UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/11**

Paper 1 Multiple Choice **May/June 2013**

45 Minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

IB13 06_0620_11/RP

UNIVERSITY of CAMBRIDGE International Examinations

1 The diagram shows a cup of tea.

Which row describes the water particles in the air above the cup compared with the water particles in the cup?

	moving faster	closer together
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

2 Crystals of sodium chloride were prepared by the following method.

1 25.0 cm^3 of dilute hydrochloric acid was accurately measured into a conical flask.

2 Aqueous sodium hydroxide was added until the solution was neutral. The volume of sodium hydroxide added was measured.

3 The solution was evaporated and the crystals washed with approximately 15 cm^3 of water.

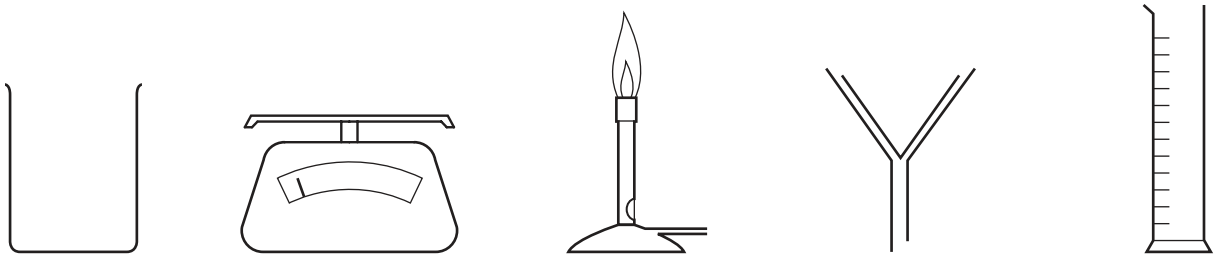
Which row shows the pieces of apparatus used to measure the 25.0 cm^3 of hydrochloric acid, the volume of aqueous sodium hydroxide and the 15 cm^3 of water?

	25.0 cm^3 of hydrochloric acid accurately	the volume of aqueous sodium hydroxide added	15 cm^3 of water approximately
A	burette	pipette	measuring cylinder
B	measuring cylinder	burette	pipette
C	pipette	burette	measuring cylinder
D	pipette	measuring cylinder	burette

3 Lead iodide is insoluble in water.

Lead iodide is made by adding aqueous lead nitrate to aqueous potassium iodide.

Which pieces of apparatus are needed to obtain solid lead iodide from 20 cm^3 of aqueous lead nitrate?



1 2 3 4 5

A 1, 2 and 4 **B** 1, 3 and 5 **C** 1, 4 and 5 **D** 2, 4 and 5

4 Element X is represented by $^{27}_{13}X$.

Which statement about element X is correct?

A An atom of X contains 13 protons and 13 neutrons.

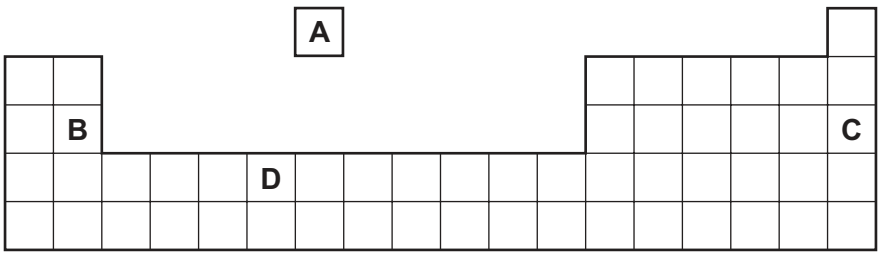
B An atom of X contains 27 protons and 13 electrons.

C X forms an ion by gaining electrons.

D X is placed in Group III of the Periodic Table.

5 The positions of four elements are shown on the outline of the Periodic Table.

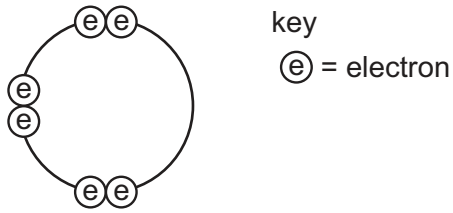
Which element forms a coloured oxide?



6 For which substance is the type of bonding **not** correct?

	substance	type of bonding		
		ionic	covalent	metallic
A	chlorine		✓	
B	potassium bromide	✓		
C	sodium			✓
D	sodium chloride		✓	

7 Element X has six electrons in its outer shell.



How could the element react?

