible for some candidates not gaining credit for the definition of a solvent (part **(b)(i)**). Many candidates need more practice in the naming of organic compounds (part **(b)(ii)**) and writing inorganic formulae (part **(e)(i)**).

(a) Many candidates gained credit by making appropriate comparisons between the closeness and motion of the particles in liquid and vapour. A few candidates gave good explanations of the changes in state when a vapour changes to a liquid or vice versa. Most did not give a change and only referred to the gaseous state. Others disadvantaged themselves by suggesting that the particles are far apart in a liquid or move quickly.

(b) (i) Many candidates gave a suitable definition of a solvent. Others wrote confus comments, often muddling the solvent and solute. The quality of the English often candidates from expressing themselves adequately in this question, although elsewhe paper the quality was generally good. Common errors were 'what you mix with a solution liquid used for tests'.

(ii) Few candidates recognised the formula of ethanol. Common incorrect answers included ethanoic acid, water and carbon hydroxide. The answer 'alcohol', given by a number of candidates was not accepted because it is a generic term. A considerable number of candidates did not respond to this question.

(c) A minority of the candidates recognised the change associated with a fall in temperature as being endothermic. The commonest errors were to suggest 'exothermic' or 'cooling'. A considerable number of candidates did not respond to this question.

(d) Most candidates gave the correct answer. The commonest error was to suggest that solid ammonium chloride could conduct electricity. A few also suggested ammonia.

(e) (i) Those candidates who correctly wrote the formula of lithium hydroxide, generally obtained credit for balancing the equation. Common incorrect formulae for lithium hydroxide included Li, LiO, $Li(OH)_2$ and LiH_2O.

(ii) Most candidates were successful in the calculation (answer = 20g).

Question 7

Many candidates performed well on this question, especially in part **(a)** where data extraction from the table was required. The test for zinc ions in part **(b)** was not well known and a majority of the candidates need more practice in the practical sequence of salt preparation (part **(c)**) and the test for chlorine (part **(f)**).

(a) (i) Nearly all the candidates correctly gave copper. A few candidates suggested poly(ethene).

(ii) Most candidates wrote about the better electrical conductivity compared with iron. Candidates who did not gain credit, often stated that 'copper is a good conductor' without any comparison being made. Others suggested malleable, expensive or 'its density'.

(iii) A majority of the candidates realised that insulators are poor conductors. Most suggested non-conductor, which was acceptable. Common errors included 'its conductivity' without qualification or 'it is a non-metal'.

(iv) This was the least well answered of the part **(a)** questions. Many candiates suggested steel, forgetting that steel is an alloy and therefore not a pure metal. A few candidates suggested poly(ethene), ignoring the fact that the question refers to a metal. The incorrect answer, aluminium, was not infrequently seen.

(v) Candidates who did not gain credit, often stated that 'steel is strong' without any comparison being made. Others suggested 'harder', which is not a property mentioned in the table.

(vi) This was almost invariably correct. Copper was the commonest incorrect answer.

(b) (i) Few candidates recognised the test for zinc ion. Common errors included calcium and copper.

(ii) Very few candidates could state that a hydroxide was formed. Credit was most often gained by those who selected zinc from part **(i)**. A few candidates gained an error carried forward mark from selecting the incorrect ion in part **(i)**. Many did not respond to the question. The commonest error was 'limewater'. Compounds other than hydroxides e.g. zinc chloride, ammonia, were not infrequently seen.

(c) A minority of the candidates wrote the correct order for the preparation of copper(II) chloride. Nearly all candidates started with step **C**. Thereafter, a wide range of errors were seen with no particular common sequence of steps.

(d) The commonest error was to suggest CuC*l*. Many candidates wrote multiples of t formula e.g. C_6Cl_{12}.

(e) Many candidates gained credit for the product at the negative electrode. Some went incorrectly suggest copper(II), which refers to an ion rather than an element. Fewer gave chlor as the product at the positive electrode. The commonest errors were to suggest chloride o oxygen.

(f) Many candidates correctly identified chlorine. Those who did not, appeared to guess and a wide range of incorrect answers was seen, for example ammonia, hydrogen, nitrogen, oxygen, carbon dioxide.

