



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE
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PHYSICAL SCIENCE

0652/42

Paper 4 (Extended)

October/November 2019

1 hour 15 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, graphs, tables or rough working.

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

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

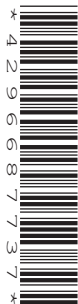
A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

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 **19** printed pages and **1** blank page.



1 An athlete of mass 75.0 kg runs a 100 m race in a time of 10.5 s.

The 100 m race is run on a straight track.

(a) Calculate the average velocity of the athlete.

Show your working.

average velocity = m/s [2]

(b) The graph in Fig. 1.1 shows the variation of speed of the athlete during the race.

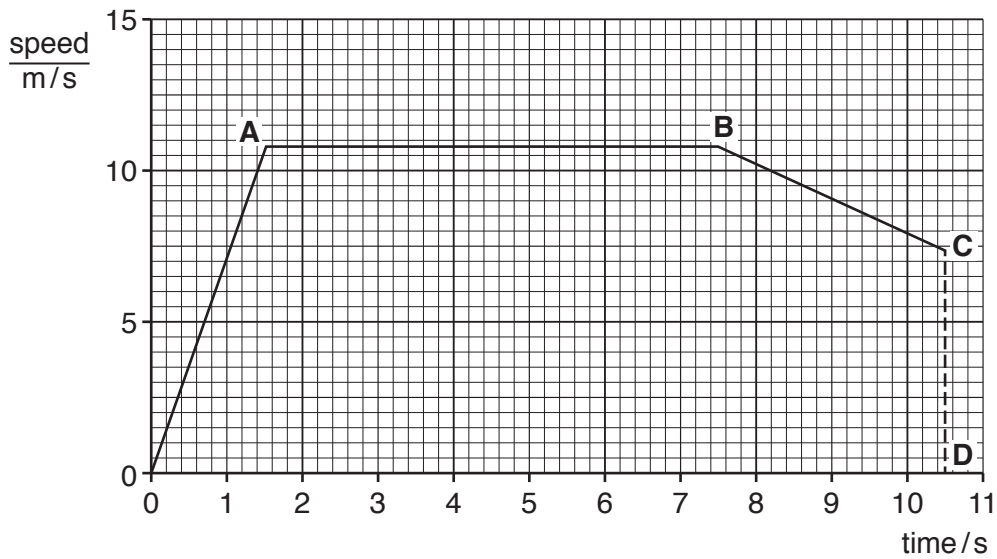


Fig. 1.1

Calculate the deceleration of the athlete in the section **BC**.
Show your working and give the unit.

deceleration = unit [3]

(c) The 100 m race is run on a straight track. A 400 m race is one lap of a circular track.

Explain why it is **not** correct to use the term *average velocity* when describing the 400 m race.

.....

 [2]

[Total: 7]

3

- 2 A student investigates the reaction between ammonia gas, NH_3 , and hydrogen chloride gas, HCl . She sets up the apparatus shown in Fig. 2.1.

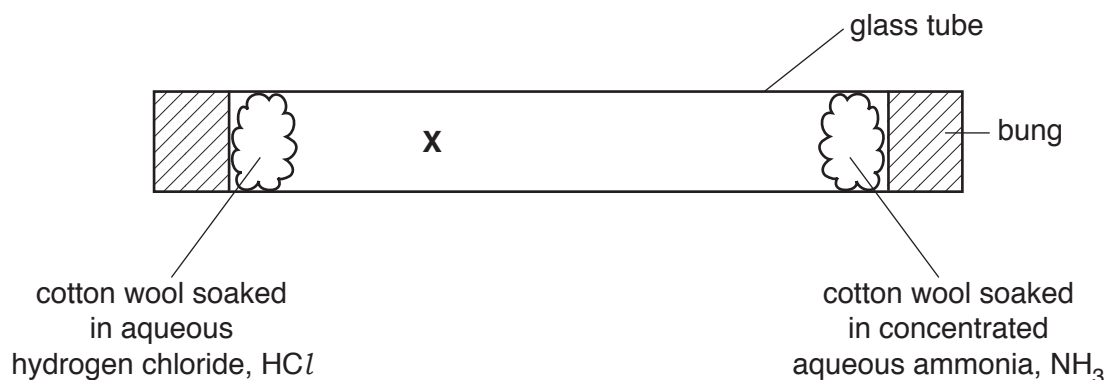


Fig. 2.1

Particles of NH_3 and particles of HCl spread through the glass tube. They meet at position **X** and react to form ammonium chloride, NH_4Cl .