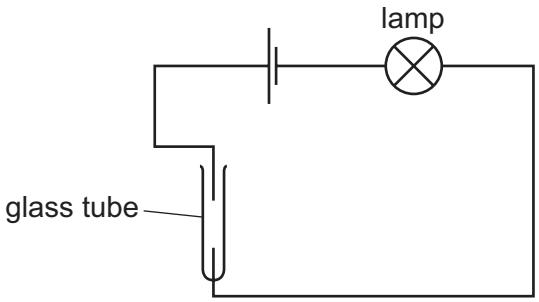
A by gaining two electrons to form a positive ion

B by losing six electrons to form a negative ion

C by sharing two electrons with two electrons from another element to form two covalent bonds

D by sharing two electrons with two electrons from another element to form four covalent bonds

8 The diagram shows an incomplete circuit.



Which substance causes the lamp to light when added to the glass tube?

A aqueous sodium chloride

B aqueous sugar

C solid sodium chloride

D solid sugar

9 A compound with the formula XF_2 has a relative formula mass of 78.

What is element X?

A argon

B calcium

C neon

D zirconium

10 What is the balanced chemical equation for the reaction between calcium and water?

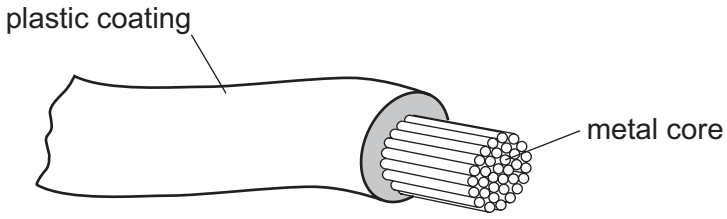
A $Ca + H_2O \rightarrow CaOH + H_2$

B $Ca + H_2O \rightarrow Ca(OH)_2 + H_2$

C $Ca + 2H_2O \rightarrow CaOH + H_2$

D $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

11 The diagram shows an electrical cable.



Which statement about the substances used is correct?

A The coating is plastic because it conducts electricity well.

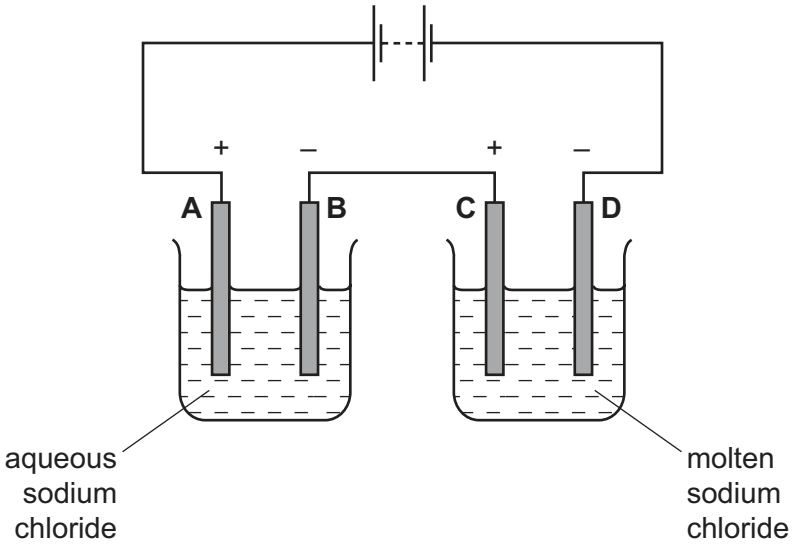
B The core is copper because it conducts electricity well.

C The core is copper because it is cheap and strong.

D The core is iron because it is cheap and strong.

12 The diagram shows an electrolysis circuit.

At which electrode is hydrogen formed?



13 Some white anhydrous copper(II) sulfate powder is put into a beaker of water and stirred.

What would show that the process was exothermic?

A A blue solution is formed.

B The beaker feels cooler.

C The beaker feels warmer.

D The powder dissolves in the water.

14 Which substance does **not** require oxygen in order to produce energy?

A coal

B hydrogen

C natural gas

D ^{235}U

15 The equation shows the formation of anhydrous copper(II) sulfate from hydrated copper(II) sulfate.

$$CuSO_4.5H_2O \rightleftharpoons CuSO_4 + 5H_2O$$

Statements 1, 2 and 3 refer to this reaction.

