

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**CHEMISTRY**

**5070/21**

Paper 2 Theory

**October/November 2019**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE IN ANY BARCODES.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided in the Question Paper.

**Section B**

Answer any **three** questions.

Write your answers in the spaces provided in the Question Paper.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

A copy of the Periodic Table is printed on page 20.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **18** printed pages and **2** blank pages.

## Section A

Answer **all** the questions in this section in the spaces provided.

The total mark for this section is 45.

- 1 The diagram shows part of the Periodic Table.

												B	C	
	Mg						Fe					Al	Si	P
				V						Cu	Zn			

Answer the questions using only the elements shown in the diagram.

Each element may be used once, more than once or not at all.

Write the symbol for an element which:

- (a) forms a stable ion by gaining three electrons

..... [1]

- (b) is extracted from haematite

..... [1]

- (c) forms an ion which gives a red-brown precipitate on addition of aqueous ammonia

..... [1]

- (d) has chemical properties similar to those of calcium

..... [1]

- (e) can have lubricating properties.

..... [1]

[Total: 5]

2 Sodium is a metal.

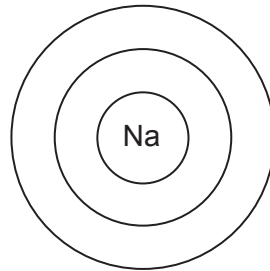
(a) State two physical properties of sodium which are different from most other metals.

1 .....

2 .....

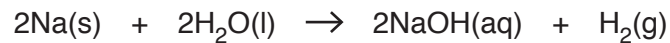
[2]

(b) Complete the electronic configuration of a sodium atom. Show all electrons.



[1]

(c) The equation shows the reaction of sodium with water.



Calculate the minimum mass of sodium, in grams, needed to produce  $300\text{ cm}^3$  of hydrogen gas at room temperature and pressure.

Give your answer to **three** significant figures.

mass of sodium ..... g [3]

(d) Sodium reacts with oxygen to form the ionic solid sodium oxide,  $\text{Na}_2\text{O}$ .

Explain, in terms of movement of electrons, how  $\text{Na}_2\text{O}$  is formed by the reaction of sodium with oxygen.

.....

.....

.....

..... [3]

(e) Sodium chloride is an ionic compound which is a solid at room temperature. It is soluble in water.

(i) Suggest one other physical property of sodium chloride.

..... [1]

(ii) State the products formed at the anode and cathode when concentrated aqueous sodium chloride is electrolysed.

product at anode .....

product at cathode .....

[1]

(iii) Describe a test for chloride ions.

test .....

observation .....

[2]

[Total: 13]

3 Water can be removed from aqueous copper(II) sulfate by distillation.

- (a) Describe how and explain why water can be separated from aqueous copper(II) sulfate by distillation.

In your answer include a description of distillation.

You may draw a labelled diagram.

.....

.....

.....

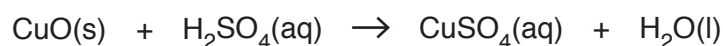
.....

.....

.....

..... [3]

- (b) Copper(II) sulfate can be prepared by heating excess copper(II) oxide with dilute sulfuric acid.



What method is used to separate excess copper(II) oxide from the reaction mixture?

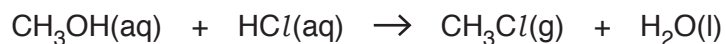
..... [1]

- (c) A copper compound contains 21.09% copper, 43.82% caesium and 35.09% chlorine by mass. Use this information to deduce the empirical formula of this copper compound.

empirical formula ..... [2]

4 This question is about compounds containing chlorine.

(a) The equation shows the reaction of aqueous methanol with hydrochloric acid.



The progress of this reaction can be followed by taking small samples of the reaction mixture every hour and determining the concentration of hydrochloric acid.

Describe a practical method by which the concentration of hydrochloric acid can be determined in a sample.

.....