CHEMISTRY (US)

Paper 0439/31

Extended Theory

Key Message

There were instances of candidates not awarded full credit for some parts because they had not responded to the requirements of the question. There was some evidence that candidates were not checking the paper after the required number of questions had been completed. On many scripts, contradictory comments which negated a correct response were found.

Candidates would benefit from further preparation for the organic component of this examination.

Candidates are also encouraged to practise their examination technique, with the completion of past papers.

General Comments

Candidates are reminded to write with clear legible hand writing and appropriate use of the available space.

Comments on Specific Questions

Question 1

(a) The was generally answered correctly.

(b) Most candidates answered this correctly.

(c) A common incorrect response was carbon, which is not a metal. Inert electrodes are made from platinum, gold, titanium and mercury.

(d) This was answered correctly by many candidates.

(e) The most common correct response was argon but any isoelectronic cation or anion was accepted.

(f) Most candidates correctly named an element that has the same electronic distribution as Ca^{2+}.

(g) Polonium was more popular than the correct response, tellurium. Candidates often did not count hydrogen and helium as Period 1.

Question 2

(a) A comparison of the physical properties of iron and potassium was needed. Credit was not given if chemical properties were included or there was no element of comparison.

(b) Typical errors were potassium oxide not hydroxide, zinc hydroxide not oxide and copper reacted with water.

Question 3

(a) (i) and (ii)

The majority of candidates were aware of the industrial methods of obtaining both nitrogen and hydrogen but failed to give sufficient detail. Those who could not recall the methods used, often resorted to fractional distillation as a general method. Cracking as a method of making hydrogen only gained partial credit.

(b) (i) **C** was correctly identified by some candidates.

(ii) This extended prose question required planning to avoid contradictions, ambiguities and omissio Candidates needed to introduce an element of structure to ensure coherence to the response.

(iii) Most candidates commented that catalysts increase the reaction rate. A good number of responses commented that the presence of a catalyst made it possible to reduce the operating temperature with a consequent increase in yield and yet have a viable rate. The idea of a decrease in activation energy was allowed on this paper, but would not be accepted on any post 16 paper.

Question 4

(a) (i) Many of the answers were too imprecise to gain credit.

(ii) The labelling F, S and O was usually correct.

(iii) The explanation had to relate to the shape of the graph, this was not always the case.

(b) The graph had to start at the origin, have an initial smaller gradient and finish with the same final mass. These sketched graphs would have benefited from being drawn with greater care.

(c) (i) Larger lumps would have smaller surface area so the collision rate would decrease as would the reaction rate.

(ii) Most candidates seemed to have a good understanding of the theory of reaction rate.

(d) The method was frequently not apparent, but a creditworthy answer which was often obtained.

Question 5

(a) (i) Candidates should rely on the definition, 'same molecular formula but different structural formula or structure' and not attempt to explain in terms of atoms. The term c*hemical formula* is meaningless and must be avoided.

(ii) Pent-2-ene was usually not given and the more demanding methylbutene was selected.

(b) (i), (ii) and (iii)
The majority of candidates could not recall the addition reactions of the alkenes and this would suggest that candidates would benefit from further preparation for the organic component of this examination.

(c) (i) Some candidates recognised the pattern given in the question.

(ii) The colour change purple/pink was quite well known.

(d) The ability to draw the structural formula of this type of polymer has improved since last November.

Question 6

(a) (i) The most common error was to state negative ions not electrons.

(ii) Some candidates could explain why lead is malleable.

(b (i) Only a minority realised that the anhydrous salt was hydrated and this is the cause of the colour change.

(ii) Only a few candidates realised that this is acid-base chemistry.

(iii) Naming these last two substances proved to be challenging.

(c) Many candidates identified x and y, but did not go onto arrive at the correct formula.

Question 7

(a) (i) Some candidates were able to explain the phrase.

(ii) The majority were aware of the pivotal need for light in this type of reaction.

(b) This question was correctly answered by most of the candidates.

(c) A large proportion of the candidates gained credit for this question.

