ASB7 Observation exercise on two organic compounds

Mark scheme

Activity b Qualitative observation

Question Number	Observations	Mark
(a)(i)	**G** - Any reference to smoke / smoky / black /sooty flame **(1)** **H** - Yellow / non-smoky / no soot / clear / blue **(1)**	**(2)**

Question Number	Observations	Mark
(a)(ii)	**G** - Layers / non-miscible / cloudy / **G** does not dissolve **(1)** **H** - Miscible / clear / solution / **H** soluble **(1)**	**(2)**

Question Number	Answers	Mark
(a)(iii)	**G** is unsaturated / non-polar (molecule) / an alkene / an alkyne / an arene **(1)** **H** is saturated / polar (molecule) / forms H-bonds with water **(1)**	**(2)**

Question Number	Observation	Mark
(b)(i)	Bromine water turns colourless / decolorised Do not allow 'turns clear' Ignore layers here	**(1)**

Question Number	Answer	Mark
(b)(ii)	Alkene / carbon-carbon double bond / C=C / Allow alkyne / carbon-carbon triple bond / C≡C Do not allow arene	**(1)**

Question Number	Observations	Mark
(c)(i)	Misty / white / steamy fumes / evidence of vigorous reaction **(1)** Not smoke but allow gas Blue litmus turns red and red litmus unchanged **(1)**	**(2)**

Question Number	Observation	Mark
(c)(ii)	(Solution turns) green / blue / brown	**(1)**

Question Number	Answer	Mark
(d)(i)	**Functional group** Carboxylic acid / -COOH / $-CO_2H$ **(1)** **Explanation** Absorption (at 3300-2500 cm^{-1}) is due to O-H in carboxylic acid **(1)**	**(2)**

Question Number	Answer	Mark
(d)(ii)	Primary alcohol / $-CH_2OH$ Not just alcohol	**(1)**

ASB8 Observation exercise on three organic compounds

Mark scheme

Activity b Qualitative observation

Question Number	Observations	Mark
(a)(i)	Miscible / solution formed / no layers **(1)** Green / yellow-green **(1)**	**(2)**

Question Number	Answer	Mark
(a)(ii)	Polar (molecule) / forms H-bonds with water / neutral Do not allow alcohol	**(1)**

Question Number	Observations	Mark
(b)(i)	Bubbles / effervescence / fizzes **(1)** Not gas, not hydrogen Sodium disappears / dissolves **(1)** White solid remains / forms on surface of sodium **(1)** Any **two**	**(2)**

Question Number	Answer	Mark
(b)(ii)	Alcohol / OH **(1)** Allow primary / secondary /tertiary alcohol	**(1)**

Question Number	Answer	Mark
(c)	**Inference** Same functional group in both / both alcohols **(1)** **Explanation** Absorption pattern the same in both spectra / gives range or wavenumber of absorption and correlates with alcohol group / refers to 3750-3300 cm^{-1} as due to alcohol **(1)**	**(2)**

Question Number	Observations	Mark
(d)(i)	**J** - (Solution turns) green / blue / brown **(1)** **K** - Stays orange / no change **(1)**	**(2)**

Question Number	Answer	Mark
(d)(ii)	**J** is a primary and/or secondary alcohol **(1)** **K** is a tertiary alcohol **(1)**	**(2)**

Question Number	Observation	Mark
(e)(i)	Cream precipitate Allow off-white / very pale yellow Reject white / yellow or pale yellow precipitate	**(1)**

Question Number	Answer	Mark
(e)(ii)	Bromoalkane / C-Br **(1)** from cream precipitate in (e)(i) Allow chloroalkane /C-Cl as a consequence of white precipitate in (e)(i) eg white precipitate **(0)** chloroalkane **(1)** Allow iodoalkane / C-I as a consequence of any yellow precipitate in (e)(i) Yellow precipitate **(0)** iodoalkane **(1)**	**(1)**