- (a) Name the process by which the particles of a gas spread out.

..... [1]

- (b) (i) Calculate the relative molecular mass of NH_3 and of HCl .

[A_r : H, 1; N, 14; Cl, 35.5]

NH_3

HCl [1]

- (ii) Write a balanced symbol equation for the reaction between ammonia gas and hydrogen chloride gas. Include state symbols.

..... [2]

- (c) Explain why ammonium chloride forms closer to the HCl end of the glass tube than to the NH_3 end.

.....

..... [1]

[Total: 5]

3 Fig. 3.1 shows part of a domestic water heating system.

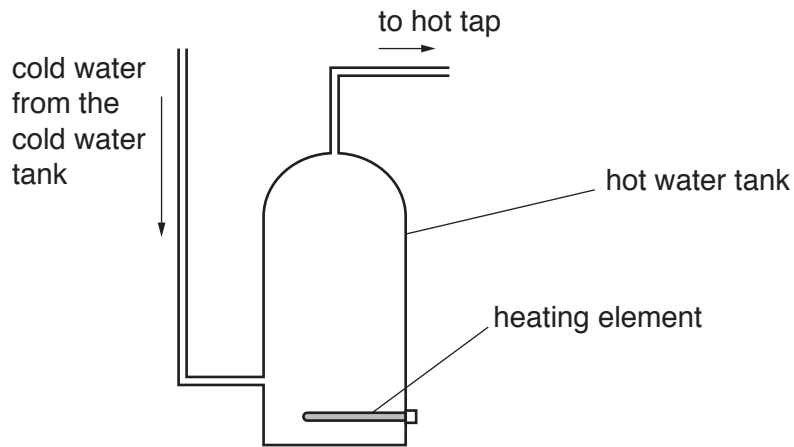


Fig. 3.1

(a) (i) Explain why the heating element is at the bottom of the hot water tank.

.....

.....

.....

.....

.....

..... [3]

(ii) A lot of thermal energy is lost from the hot water tank.

Suggest how this energy loss can be reduced.

.....

..... [1]

(b) The hot water tank is made from copper.

Copper is a good conductor of thermal energy.

Explain, by referring to electrons, why copper is a good thermal conductor.

.....

.....

.....

..... [2]

[Total: 6]

- 4 A chemist assesses the purity of three solid compounds, **A**, **B** and **C**, using their melting points.

Table 4.1 shows the results.

Table 4.1

	compound		
	A	B	C
melting point/°C	131–139	35	35

- (a) Explain why the data suggests that compound **A** is **not** pure.

.....
 [1]

- (b) The chemist adds compound **B** to compound **C**. The mixture melts between 28–32 °C.

The chemist has not made a mistake.

Explain why the melting point of the mixture is **not** 35 °C.

.....

 [2]

- (c) Explain why chromatography is **not** a suitable method to use to assess the purity of the three solid compounds.

.....
 [1]

[Total: 4]

5 Table 5.1 shows information about some organic compounds.

Table 5.1

compound	molecular formula	structure
methane	CH_4	<pre> H H — C — H H </pre>
ethane	C_2H_6	<pre> H H H — C — C — H H H </pre>
propane	C_3H_8	<pre> H H H H — C — C — C — H H H H </pre>
butane	C_4H_{10}	<pre> H H H H H — C — C — C — C — H H H H H </pre>

The compounds are members of a homologous series.

(a) (i) State what is meant by the term *homologous series*.

.....

 [2]

(ii) Name the homologous series to which the compounds in Table 5.1 belong.

..... [1]

(iii) Explain how the information in Table 5.1 shows these compounds are saturated.

.....
 [1]

(b) Organic compounds can be cracked into smaller molecules.

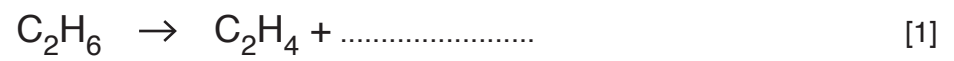
(i) State **two** conditions needed for cracking.

1.

2.

[2]

(ii) Complete the equation to show the products of cracking C_2H_6 .



