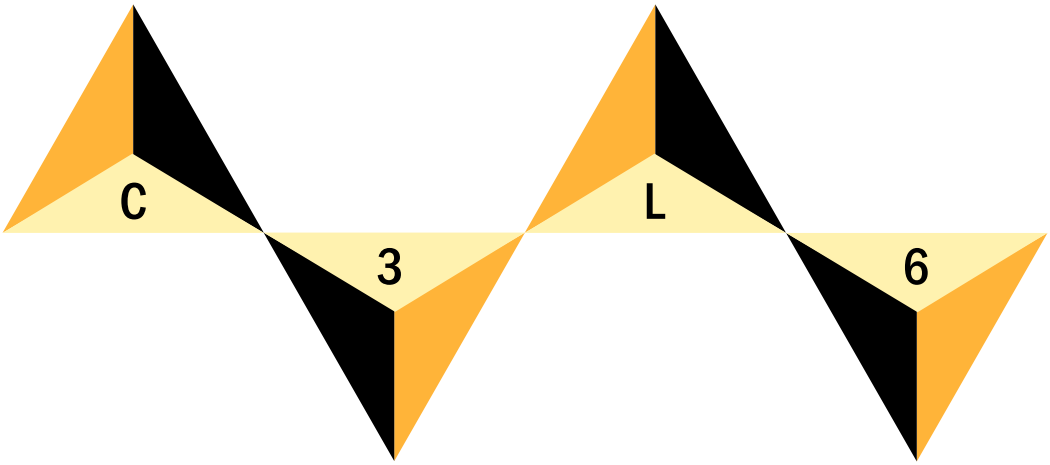


Cambridge Chemistry Challenge Lower 6th

June 2013

Student Answer Booklet

Student name _____

male ☐ female ☐

Email _____

School _____

School year (eg year 12) _____

Subjects taken for AS _____

_____

_____

	p2	p3	p4	p5	p6	p7	p8	p9	Total
mark									

leave blank

1(a)

empirical formua of A

molecular formua of A

(b) functional group contained in A

(c)(i)

number of moles

(c)(ii) structure of A:

(d) structure of B:

leave blank

1(e) **structure of ion C**

structure of D

(f) **structure of E**

(g) **molecular formula for phenylbutazone:**

(h) **(i)** **The M_r of phenylbutazone is 309.** ☐

(ii) **The molecule fragments.** ☐

(iii) **Naturally occurring carbon contains a small proportion of ^{13}C.** ☐

(iv) **Naturally occurring hydrogen contains a large proportion of deuterium (^{2}H).** ☐

(v) **One of the nitrogen atoms has been protonated.** ☐

leave blank

1(i) **structure of fragment at m/z 252:**

structure of other fragment:

(j) **number of burgers needed:**

(k)(i) **mass of azobenzene produced:**

leave blank

1(k)(ii) mass of phenylbutazone oxidised:

(iii) concentration of phenylbutazone in the blood:

(l) number of peaks in carbon NMR spectra:

1,2-dimethylbenzene	1,3-dimethylbenzene	1,4-dimethylbenzene

(m) number of peaks in carbon NMR spectra of phenylbutazone:

leave blank

1(n)(i) atom introduced:

(n)(ii) structure of metabolite:

(o) missing letters in scrabble answer:



leave blank

2(a) standard enthalpy change:

(b)(i) equation:

(b)(ii) standard enthalpy change:

(c)(i) formula of nitrate(III): **formula of nitrate(V):**

(c)(ii) structure of nitrate(III): **structure of nitrate(V):**

bond angle in nitrate(III): **bond angle in nitrate(V):**

leave blank

2(c)(iii) equation between iodide and nitrate(III) in acid:

(c)(iv) sulfur-containing ion:

(c)(v) equation between sulfate(IV) and and iodine in acid:

(d) (i) The ^{40}K emits an alpha particle. ☐

(ii) A neutron in the ^{40}K decays into a proton, a positron (positive electron) and a neutrino. ☐

(iii) A proton in the ^{40}K decays into a neutron, a positron (positive electron) and a neutrino. ☐

(iv) A neutron in the ^{40}K decays into a proton, an electron, and a neutrino. ☐

(v) A proton in the ^{40}K captures an electron, and decays into a neutron and a neutrino. ☐

leave blank

2(e)(i) atoms of ^{40}Ar in $1cm^3$ of water:

(e)(ii) mass of rock:

(e)(iii) mass of potassium:

(e)(iv) atoms of ^{40}K:

(f) age of sample: