



Cambridge Chemistry Challenge Lower 6th
International Year of the Periodic Table
June 2019
Student Answer Booklet

In order to print your certificate, we need to store your name, school, and mark in a database: these details are only viewable by your school and our committee. Your participation in the competition indicates that you are happy for us to do this.

Student name _____

School _____

Date of exam _____

School year (eg year 12) _____

Signature _____

	p2	p3	p4	p5	p6	p7	p8	p9	p10	Total
mark	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

1(a)

(i) Oxidation state of indium:

[1]

(ii) Equation for indium metal and dilute nitric acid:

[1]

(iii) Oxidised species:

[1]

Reduced species:

(iv) Equation for indium metal and conc. nitric acid:

[1]

(v) Equation for formation of indium hydroxide:

[1]

(vi) Equation for formation of indium oxide:

[1]

(vii) Maximum mass of indium oxide:

[2]

1(b)

(i) Apparent RMM of indium if oxide is InO:

[1]

(ii) Apparent RMM of indium if oxide is InO₂:

[1]

1(c)

(ii) no. of protons = no. of neutrons =

[3]

no. of electrons =

1(d)

[3]

% of tellurium-130 =

1(e)

(i) Equation for thallium(III) nitrate and potassium iodide:

[1]

1(f)

(i) Oxidation state of Cs:

[1]

(ii) Average oxidation state of I:

[1]

(iii) Dot & cross diagram:

[1]

(iv) Bond angle:

[1]

1(g)

(i) Formula for nitrogen(V) oxide:

[1]

Formula for niobium(V) oxide:

(ii) Structure of molecular nitrogen(V) oxide:

[1]

1(g)

(iii) Cation:

Anion:

[1]

(iv) Standard enthalpy change:

[3]

(v) Two formulae of lithium niobate(V):

[1]

1(h)

(i) Electron configuration of calcium:

[1]

Electron configuration of zinc:

[1]

(ii) Valence electrons of barium:

[1]

Valence electrons of mercury:

(iii) Valence electrons of manganese:

[1]

Valence electrons of bromine:

(iv) Electron configuration of oganesson:

[1]

1(j)

(i) Number of 5g orbitals:

[1]

(ii) Atomic number of element beneath Og:

[1]

2(a)

(i) Oxidation state of iodine in periodic acid:

[1]

(ii) Balanced equation for the formation of metaperiodic acid:

[1]

(iii) Structure of orthoperiodic acid:

[1]

(iv) Structure of metaperiodic acid:

[1]

2(b) Circle the term describing the role of periodic acid:

[1]

Oxidising agent Reducing agent Dehydrating agent Catalyst

2(c) Structures formed on reaction with periodic acid:

[4]

(i)	(ii)
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2(d) Structure of the cyclic intermediate:

[1]

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2(e)

(i) Hydrated forms:

Aldehyde A	Ketone B
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[1]

(ii) Products resulting from reaction with periodic acid:

Aldehyde A	Ketone B
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[2]

2(f) Structures for compounds C, D and E:

Compound C	Compound D
Compound E	

[3]

2(g)

(i) Products of complete reaction of glucose with periodic acid:

[2]

(ii) Products of complete reaction of fructose with periodic acid:

[3]

2(h)

(i) Structure(s) of fuculose phosphate consistent with experiment
& (ii) with C - C bonds that are broken on reaction with periodic acid
indicated on the structure(s):

[3]

[2]

2(j)

(i) Structure for the phosphorus-containing product:

[2]



(ii) Structure(s) from part h giving the correct phosphorous-containing product on reaction with periodic acid:

[1]