[Total: 7]

6 Fig. 6.1 shows a circuit diagram.

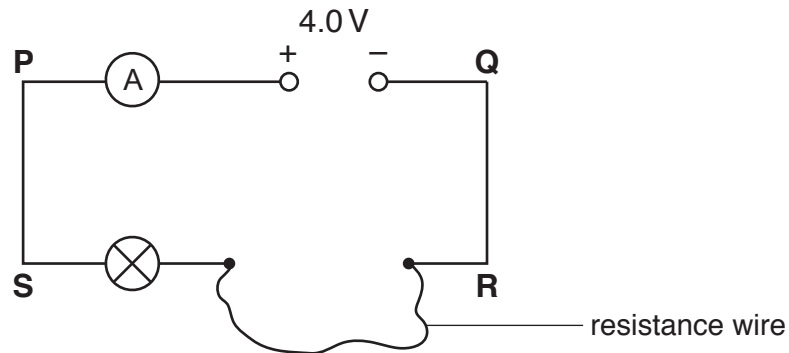


Fig. 6.1

The power supply has a fixed e.m.f. of 4.0 V.

- (a) 1. Draw an arrow between **P** and **S** to show the direction of the conventional current in the circuit. [1]
2. Draw an arrow between **Q** and **R** to show the direction of the movement of electrons in the circuit. [1]

- (b) On Fig. 6.1, draw a voltmeter to measure the potential difference across the lamp. [2]

- (c) The resistance wire is chosen so that the potential difference across the lamp is 1.5 V. The lamp has a power of 2.5 W.

- (i) Calculate the current in the lamp.

current = A [2]

- (ii) Calculate the potential difference across the resistance wire.

potential difference = V [1]

- (iii) Calculate the resistance of the resistance wire.

resistance = Ω [2]

(d) A different resistance wire **X** has a diameter of 0.40 mm. The resistance of wire **X** is $4.5\ \Omega$.

Another wire **Y** of the same length and made from the same material as wire **X** has a diameter of 0.20 mm.

Calculate the resistance of wire **Y**.

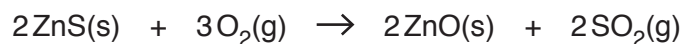
resistance = Ω [2]

[Total: 10]

7 The equation for the extraction of zinc, Zn, from its ore, ZnS, takes place in two stages.

(a) **Stage one** of the extraction of Zn uses oxygen.

The equation for stage one is shown.



Calculate the mass of ZnO that is produced from 7.0 tonnes of ZnS.

1 tonne = 1000 kg

[A_r : Zn, 65; S, 32; O, 16]

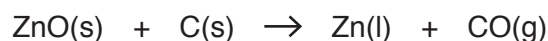
Show your working in the box.

mass of ZnO = tonnes

[3]

(b) **Stage two** of the extraction of Zn uses carbon.

The equation for stage two is shown.



(i) Name the substance that acts as a reducing agent in this reaction.

..... [1]

(ii) Carbon monoxide gas, CO, is a pollutant.

State **one** adverse effect of carbon monoxide gas.

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

(iii) Carbon monoxide gas is released in the exhaust gases of car engines during the combustion of fossil fuels.

Describe how carbon monoxide can be removed from the exhaust gases of car engines.

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

(c) Zinc is used for galvanising steel. This helps prevent the corrosion of steel.

Explain why galvanising steel with zinc helps to prevent the corrosion of steel.

.....
.....
.....
.....
.....
..... [3]

(d) Mild steel is an alloy of iron.

State **one** benefit of mixing additives with iron to produce an alloy.

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

[Total: 11]

- 8 Fig. 8.1 shows a ray of light incident on a glass block.

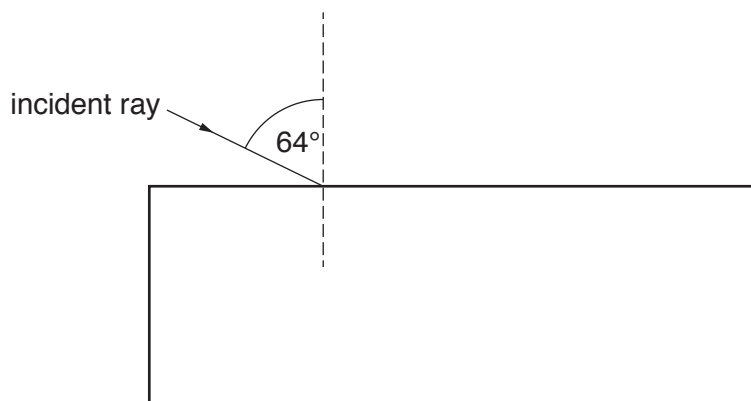


Fig. 8.1

The angle of incidence is 64° .

- (a) On Fig. 8.1, draw the path of the ray of light as it passes through and leaves the block. [2]
- (b) The glass block has a refractive index $n = 1.48$.

Calculate the value of the angle of refraction.

Show your working.

angle of refraction = $^\circ$ [3]

- (c) The speed of light in air is 3.0×10^8 m/s.

Calculate the speed of light in the glass block.

speed of light in the glass block = m/s [2]

[Total: 7]

9 Fig. 9.1 shows a simple d.c. motor.

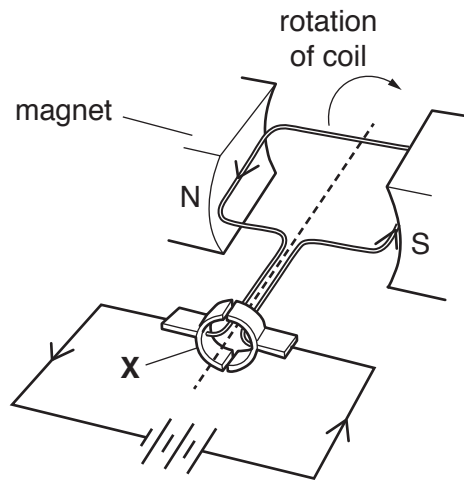


Fig. 9.1

(a) Explain why the coil of the motor turns when there is a current in it.

.....

.....

.....

..... [3]

(b) (i) Name the part labelled X.

..... [1]

(ii) Describe the role of part X in the operation of the motor.

.....

.....

..... [2]

[Total: 6]

- 10 (a) A student investigates the electrolysis of molten magnesium chloride, MgCl_2 .

Fig. 10.1 shows the apparatus used by the student.

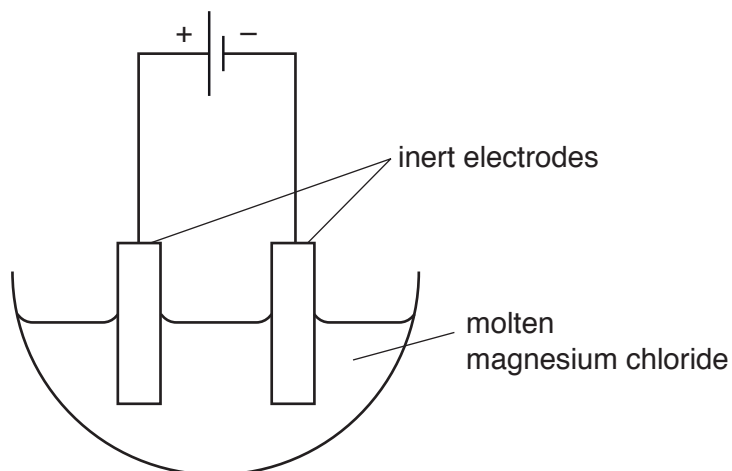


Fig. 10.1

- (i) Explain why the magnesium chloride must be molten for electrolysis to occur.

.....
 [1]

- (ii) Predict the products formed at each electrode during the electrolysis of molten magnesium chloride, MgCl_2 .

positive anode

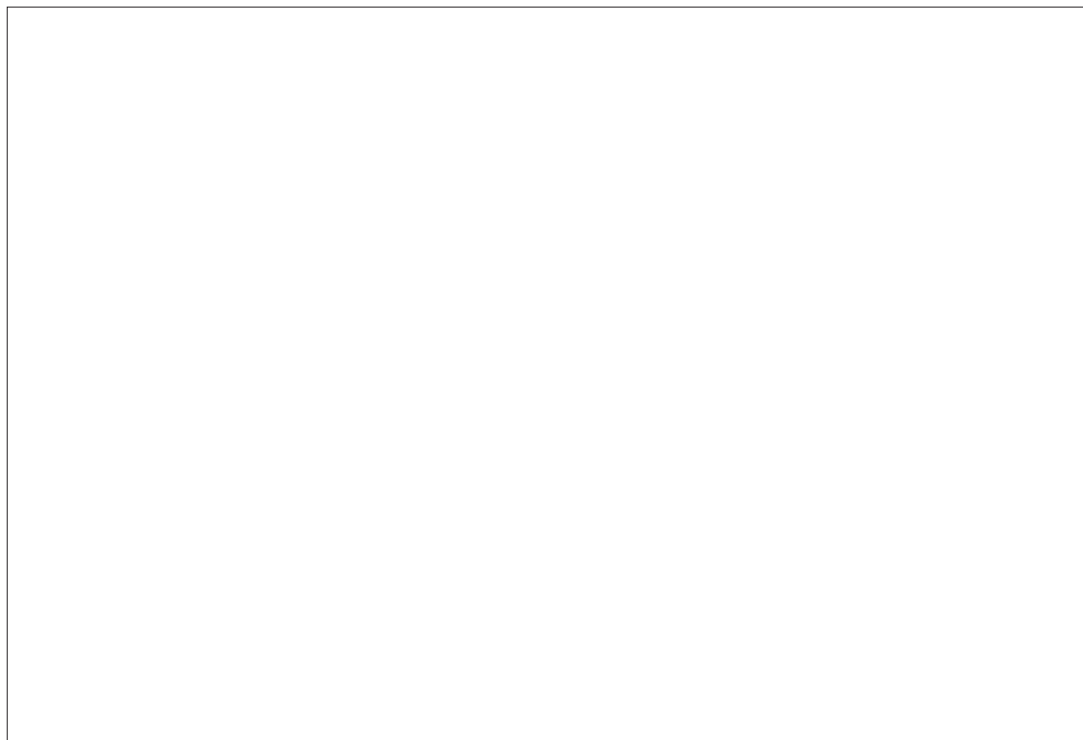
negative cathode

[2]

(iii) Magnesium chloride, $MgCl_2$, is an ionic compound.

Draw the dot-and-cross diagram to represent the ionic bonding in magnesium chloride.

You only need to show the outer electrons.



[3]

(b) Magnesium is in Group II of the Periodic Table.

Fig. 10.2 shows the elements in Group II of the Periodic Table.

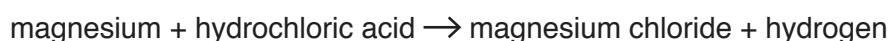
4 Be beryllium 9
12 Mg magnesium 24
20 Ca calcium 40
38 Sr strontium 88
56 Ba barium 137

Fig. 10.2

The reaction between magnesium and hydrochloric acid produces:

- bubbles of hydrogen gas
- a colourless solution of magnesium chloride.

The word equation for this reaction is shown.



The vigorous reaction between barium and hydrochloric acid produces:

- many bubbles of hydrogen gas
- a colourless solution of barium chloride.

The word equation for this reaction is shown.



(i) Predict the products of the reaction of beryllium, Be, with hydrochloric acid.

..... [1]

(ii) Predict whether beryllium is more or less reactive than magnesium. Give a reason for your answer.

.....

..... [1]

[Total: 8]

- 11 A detector records the activity of a radioactive isotope, Nd-149.

The number of counts detected in one minute is recorded every 0.5 hours.

The results are shown in Table 11.1.

Table 11.1

time / hours	<u>reading on the detector</u> counts / minute
0	62
0.5	54
1.0	47
1.5	40
2.0	36
2.5	31
3.0	27

The average background radiation in the laboratory is 9 counts / minute.

- (a) Explain what is meant by *background radiation*.

.....
 [1]

- (b) Calculate the half-life of Nd-149.

Show your working.

half-life = hours [3]

[Total: 4]

- 12 The reaction between hydrochloric acid and sodium hydroxide solution produces sodium chloride and water. This reaction is exothermic.

The word equation for this exothermic reaction is shown.



- (a) State the pH value for the solution formed during this reaction.

..... [1]

- (b) State what is meant by the term *acid*, in terms of proton transfer.

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

- (c) On Fig. 12.1:

- draw the energy level diagram for this exothermic reaction
- label the reactants and label the products
- use an arrow to show the energy change.

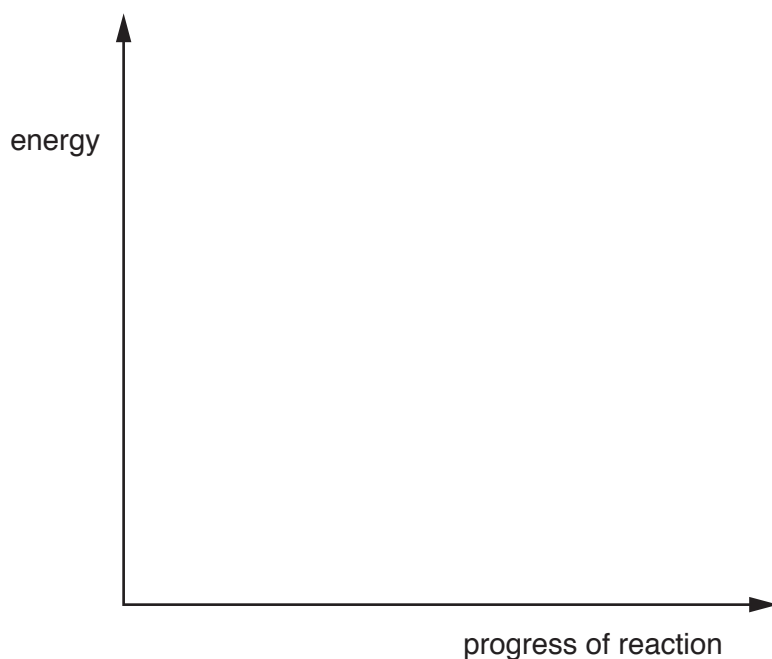


Fig. 12.1

[3]