1 Hydrated copper(II) sulfate is reduced to anhydrous copper(II) sulfate.

2 The (II) in the name copper(II) sulfate refers to the oxidation state of the metal.

3 The reaction is reversible.

Which statements are correct?

A 1 only **B** 1 and 2 **C** 2 and 3 **D** 3 only

16 Calcium carbonate reacts with hydrochloric acid to form carbon dioxide.

Which changes would slow this reaction down?

1 decreasing the concentration of hydrochloric acid

2 decreasing the particle size of calcium carbonate

3 decreasing the temperature

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

17 The equations represent redox reactions.

In which equation is the underlined substance acting as a reducing agent?

A $3\underline{CO} + Fe_2O_3 \rightarrow 2Fe + 3CO_2$

B $\underline{CO_2} + C \rightarrow 2CO$

C $\underline{CuO} + H_2 \rightarrow Cu + H_2O$

D $\underline{CaO} + H_2O \rightarrow Ca(OH)_2$

18 Ant stings hurt because of the methanoic acid produced by the ant.

Which substance could, **most safely**, be used to neutralise the acid?

	substance	pH
A	baking soda	8
B	car battery acid	1
C	lemon juice	3
D	oven cleaner	14

19 The diagram shows one period of the Periodic Table.

Li	Be	B	C	N	O	F	Ne

Which two elements form acidic oxides?

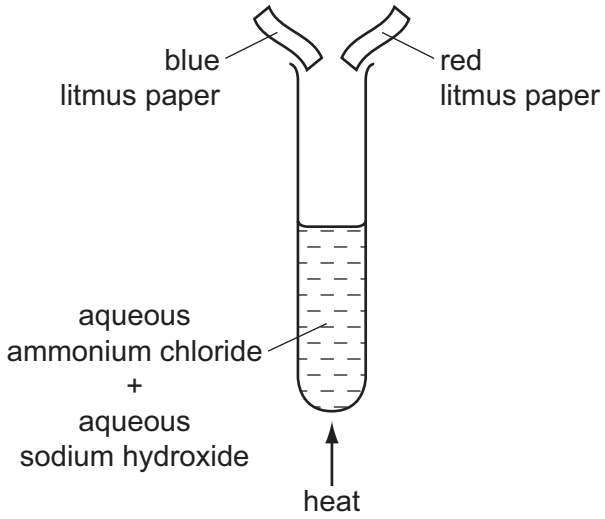
A carbon and lithium

B carbon and neon

C carbon and nitrogen

D nitrogen and neon

20 The diagram shows an experiment.



What happens to the pieces of litmus paper?

	blue litmus paper	red litmus paper
A	changes colour	changes colour
B	changes colour	no colour change
C	no colour change	changes colour
D	no colour change	no colour change

21 Two indicators, bromophenol blue and Congo red, show the following colours in acidic solutions and in alkaline solutions.

indicator	acid	alkali
bromophenol blue	yellow	blue
Congo red	violet	red

A few drops of each indicator are added to separate samples of a solution of pH 2.

What are the colours of the indicators in this solution?

	in a solution of pH 2	
	bromophenol blue is	Congo red is
A	blue	red
B	blue	violet
C	yellow	red
D	yellow	violet

22 Which property of elements increases across a period of the Periodic Table?

A metallic character

B number of electron shells

C number of outer shell electrons

D tendency to form positive ions

23 Which element is a transition metal?

	colour of chloride	melting point of element / °C
A	white	113
B	white	1495
C	yellow	113
D	yellow	1495

24 Fluorine is at the top of Group VII in the Periodic Table.

Which row shows the properties of fluorine?

	colour	state at room temperature	reaction with aqueous potassium iodide
A	brown	gas	no reaction
B	brown	liquid	iodine displaced
C	yellow	gas	iodine displaced
D	yellow	liquid	no reaction

25 Group I metals are also known as the Alkali Metals.

Which statement about the metals in Group I is **not** correct?

A In their reactions they lose electrons.

B Their atoms all have one electron in their outer shell.

C They form +1 ions in their reactions with non-metals.

D They form covalent compounds by sharing electrons.