CHEMISTRY (US)

Paper 0439/51
Practical Test

Key messages

Burette readings should be recorded to one decimal place and it is not possible for the initial reading on the burette to be greater than the final reading.

In qualitative analysis exercises, candidates must follow the instructions given and record all observations. Candidates should be aware that the mark allocation reflects the number of valid points to be made for parts of questions.

General comments

The majority of candidates successfully attempted and completed both questions. However, a few candidates failed to follow the instructions as detailed in certain parts of the questions.

A few Centres did not submit any Supervisors' results with the candidates' scripts, while a significant minority only recorded results for Question 1 and none for Question 2. Centres are reminded that these results are used when marking to compare with the candidates' responses, particularly in Question 1.

Some Centres recorded unexpected volumes of acid in experiments 1 and 2 in **Question 1**. Centres should ensure that the Confidential Instructions are followed.

Comments on specific questions

Question 1

(a) and (b)

The tables of results were completed by all of the candidates. A minority of candidates recorded initial burette readings greater than the final burette readings. Some candidates recorded volumes to the nearest whole number only and lost credit. Burette readings should be recorded to one decimal place. There was often a wide variation in the results produced by different candidates from the same Centre. A significant number of candidates had burette readings under 10 cm^3 in experiment 2.

(c) The colour changes were usually correctly recorded, with full credit being given for colourless to pink. White, clear or transparent were common incorrect starting colours. Purple given as a final colour was ignored.

(d) Most candidates recognised that a neutralisation reaction had occurred.

(e) Partial credit was awarded for recognising that double the volume of sodium hydroxide would be required to react with 50 cm^3 of acid **K**. Full credit was given for candidates doubling their value from experiment 1 and giving the correct unit.

(f) (i) More able candidates clearly described the effect of the calcium carbonate reacting with the acid, thus reducing the volume of sodium hydroxide used. Many candidates answered in terms of what they observed, describing effervescence and the evolution of carbon dioxide.

(ii) Only the more able candidates were able to correctly calculate the difference in volume.

(iii) Many candidates answered this question incorrectly.

(g) Only the more able candidates understood that the results would be unaffe concentrations and volumes of the reactants in the titrations were unchanged. Most answered in terms of the reaction rate increasing and consequently more or less sodium h would be used.

(h) (i) Having used a measuring cylinder in the experiments, almost all candidates were able to describe an advantage of using a pipette as being more accurate.

(ii) Only a minority of candidates were able to realise that using a polystyrene cup would have no advantages, as temperature measurement was not involved in the experiments. Most answers referred to the insulating effect of the cup which was irrelevant. A large number of responses mentioned the ease of disposal of the cups, the fact that glass containers break easily or that the contents of the polystyrene cup could not be seen.

Question 2

(a) Most candidates were able to state that the appearance of liquid **F** was colourless or yellow, although some thought it was white or clear. Incorrect references to precipitates were common.

(b) The formation of a yellow/red/brown solution, followed by the formation of layers was expected. Many orange colourations were recorded and many candidates failed to record the presence of layers and the colours of these layers. The formation of precipitates did not gain credit.

(c) A significant number of candidates recorded the formation of a white precipitate, colour changes or effervescence.

(d) This question was generally well answered, with the recognition of a yellow precipitate. Some candidates incorrectly noted the colour of the precipitate as cream or white.

(e) The formation of a brown or white precipitate was often recognised.

(f) Only the more able candidates gained full credit. Reference to effervescence and the formation of a yellow solution was often missing.

The addition of starch solution should have produced a blue/black colouration showing the formation of iodine. However, some candidates did not record this observation. Other candidates recorded the formation of a black precipitate, which was incorrect.

(g) A significant number of candidates suggested the iodine was reacting or displacing bromine. Good responses referred to the iodine dissolving in liquid **L**.

(h) Most candidates gained partial credit for referring to the organic nature of liquid **M**. Many responses mentioned immiscibility or oils which received credit. Reference to transition metal ions was ignored.

(i) Credit was given for recognition of a positive test for iodide ions in **(d).** References to bromide, chloride and halide ions were ignored.