[Total: 5]

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The Periodic Table of Elements

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3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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19 K potassium 39	20 Ca calcium 40											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
37 Rb rubidium 85	38 Sr strontium 88	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
55 Cs caesium 133	56 Ba barium 137	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Fr francium —	56 Ra radium —	57–71 lanthanoids —	58 Cs caesium 133	59–103 actinoids —	86 Rn radon —																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
87 Fr francium —	88 Ra radium —	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —	87 La lanthanum 139	88 Ce cerium 140	89 Pr praseodymium 141	90 Nd neodymium 144	91 Pm promethium —	92 Sm samarium 150	93 Eu europium 152	94 Gd gadolinium 157	95 Tb terbium 159	96 Dy dysprosium 163	97 Ho holmium 165	98 Er erbium 167	99 Tm thulium 169	100 Yb ytterbium 173	101 Lu lutetium 175	102 Ac actinium —	103 Th thorium 232	104 Pa protactinium 231	105 U uranium 238	106 Np neptunium —	107 Pu plutonium —	108 Am americium —	109 Cm curium —	110 Bk berkelium —	111 Cf californium —	112 Es einsteinium —	113 Fm fermium —	114 Md mendelevium —	115 No nobelium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —	119 Nh nihonium —	120 Fl flerovium —	121 Mc moscovium —	122 Lv livermorium —	123 Ts tennessine —	124 Og oganesson —	125 Nh nihonium —	126 Fl flerovium —	127 Mc moscovium —	128 Lv livermorium —	129 Ts tennessine —	130 Og oganesson —	131 Nh nihonium —	132 Fl flerovium —	133 Mc moscovium —	134 Lv livermorium —	135 Ts tennessine —	136 Og oganesson —	137 Nh nihonium —	138 Fl flerovium —	139 Mc moscovium —	140 Lv livermorium —	141 Ts tennessine —	142 Og oganesson —	143 Nh nihonium —	144 Fl flerovium —	145 Mc moscovium —	146 Lv livermorium —	147 Ts tennessine —	148 Og oganesson —	149 Nh nihonium —	150 Fl flerovium —	151 Mc moscovium —	152 Lv livermorium —	153 Ts tennessine —	154 Og oganesson —	155 Nh nihonium —	156 Fl flerovium —	157 Mc moscovium —	158 Lv livermorium —	159 Ts tennessine —	160 Og oganesson —	161 Nh nihonium —	162 Fl flerovium —	163 Mc moscovium —	164 Lv livermorium —	165 Ts tennessine —	166 Og oganesson —	167 Nh nihonium —	168 Fl flerovium —	169 Mc moscovium —	170 Lv livermorium —	171 Ts tennessine —	172 Og oganesson —	173 Nh nihonium —	174 Fl flerovium —	175 Mc moscovium —	176 Lv livermorium —	177 Ts tennessine —	178 Og oganesson —	179 Nh nihonium —	180 Fl flerovium —	181 Mc moscovium —	182 Lv livermorium —	183 Ts tennessine —	184 Og oganesson —	185 Nh nihonium —	186 Fl flerovium —	187 Mc moscovium —	188 Lv livermorium —	189 Ts tennessine —	190 Og oganesson —	191 Nh nihonium —	192 Fl flerovium —	193 Mc moscovium —	194 Lv livermorium —	195 Ts tennessine —	196 Og oganesson —	197 Nh nihonium —	198 Fl flerovium —	199 Mc moscovium —	200 Lv livermorium —	201 Ts tennessine —	202 Og oganesson —	203 Nh nihonium —	204 Fl flerovium —	205 Mc moscovium —	206 Lv livermorium —	207 Ts tennessine —	208 Og oganesson —	209 Nh nihonium —	210 Fl flerovium —	211 Mc moscovium —	212 Lv livermorium —	213 Ts tennessine —	214 Og oganesson —	215 Nh