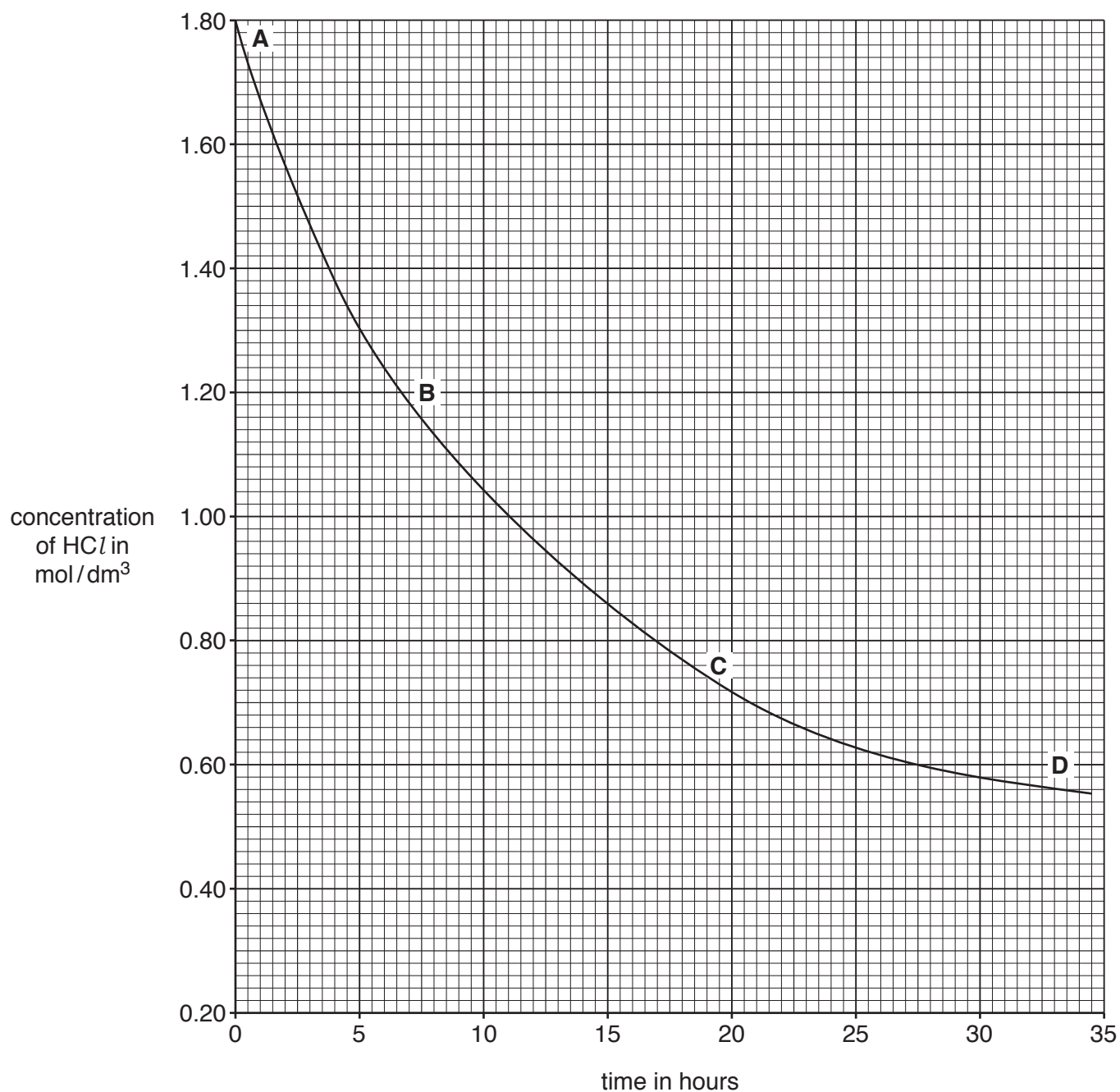
.....

.....

.....

..... [3]

- (b) The graph shows how the concentration of hydrochloric acid changes as the reaction proceeds.



- (i) Deduce the concentration of hydrochloric acid four hours from the start of the experiment.

..... mol/dm<sup>3</sup> [1]

- (ii) At which point on the graph, **A**, **B**, **C** or **D**, is the rate of reaction fastest?

Give a reason for your answer by referring to the graph.

.....  
 ..... [2]

- (c) Describe and explain, using ideas about collisions between particles, how the rate of a reaction changes when the temperature is decreased.

All other conditions stay the same.

.....

.....

.....

.....

..... [3]

- (d) Describe the effect of hydrochloric acid on Universal Indicator paper. .... [1]

- (e) Name a metal chloride that is insoluble in water. .... [1]

- (f) Chlorofluorocarbons (CFCs) diffuse into the atmosphere.  
Describe the effect of CFCs on the atmosphere and explain why this is a problem.  
effect .....  
.....  
explanation .....  
..... [2]

[Total: 13]



5 The table shows some properties of four Group VII elements.

element	melting point in °C	boiling point in °C	density of liquid at boiling point in g/cm <sup>3</sup>	colour
chlorine	-101	-35		light green
bromine	-7		3.12	red-brown
iodine	114	184	4.93	grey-black
astatine	302	337	6.35	

(a) (i) Complete the table by estimating

- the boiling point of bromine
- the density of liquid chlorine at its boiling point.

[2]

(ii) Use the information in the table to suggest the colour of astatine.

..... [1]

(b) Explain why chlorine is used in water treatment.

..... [1]

(c) Chlorine reacts with aqueous potassium iodide. The products are aqueous potassium chloride and aqueous iodine.