26 Which element is a metal?

	charge on element ion	electrical conductivity
A	negative	low
B	positive	high
C	negative	high
D	positive	low

27 Which property makes aluminium ideal for making food containers?

A conducts electricity

B conducts heat

C mechanical strength

D resistance to corrosion

28 Which substance is **not** involved in the extraction of iron from hematite?

A carbon

B carbon monoxide

C calcium carbonate

D nitrogen

29 Pure metals conduct electricity and can be hammered into different shapes.

Why are metals sometimes used as alloys?

A Alloys are cheaper than the metals they are made from.

B Alloys are easier to hammer into different shapes.

C Alloys are harder and keep their shape better.

D Alloys conduct electricity better.

30 Below are some metals in decreasing order of reactivity.

magnesium

zinc

iron

copper

Titanium reacts with acid and cannot be extracted from its ore by heating with carbon.

Where should titanium be placed in this list?

A below copper

B between iron and copper

C between magnesium and zinc

D between zinc and iron

31 Water has been contaminated with sea-water.

Which substances can be removed by chlorination and filtration?

A bacteria, sand and sodium chloride

B bacteria and sand only

C bacteria and sodium chloride only

D sand and sodium chloride only

32 Iron rusts when it reacts with ……1……

Rusting can be prevented by covering the iron with a more reactive metal, such as ……2……

Which words correctly complete gaps 1 and 2?

	1	2
A	oxygen	copper
B	oxygen	magnesium
C	oxygen and water	copper
D	oxygen and water	magnesium

33 Nitrogen, phosphorus and potassium are essential elements for plant growth.

Which mixture provides all three essential elements?

	mixture	formula
A	ammonium phosphate + potassium chloride	$(NH_4)_3PO_4$ + KCl
B	ammonium phosphate + ammonium nitrate	$(NH_4)_3PO_4$ + NH_4NO_3
C	ammonium phosphate + ammonium chloride	$(NH_4)_3PO_4$ + NH_4Cl
D	ammonium nitrate + potassium chloride	NH_4NO_3 + KCl

34 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

key

✓ = true

✗ = false

35 The list shows four methods that were suggested for the formation of carbon dioxide.

1 action of an alkali on a carbonate

2 action of heat on a carbonate

3 complete combustion of methane

4 reaction of a carbonate with oxygen

Which methods would result in the production of carbon dioxide?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

36 Organic compounds may have names ending in -ane, -ene, -ol or -oic acid.

How many of these endings indicate the compounds contain double bonds in their molecules?

A 1 **B** 2 **C** 3 **D** 4

37 The table shows the boiling points of four members of the homologous series of alcohols.

compound		boiling point / °C
name	formula	
methanol	CH_3OH	65
ethanol	C_2H_5OH	78
propanol	C_3H_7OH	X
butanol	C_4H_9OH	117

What is the value of X?

A 55 °C **B** 82 °C **C** 98 °C **D** 115 °C

38 The table shows some fractions that are obtained from petroleum by fractional distillation, together with some of their uses.

fraction	use
refinery gas	cooking
gasoline	fuel for cars
1	making chemicals
2	jet fuel
3	fuel for ships
bitumen	making roads

Which row correctly identifies fractions 1, 2 and 3?

	1	2	3
A	diesel oil	fuel oil	lubricating fraction
B	fuel oil	diesel oil	kerosene
C	kerosene	naphtha	diesel oil
D	naphtha	kerosene	fuel oil

39 Which columns describe the hydrocarbons ethane and ethene?

	1	2	3	4
state at room temperature	gas	gas	liquid	liquid
reaction with oxygen	burns	burns	burns	burns
reaction with aqueous bromine	no reaction	decolourises bromine	no reaction	decolourises bromine

A 1 (ethane) and 2 (ethene)

B 1 (ethane) and 4 (ethene)

C 2 (ethene) and 3 (ethane)

D 3 (ethane) and 4 (ethene)

40 Which of the statements about ethanol are correct?

1 Ethanol can be formed by an addition reaction.

2 Ethanol can be formed by fermentation.

3 When ethanol burns in air, it forms carbon dioxide and water.

A 1, 2 and 3 **B** 1 and 2 **C** 1 and 3 **D** 2 and 3

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DATA SHEET
The Periodic Table of the Elements

Group																		
I	II										III	IV	V	VI	VII	0
																4 **He** Helium 2
					1 **H** Hydrogen 1											
7 **Li** Lithium 3	9 **Be** Beryllium 4										11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12										27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a	a = relative atomic mass
X	**X** = atomic symbol
b	b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).