nihonium —	216 Fl flerovium —	217 Mc moscovium —	218 Lv livermorium —	219 Ts tennessine —	220 Og oganesson —	221 Nh nihonium —	222 Fl flerovium —	223 Mc moscovium —	224 Lv livermorium —	225 Ts tennessine —	226 Og oganesson —	227 Nh nihonium —	228 Fl flerovium —	229 Mc moscovium —	230 Lv livermorium —	231 Ts tennessine —	232 Og oganesson —	233 Nh nihonium —	234 Fl flerovium —	235 Mc moscovium —	236 Lv livermorium —	237 Ts tennessine —	238 Og oganesson —	239 Nh nihonium —	240 Fl flerovium —	241 Mc moscovium —	242 Lv livermorium —	243 Ts tennessine —	244 Og oganesson —	245 Nh nihonium —	246 Fl flerovium —	247 Mc moscovium —	248 Lv livermorium —	249 Ts tennessine —	250 Og oganesson —	251 Nh nihonium —	252 Fl flerovium —	253 Mc moscovium —	254 Lv livermorium —	255 Ts tennessine —	256 Og oganesson —	257 Nh nihonium —	258 Fl flerovium —	259 Mc moscovium —	260 Lv livermorium —	261 Ts tennessine —	262 Og oganesson —	263 Nh nihonium —	264 Fl flerovium —	265 Mc moscovium —	266 Lv livermorium —	267 Ts tennessine —	268 Og oganesson —	269 Nh nihonium —	270 Fl flerovium —	271 Mc moscovium —	272 Lv livermorium —	273 Ts tennessine —	274 Og oganesson —	275 Nh nihonium —	276 Fl flerovium —	277 Mc moscovium —	278 Lv 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—	330 Fl flerovium —	331 Mc moscovium —	332 Lv livermorium —	333 Ts tennessine —	334 Og oganesson —	335 Nh nihonium —	336 Fl flerovium —	337 Mc moscovium —	338 Lv livermorium —	339 Ts tennessine —	340 Og oganesson —	341 Nh nihonium —	342 Fl flerovium —	343 Mc moscovium —	344 Lv livermorium —	345 Ts tennessine —	346 Og oganesson —	347 Nh nihonium —	348 Fl flerovium —	349 Mc moscovium —	350 Lv livermorium —	351 Ts tennessine —	352 Og oganesson —	353 Nh nihonium —	354 Fl flerovium —	355 Mc moscovium —	356 Lv livermorium —	357 Ts tennessine —	358 Og oganesson —	359 Nh nihonium —	360 Fl flerovium —	361 Mc moscovium —	362 Lv livermorium —	363 Ts tennessine —	364 Og oganesson —	365 Nh nihonium —	366 Fl flerovium —	367 Mc moscovium —	368 Lv livermorium —	369 Ts tennessine —	370 Og oganesson —	371 Nh nihonium —	372 Fl flerovium —	373 Mc moscovium —	374 Lv livermorium —	375 Ts tennessine —	376 Og oganesson —	377 Nh nihonium —	378 Fl flerovium —	379 Mc moscovium —	380 Lv livermorium —	381 Ts tennessine —	382 Og oganesson —	383 Nh nihonium —	384 Fl flerovium —	385 Mc moscovium —	386 Lv livermorium —	387 Ts tennessine —	388 Og oganesson —	389 Nh nihonium —	390 Fl flerovium —	391 Mc moscovium —	392 Lv livermorium —	393 Ts tennessine —	394 Og oganesson —	395 Nh nihonium —	396 Fl flerovium —	397 Mc moscovium —	398 Lv livermorium —	399 Ts tennessine —	400 Og oganesson —	401 Nh nihonium —	402 Fl flerovium —	403 Mc moscovium —	404 Lv livermorium —	405 Ts tennessine —	406 Og oganesson —	407 Nh nihonium —	408 Fl flerovium —	409 Mc moscovium —	410 Lv livermorium —	411 Ts tennessine —	412 Og oganesson —	413 Nh nihonium —	414 Fl flerovium —	415 Mc moscovium —	416 Lv livermorium —	417 Ts tennessine —	418 Og oganesson —	419 Nh nihonium —	420 Fl flerovium —	421 Mc moscovium —	422 Lv livermorium —	423 Ts tennessine —	424 Og oganesson —	425 Nh nihonium —	426 Fl flerovium —	427 Mc moscovium —	428 Lv livermorium —	429 Ts tennessine —	430 Og oganesson —	431 Nh nihonium —	432 Fl flerovium —	433 Mc