(i) Construct the ionic equation for this reaction.

..... [1]

(ii) Explain why potassium chloride does not react with iodine.

..... [1]

(d) Hydrated nickel(II) chloride has the formula  $\text{NiCl}_2 \cdot x\text{H}_2\text{O}$ .  
It has a relative formula mass of 238.

Calculate the value of x in this formula.

[The relative atomic mass of nickel, Ni, is 59]

x = ..... [2]

[Total: 8]

## Section B

Answer **three** questions from this section in the spaces provided.

The total mark for this section is 30.

6 Ethanoic acid,  $\text{CH}_3\text{COOH}$ , is a weak acid.

(a) What is the meaning of the term *weak* when applied to acids?

.....  
..... [1]

(b) Ethanoic acid is solid at  $16.0^\circ\text{C}$ .

Describe the arrangement and movement of the particles in a solid.

arrangement .....

movement ..... [2]

(c) The melting point of ethanoic acid is  $16.7^\circ\text{C}$ .

The boiling point of ethanoic acid is  $118.0^\circ\text{C}$ .

Deduce the physical state of ethanoic acid at  $130.0^\circ\text{C}$ .

Explain your answer.

.....  
..... [1]

(d) The equation for the reaction of ethanoic acid with sodium carbonate is shown.



A student added 3.18 g of sodium carbonate to 224 cm<sup>3</sup> of 0.250 mol/dm<sup>3</sup> ethanoic acid.

Show by calculation that sodium carbonate is in excess.

[3]

(e) Calcium reacts with ethanoic acid.

The products are calcium ethanoate and hydrogen.

Construct the equation for this reaction.

..... [1]

(f) Ethanoic acid reacts with butanol, C<sub>4</sub>H<sub>9</sub>OH, to produce an ester.

(i) Name the ester formed when ethanoic acid reacts with butanol.

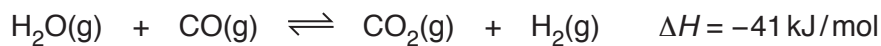
..... [1]

(ii) Draw the structure of this ester.

[1]

[Total: 10]

7 Hydrogen can be produced when steam and carbon monoxide are passed over a catalyst.



- (a) (i) The temperature of the equilibrium mixture is decreased.  
The pressure on the equilibrium mixture is kept constant.

Describe how and explain why the position of equilibrium changes.

.....  
.....  
..... [2]

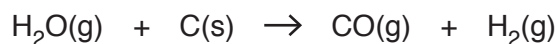
- (ii) The pressure on the equilibrium mixture is increased.  
The temperature of the equilibrium mixture is kept constant.

Explain why the change in pressure has no effect on this equilibrium.

.....  
..... [1]

(b) Hydrogen is also produced when steam is passed over hot coke (carbon).

This reaction is endothermic.



(i) On the axes below draw a labelled energy profile diagram for the reaction to show:

- the reactants and products
- the enthalpy change for the reaction
- the activation energy of the reaction.

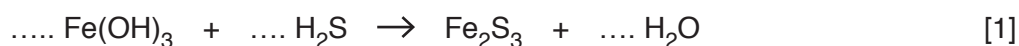


[3]

(ii) The mixture of gases produced when steam is passed over hot coke also contains hydrogen sulfide,  $\text{H}_2\text{S}$ , as an impurity.

This can be removed by reacting the gas with moist iron(III) hydroxide.

Complete the equation for this reaction.



(c) Fossil fuels contain small amounts of sulfur.

(i) Describe how the combustion of fossil fuels leads to the formation of acid rain.

.....  
 .....  
 ..... [2]

(ii) Describe one effect of acid rain on buildings.

..... [1]

[Total: 10]

8 Silicon is an element in Group IV of the Periodic Table.

(a) One of the isotopes of silicon is:



Deduce the number of electrons, neutrons and protons in one atom of this isotope of silicon.

number of electrons .....

number of neutrons .....

number of protons .....

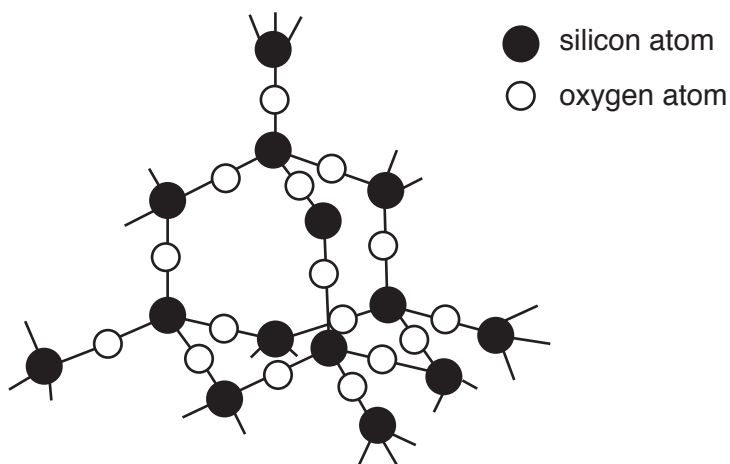
[3]

(b) Silicon reacts with nitrogen when heated to produce silicon nitride,  $\text{Si}_3\text{N}_4$ .

Construct the equation for this reaction.

..... [1]

(c) The structure of silicon dioxide is shown.



(i) Describe two similarities in the structures of silicon dioxide and diamond.

1 .....

.....

2 .....

.....

[2]

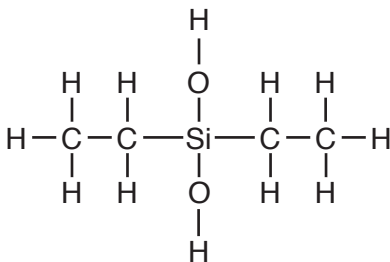
(ii) Explain why silicon dioxide has a high melting point.

.....

.....

..... [2]

(d) The structure of a compound of silicon is shown.



Deduce the molecular formula of this compound.

..... [1]

(e) Draw a 'dot-and-cross' diagram for a silicon(IV) chloride molecule,  $\text{SiCl}_4$ .

Only include the outer shell electrons.

[1]

[Total: 10]

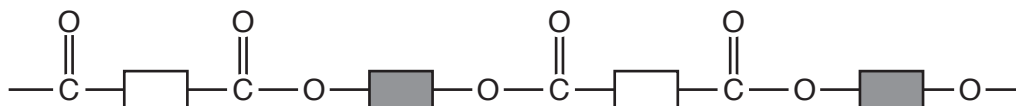
9 This question is about polymers.

(a) Polyesters and polyamides are both polymers formed by condensation reactions.

What is meant by the term *condensation reaction*?

.....  
 ..... [1]

(b) The partial structure of a polyester is shown.



(i) On the diagram, draw a circle around an ester linkage. [1]

(ii) Draw the structures of the **two** monomers used to produce this polymer.

[2]

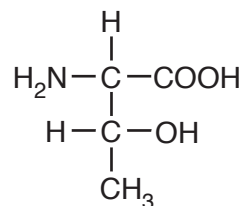
(iii) *Terylene* is a polyester.

State one common use of *Terylene*.

..... [1]



(c) The structure of the amino acid threonine is shown.



Threonine can be polymerised.

Explain, by referring to the groups present, why polymers with different linkages can be formed from threonine.

.....  
 .....  
 ..... [2]

(d) Poly(ethene) is made from ethene monomers.

(i) Draw the structure of ethene, showing all of the atoms and all of the bonds.

[1]

(ii) Poly(ethene) is a non-biodegradable plastic.

What is meant by the term *non-biodegradable*?

.....  
 ..... [1]

(iii) Describe one pollution problem caused by the disposal of non-biodegradable plastics.

.....  
 ..... [1]

[Total: 10]



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## The Periodic Table of Elements

		Group																																																																																																																																																																																																																																																																																																																																																																																																											
I	II											III	IV	V	VI	VII	VIII																																																																																																																																																																																																																																																																																																																																																																																												
3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9	<b>Key</b> atomic number atomic symbol name relative atomic mass										5 <b>B</b> boron 11	6 <b>C</b> carbon 12	7 <b>N</b> nitrogen 14	8 <b>O</b> oxygen 16	9 <b>F</b> fluorine 19	10 <b>Ne</b> neon 20																																																																																																																																																																																																																																																																																																																																																																																												
11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24											13 <b>Al</b> aluminium 27	14 <b>Si</b> silicon 28	15 <b>P</b> phosphorus 31	16 <b>S</b> sulfur 32	17 <b>Cl</b> chlorine 35.5	18 <b>Ar</b> argon 40	19 <b>K</b> potassium 39	20 <b>Ca</b> calcium 40	21 <b>Sc</b> scandium 45	22 <b>Ti</b> titanium 48	23 <b>V</b> vanadium 51	24 <b>Cr</b> chromium 52	25 <b>Mn</b> manganese 55	26 <b>Fe</b> iron 56	27 <b>Co</b> cobalt 59	28 <b>Ni</b> nickel 59	29 <b>Cu</b> copper 64	30 <b>Zn</b> zinc 65	31 <b>Ga</b> gallium 70	32 <b>Ge</b> germanium 73	33 <b>As</b> arsenic 75	34 <b>Se</b> selenium 79	35 <b>Br</b> bromine 80	36 <b>Kr</b> krypton 84																																																																																																																																																																																																																																																																																																																																																																										
37 <b>Rb</b> rubidium 85	38 <b>Sr</b> strontium 88	39 <b>Y</b> yttrium 89	40 <b>Zr</b> zirconium 91	41 <b>Nb</b> niobium 93	42 <b>Mo</b> molybdenum 96	43 <b>Tc</b> technetium —	44 <b>Ru</b> ruthenium 101	45 <b>Rh</b> rhodium 103	46 <b>Pd</b> palladium 106	47 <b>Ag</b> silver 108	48 <b>Cd</b> cadmium 112	49 <b>In</b> indium 115	50 <b>Sn</b> tin 119	51 <b>Sb</b> antimony 122	52 <b>Te</b> tellurium 128	53 <b>I</b> iodine 127	54 <b>Xe</b> xenon 131	55 <b>Cs</b> caesium 133	56 <b>Ba</b> barium 137	57–71 lanthanoids	72 <b>Hf</b> hafnium 178	73 <b>Ta</b> tantalum 181	74 <b>W</b> tungsten 184	75 <b>Re</b> rhenium 186	76 <b>Os</b> osmium 190	77 <b>Ir</b> iridium 192	78 <b>Pt</b> platinum 195	79 <b>Au</b> gold 197	80 <b>Hg</b> mercury 201	81 <b>Tl</b> thallium 204	82 <b>Pb</b> lead 207	83 <b>Bi</b> bismuth 209	84 <b>Po</b> polonium —	85 <b>At</b> astatine —	86 <b>Rn</b> radon —																																																																																																																																																																																																																																																																																																																																																																										
87 <b>Fr</b> francium —	88 <b>Ra</b> radium —	89–103 actinoids	104 <b>Rf</b> rutherfordium —	105 <b>Db</b> dubnium —	106 <b>Sg</b> seaborgium —	107 <b>Bh</b> bohrium —	108 <b>Hs</b> hassium —	109 <b>Mt</b> meitnerium —	110 <b>Ds</b> darmstadtium —	111 <b>Rg</b> roentgenium —	112 <b>Cn</b> copernicium —	113 <b>Nh</b> nihonium —	114 <b>Fl</b> flerovium —	115 <b>Mc</b> moscovium —	116 <b>Lv</b> livermorium —	117 <b>Ts</b> tennessine —	118 <b>Og</b> oganeson —	119 <b>Uue</b> unbinilium —	120 <b>Uub</b> unbinilium —	121 <b>Uut</b> ununilium —	122 <b>Uuq</b> ununilium —	123 <b>Uub</b> ununilium —	124 <b>Uut</b> ununilium —	125 <b>Uuq</b> ununilium —	126 <b>Uur</b> ununilium —	127 <b>Uus</b> ununilium —	128 <b>Uuo</b> ununilium —	129 <b>Uuq</b> ununilium —	130 <b>Uur</b> ununilium —	131 <b>Uus</b> ununilium —	132 <b>Uuo</b> ununilium —	133 <b>Uuq</b> ununilium —	134 <b>Uur</b> ununilium —	135 <b>Uus</b> ununilium —	136 <b>Uuo</b> ununilium —	137 <b>Uuq</b> ununilium —	138 <b>Uur</b> ununilium —	139 <b>Uus</b> ununilium —	140 <b>Uuo</b> ununilium —	141 <b>Uuq</b> ununilium —	142 <b>Uur</b> ununilium —	143 <b>Uus</b> ununilium —	144 <b>Uuo</b> ununilium —	145 <b>Uuq</b> ununilium —	146 <b>Uur</b> ununilium —	147 <b>Uus</b> ununilium —	148 <b>Uuo</b> ununilium —	149 <b>Uuq</b> ununilium —	150 <b>Uur</b> ununilium —	151 <b>Uus</b> ununilium —	152 <b>Uuo</b> ununilium —	153 <b>Uuq</b> ununilium —	154 <b>Uur</b> ununilium —	155 <b>Uus</b> ununilium —	156 <b>Uuo</b> ununilium —	157 <b>Uuq</b> ununilium —	158 <b>Uur</b> ununilium —	159 <b>Uus</b> ununilium —	160 <b>Uuo</b> ununilium —	161 <b>Uuq</b> ununilium —	162 <b>Uur</b> ununilium —	163 <b>Uus</b> ununilium —	164 <b>Uuo</b> ununilium —	165 <b>Uuq</b> ununilium —	166 <b>Uur</b> ununilium —	167 <b>Uus</b> ununilium —	168 <b>Uuo</b> ununilium —	169 <b>Uuq</b> ununilium —	170 <b>Uur</b> ununilium —	171 <b>Uus</b> ununilium —	172 <b>Uuo</b> ununilium —	173 <b>Uuq</b> ununilium —	174 <b>Uur</b> ununilium —	175 <b>Uus</b> ununilium —	176 <b>Uuo</b> ununilium —	177 <b>Uuq</b> ununilium —	178 <b>Uur</b> ununilium —	179 <b>Uus</b> ununilium —	180 <b>Uuo</b> ununilium —	181 <b>Uuq</b> ununilium —	182 <b>Uur</b> ununilium —	183 <b>Uus</b> ununilium —	184 <b>Uuo</b> ununilium —	185 <b>Uuq</b> ununilium —	186 <b>Uur</b> ununilium —	187 <b>Uus</b> ununilium —	188 <b>Uuo</b> ununilium —	189 <b>Uuq</b> ununilium —	190 <b>Uur</b> ununilium —	191 <b>Uus</b> ununilium —	192 <b>Uuo</b> ununilium —	193 <b>Uuq</b> ununilium —	194 <b>Uur</b> ununilium —	195 <b>Uus</b> ununilium —	196 <b>Uuo</b> ununilium —	197 <b>Uuq</b> ununilium —	198 <b>Uur</b> ununilium —	199 <b>Uus</b> ununilium —	200 <b>Uuo</b> ununilium —	201 <b>Uuq</b> ununilium —	202 <b>Uur</b> ununilium —	203 <b>Uus</b> ununilium —	204 <b>Uuo</b> ununilium —	205 <b>Uuq</b> ununilium —	206 <b>Uur</b> ununilium —	207 <b>Uus</b> ununilium —	208 <b>Uuo</b> ununilium —	209 <b>Uuq</b> ununilium —	210 <b>Uur</b> ununilium —	211 <b>Uus</b> ununilium —	212 <b>Uuo</b> ununilium —	213 <b>Uuq</b> ununilium —	214 <b>Uur</b> ununilium —	215 <b>Uus</b> ununilium —	216 <b>Uuo</b> ununilium —	217 <b>Uuq</b> ununilium —	218 <b>Uur</b> ununilium —	219 <b>Uus</b> ununilium —	220 <b>Uuo</b> ununilium —	221 <b>Uuq</b> ununilium —	222 <b>Uur</b> ununilium —	223 <b>Uus</b> ununilium —	224 <b>Uuo</b> ununilium —	225 <b>Uuq</b> ununilium —	226 <b>Uur</b> ununilium —	227 <b>Uus</b> ununilium —	228 <b>Uuo</b> ununilium —	229 <b>Uuq</b> ununilium —	230 <b>Uur</b> ununilium —	231 <b>Uus</b> ununilium —	232 <b>Uuo</b> ununilium —	233 <b>Uuq</b> ununilium —	234 <b>Uur</b> ununilium —	235 <b>Uus</b> ununilium —	236 <b>Uuo</b> ununilium —	237 <b>Uuq</b> ununilium —	238 <b>Uur</b> ununilium —	239 <b>Uus</b> ununilium —	240 <b>Uuo</b> ununilium —	241 <b>Uuq</b> ununilium —	242 <b>Uur</b> ununilium —	243 <b>Uus</b> ununilium —	244 <b>Uuo</b> ununilium —	245 <b>Uuq</b> ununilium —	246 <b>Uur</b> ununilium —	247 <b>Uus</b> ununilium —	248 <b>Uuo</b> ununilium —	249 <b>Uuq</b> ununilium —	250 <b>Uur</b> ununilium —	251 <b>Uus</b> ununilium —	252 <b>Uuo</b> ununilium —	253 <b>Uuq</b> ununilium —	254 <b>Uur</b> ununilium —	255 <b>Uus</b> ununilium —	256 <b>Uuo</b> ununilium —	257 <b>Uuq</b> ununilium —	258 <b>Uur</b> ununilium —	259 <b>Uus</b> ununilium —	260 <b>Uuo</b> ununilium —	261 <b>Uuq</b> ununilium —	262 <b>Uur</b> ununilium —	263 <b>Uus</b> ununilium —	264 <b>Uuo</b> ununilium —	265 <b>Uuq</b> ununilium —	266 <b>Uur</b> ununilium —	267 <b>Uus</b> ununilium —	268 <b>Uuo</b> ununilium —	269 <b>Uuq</b> ununilium —	270 <b>Uur</b> ununilium —	271 <b>Uus</b> ununilium —	272 <b>Uuo</b> ununilium —	273 <b>Uuq</b> ununilium —	274 <b>Uur</b> ununilium —	275 <b>Uus</b> ununilium —	276 <b>Uuo</b> ununilium —	277 <b>Uuq</b> ununilium —	278 <b>Uur</b> ununilium —	279 <b>Uus</b> ununilium —	280 <b>Uuo</b> ununilium —	281 <b>Uuq</b> ununilium —	282 <b>Uur</b> ununilium —	283 <b>Uus</b> ununilium —	284 <b>Uuo</b> ununilium —	285 <b>Uuq</b> ununilium —	286 <b>Uur</b> ununilium —	287 <b>Uus</b> ununilium —	288 <b>Uuo</b> ununilium —	289 <b>Uuq</b> ununilium —	290 <b>Uur</b> ununilium —	291 <b>Uus</b> ununilium —	292 <b>Uuo</b> ununilium —	293 <b>Uuq</b> ununilium —	294 <b>Uur</b> ununilium —	295 <b>Uus</b> ununilium —	296 <b>Uuo</b> ununilium —	297 <b>Uuq</b> ununilium —	298 <b>Uur</b> ununilium —	299 <b>Uus</b> ununilium —	300 <b>Uuo</b> ununilium —	301 <b>Uuq</b> ununilium —	302 <b>Uur</b> ununilium —	303 <b>Uus</b> ununilium —	304 <b>Uuo</b> ununilium —	305 <b>Uuq</b> ununilium —	306 <b>Uur</b> ununilium —	307 <b>Uus</b> ununilium —	308 <b>Uuo</b> ununilium —	309 <b>Uuq</b> ununilium —	310 <b>Uur</b> ununilium —	311 <b>Uus</b> ununilium —	312 <b>Uuo</b> ununilium —	313 <b>Uuq</b> ununilium —	314 <b>Uur</b> ununilium —	315 <b>Uus</b> ununilium —	316 <b>Uuo</b> ununilium —	317 <b>Uuq</b> ununilium —	318 <b>Uur</b> ununilium —	319 <b>Uus</b> ununilium —	320 <b>Uuo</b> ununilium —	321 <b>Uuq</b> ununilium —	322 <b>Uur</b> ununilium —	323 <b>Uus</b> ununilium —	324 <b>Uuo</b> ununilium —	325 <b>Uuq</b> ununilium —	326 <b>Uur</b> ununilium —	327 <b>Uus</b> ununilium —	328 <b>Uuo</b> ununilium —	329 <b>Uuq</b> ununilium —	330 <b>Uur</b> ununilium —	331 <b>Uus</b> ununilium —	332 <b>Uuo</b> ununilium —	333 <b>Uuq</b> ununilium —	334 <b>Uur</b> ununilium —	335 <b>Uus</b> ununilium —	336 <b>Uuo</b> ununilium —	337 <b>Uuq</b> ununilium —	338 <b>Uur</b> ununilium —	339 <b>Uus</b> ununilium —	340 <b>Uuo</b> ununilium —	341 <b>Uuq</b> ununilium —	342 <b>Uur</b> ununilium —	343 <b>Uus</b> ununilium —	344 <b>Uuo</b> ununilium —	345 <b>Uuq</b> ununilium —	346 <b>Uur</b> ununilium —	347 <b>Uus</b> ununilium —	348 <b>Uuo</b> ununilium —	349 <b>Uuq</b> ununilium —	350 <b>Uur</b> ununilium —	351 <b>Uus</b> ununilium —	352 <b>Uuo</b> ununilium —	353 <b>Uuq</b> ununilium —	354 <b>Uur</b> ununilium —	355 <b>Uus</b> ununilium —	356 <b>Uuo</b> ununilium —	357 <b>Uuq</b> ununilium —	358 <b>Uur</b> ununilium —	359 <b>Uus</b> ununilium —	360 <b>Uuo</b> ununilium —	361 <b>Uuq</b> ununilium —	362 <b>Uur</b> ununilium —	363 <b>Uus</b> ununilium —	364 <b>Uuo</b> ununilium —	365 <b>Uuq</b> ununilium —	366 <b>Uur</b> ununilium —	367 <b>Uus</b> ununilium —	368 <b>Uuo</b> ununilium —	369 <b>Uuq</b> ununilium —	370 <b>Uur</b> ununilium —	371 <b>Uus</b> ununilium —	372 <b>Uuo</b> ununilium —	373 <b>Uuq</b> ununilium —	374 <b>Uur</b> ununilium —	375 <b>Uus</b> ununilium —	376 <b>Uuo</b> ununilium —	377 <b>Uuq</b> ununilium —	378 <b>Uur</b> ununilium —	379 <b>Uus</b> ununilium —	380 <b>Uuo</b> ununilium —	381 <b>Uuq</b> ununilium —	382 <b>Uur</b> ununilium —	383 <b>Uus</b> ununilium —	384 <b>Uuo</b> ununilium —	385 <b>Uuq</b> ununilium —	386 <b>Uur</b> ununilium —	387 <b>Uus</b> ununilium —	388 <b>Uuo</b> ununilium —	389 <b>Uuq</b> ununilium —	390 <b>Uur</b> ununilium —	391 <b>Uus</b> ununilium —	392 <b>Uuo</b> ununilium —	393 <b>Uuq</b> ununilium —	394 <b>Uur</b> ununilium —	395 <b>Uus</b> ununilium —	396 <b>Uuo</b> ununilium —	397 <b>Uuq</b> ununilium —	398 <b>Uur</b> ununilium —	399 <b>Uus</b> ununilium —	400 <b>Uuo</b> ununilium —	401 <b>Uuq</b> ununilium —	402 <b>Uur</b> ununilium —	403 <b>Uus</b> ununilium —	404 <b>Uuo</b> ununilium —	405 <b>Uuq</b> ununilium —	406 <b>Uur</b> ununilium —	407 <b>Uus</b> ununilium —	408 <b>Uuo</b> ununilium —	409 <b>Uuq</b> ununilium —	410 <b>Uur</b> ununilium —	411 <b>Uus</b> ununilium —	412 <b>Uuo</b> ununilium —	413 <b>Uuq</b> ununilium —	414 <b>Uur</b> ununilium —	415 <b>Uus</b> ununilium —	416 <b>Uuo</b> ununilium —	417 <b>Uuq</b> ununilium —	418 <b>Uur</b> ununilium —	419 <b>Uus</b> ununilium —	420 <b>Uuo</b> ununilium —	421 <b>Uuq</b> ununilium —	422 <b>Uur</b> ununilium —	423 <b>Uus</b> ununilium —	424 <b>Uuo</b> ununilium —	425 <b>Uuq</b> ununilium —	426 <b>Uur</b> ununilium —	427 <b>Uus</b> ununilium —	428 <b>Uuo</b> ununilium —	429 <b>Uuq</b> ununilium —	430 <b>Uur</b> ununilium —	431 <b>Uus</b> ununilium —	432 <b>Uuo</b> ununilium —	433 <b>Uuq</b> ununilium —	434 <b>Uur</b> ununilium —	435 <b>Uus</b> ununilium —	436 <b>Uuo</b> ununilium —	437 <b>Uuq</b> ununilium —	438 <b>Uur</b> ununilium —	439 <b>Uus</b> ununilium —	440 <b>Uuo</b> ununilium —	441 <b>Uuq</b> ununilium —	442 <b>Uur</b> ununilium —	443 <b>Uus</b> ununilium —	444 <b>Uuo</b> ununilium —	445 <b>Uuq</b> ununilium —	446 <b>Uur</b> ununilium —	447 <b>Uus</b> ununilium —	448 <b>Uuo</b> ununilium —	449 <b>Uuq</b> ununilium —	450 <b>Uur</b> ununilium —	451 <b>Uus</b> ununilium —	452 <b>Uuo</b> ununilium —	453 <b>Uuq</b> ununilium —	454 <b>Uur</b> ununilium —	455 <b>Uus</b> ununilium —	456 <b>Uuo</b> ununilium —	457 <b>Uuq</b> ununilium —	458 <b>Uur</b> ununilium —	459 <b>Uus</b> ununilium —	460 <b>Uuo</b> ununilium —	461 <b>Uuq</b> ununilium —	462 <b>Uur</b> ununilium —	463 <b>Uus</b> ununilium —	464 <b>Uuo</b> ununilium —	465 <b>Uuq</b> ununilium —	466 <b>Uur</b> ununilium —	467 <b>Uus</b> ununilium —	468 <b>Uuo</b> ununilium —	469 <b>Uuq</b> ununilium —	470 <b>Uur</b> ununilium —	471 <b>Uus</b> ununilium —	472 <b>Uuo</b> ununilium —	473 <b>Uuq</b> ununilium —	474 <b>Uur</b> ununilium —	475 <b>Uus</b> ununilium —	476 <b>Uuo</b> ununilium —	477 <b>Uuq</b> ununilium —	478 <b>Uur</b> ununilium —	479 <b>Uus</b> ununilium —	480 <b>Uuo</b> ununilium —	481 <b>Uuq</b> ununilium —	482 <b>Uur</b> ununilium —	483 <b>Uus</b> ununilium —	484 <b>Uuo</b> ununilium —	485 <b>Uuq</b> ununilium —	486 <b>Uur</b> ununilium —	487 <b>Uus</b> ununilium —	488 <b>Uuo</b> ununilium —	489 <b>Uuq</b> ununilium —	490 <b>Uur</b> ununilium —	491 <b>Uus</b> ununilium —	492 <b>Uuo</b> ununilium —	493 <b>Uuq</b> ununilium —	494 <b>Uur</b> ununilium —	495 <b>Uus</b> ununilium —	496 <b>Uuo</b> ununilium —	497 <b>Uuq</b> ununilium —	4