moscovium —	434 Lv livermorium —	435 Ts tennessine —	436 Og oganesson —	437 Nh nihonium —	438 Fl flerovium —	439 Mc moscovium —	440 Lv livermorium —	441 Ts tennessine —	442 Og oganesson —	443 Nh nihonium —	444 Fl flerovium —	445 Mc moscovium —	446 Lv livermorium —	447 Ts tennessine —	448 Og oganesson —	449 Nh nihonium —	450 Fl flerovium —	451 Mc moscovium —	452 Lv livermorium —	453 Ts tennessine —	454 Og oganesson —	455 Nh nihonium —	456 Fl flerovium —	457 Mc moscovium —	458 Lv livermorium —	459 Ts tennessine —	460 Og oganesson —	461 Nh nihonium —	462 Fl flerovium —	463 Mc moscovium —	464 Lv livermorium —	465 Ts tennessine —	466 Og oganesson —	467 Nh nihonium —	468 Fl flerovium —	469 Mc moscovium —	470 Lv livermorium —	471 Ts tennessine —	472 Og oganesson —	473 Nh nihonium —	474 Fl flerovium —	475 Mc moscovium —	476 Lv livermorium —	477 Ts tennessine —	478 Og oganesson —	479 Nh nihonium —	480 Fl flerovium —	481 Mc moscovium —	482 Lv livermorium —	483 Ts tennessine —	484 Og oganesson —	485 Nh nihonium —	486 Fl flerovium —	487 Mc moscovium —	488 Lv livermorium —	489 Ts tennessine —	490 Og oganesson —	491 Nh nihonium —	492 Fl flerovium —	493 Mc moscovium —	494 Lv livermorium —	495 Ts tennessine —	496 Og oganesson —	497 Nh nihonium —	498 Fl flerovium —	499 Mc moscovium —	500 Lv livermorium —	501 Ts tennessine —	502 Og oganesson —	503 Nh nihonium —	504 Fl flerovium —	505 Mc moscovium —	506 Lv livermorium —	507 Ts tennessine —	508 Og oganesson —	509 Nh nihonium —	510 Fl flerovium —	511 Mc moscovium —	512 Lv livermorium —	513 Ts tennessine —	514 Og oganesson —	515 Nh nihonium —	516 Fl flerovium —	517 Mc moscovium —	518 Lv livermorium —	519 Ts tennessine —	520 Og oganesson —	521 Nh nihonium —	522 Fl flerovium —	523 Mc moscovium —	524 Lv livermorium —	525 Ts tennessine —	526 Og oganesson —	527 Nh nihonium —	528 Fl flerovium —	529 Mc moscovium —	530 Lv livermorium —	531 Ts tennessine —	532 Og oganesson —	533 Nh nihonium —	534 Fl flerovium —	535 Mc moscovium —	536 Lv livermorium —	537 Ts tennessine —	538 Og oganesson —	539 Nh nihonium —	540 Fl flerovium —	541 Mc moscovium —	542 Lv livermorium —	543 Ts tennessine —	544 Og oganesson —	545 Nh nihonium —	546 Fl flerovium —	547 Mc moscovium —	548 Lv livermorium —	549 Ts tennessine —	550 Og oganesson —	551 Nh nihonium —	552 Fl flerovium —	553 Mc moscovium —	554 Lv livermorium —	555 Ts tennessine —	556 Og oganesson —	557 Nh nihonium —	558 Fl flerovium —	559 Mc moscovium —	560 Lv livermorium —	561 Ts tennessine —	562 Og oganesson —	563 Nh nihonium —	564 Fl flerovium —	565 Mc moscovium —	566 Lv livermorium —	567 Ts tennessine —	568 Og oganesson —	569 Nh nihonium —	570 Fl flerovium —	571 Mc moscovium —	572 Lv livermorium —	573 Ts tennessine —	574 Og oganesson —	575 Nh nihonium —	576 Fl flerovium —	577 Mc moscovium —	578 Lv livermorium —	579 Ts tennessine —	580 Og oganesson —	581 Nh nihonium —	582 Fl flerovium —	583 Mc moscovium —	584 Lv livermorium —	585 Ts tennessine —	586 Og oganesson —	587 Nh nihonium —	588 Fl flerovium —	589 Mc moscovium —	590 Lv livermorium —	591 Ts tennessine —	592 Og oganesson —	593 Nh nihonium —	594 Fl flerovium —	595 Mc moscovium —	596 Lv livermorium —	597 Ts tennessine —	598 Og oganesson —	599 Nh nihonium —	600 Fl flerovium —	601 Mc moscovium —	602 Lv