ASB12 Observation exercise on three organic compounds

Mark scheme

Activity b Qualitative observation

Question Number	Observations	Mark
(a)(i)	(Bromine water) turns colourless / is decolorised **(1)** Do not allow turns clear (Two) layers / non miscible **(1)**	**(2)**

Question Number	Observation	Mark
(a)(ii)	(Manganate (VII) turns) colourless / is decolorised Allow turns brown If layers recorded here, but not in (a)(i), allow second mark in (a)(i)	**(1)**

Question Number	Answer	Mark
(a)(iii)	Unsaturated / alkene / carbon-carbon double bond / C=C	**(1)**

Question Number	Observations	Mark
(b)	Any two from: Bubbles / effervescence / fizzes **(1)** Not gas, not hydrogen Sodium disappears / dissolves **(1)** White solid remains / forms on surface of sodium **(1)**	**(2)**

Question Number	Observations	Mark
(c)	Misty fumes / white fumes / steamy fumes / evidence of vigorous reaction **(1)** Reject smoke but allow gas instead of fumes (Damp blue litmus turns) red **(1)**	**(2)**

Question Number	Observations	Mark
(d)(i)	**(K)** (solution turns) green / blue / brown **(1)** **(L)** (solution turns) green / blue / brown **(1)**	**(2)**

Question Number	Answer	Mark
(d)(ii)	Primary or secondary alcohols / alcohols but neither are tertiary / both are alcohols which can be oxidized Reject just 'both are alcohols'	**(1)**

Question Number	Answer	Mark
(e)(i)	Carboxylic acid / COOH / CO_2H	**(1)**

Question Number	Answer	Mark
(e)(ii)	(Bond) C═O (Functional group) Ketone / RCOR Both for 1 mark	**(1)**

Question Number	Answer	Mark
(e)(iii)	**(K)** primary alcohol / (R–)CH_2OH **(L)** secondary alcohol / (R–)CHOH(–R) Both for 1 mark	**(1)**

ASB15 Observation exercise on organic compounds – 1

Mark scheme

Activity b Qualitative observation

Question Number	Observations	Mark
(a)(i)	**(G)** Smoke / smoky / black / sooty flame **(1)** **(H)** Yellow / non-smoky / no soot / any reasonable description of the flame being less smoky etc than the flame from **G (1)**	**(2)**

Question Number	Observations	Mark
(a)(ii)	**(G)** Bromine water turns colourless / decolorised **(1)** **(H)** Bromine water stays yellow / not decolorised / no change **(1)** In either test: layers / non-miscible / **G** / **H** insoluble **(1)**	**(3)**

Question Number	Answer	Mark
(a)(iii)	Spectrum is for compound **H (required but no mark for this alone)** Any two from three: Explanation: 1. Absorption is for C-H bond so alkane / absorption at 2962-2853 cm^{-1} (C-H stretching) so alkane OR Absorption is for C-H bond so alkane / absorption at 1485-1365 cm^{-1} (C-H bending) so alkane **(1)** 2. No alkene absorption for C-H bond so not alkene / no absorption at 3095-3010 cm^{-1} (C-H stretching) so not alkene **(1)** 3. No alkene absorption for C=C so not alkene / no absorption at 1669-1665 cm^{-1} (C=C stretching) so not alkene **(1)** Note: points in brackets not essential for awarding marks	**(2)**

Question Number	Observations	Mark
(b)(i)	**(I)** Misty fumes / white fumes / steamy fumes / evidence of vigorous reaction **(1)** Reject smoke but allow gas instead of fumes **(J)** Misty fumes / white fumes / steamy fumes / evidence of vigorous reaction **(1)** Reject smoke but allow gas instead of fumes (Damp blue litmus) turns red for both **I** and **J (1)**	**(3)**

Question Number	Observations	Mark
(b)(ii)	**(I)** (Solution turns) green / blue / brown **(1)** **(J)** Stays orange / no change **(1)**	**(2)**

Question Number	Answer	Mark
(b)(iii)	$C_4H_{10}O$ Allow C_4H_9OH	**(1)**

Question Number	Answer	Mark
(b)(iv)	2-methylpropan-2-ol / $CH_3C(CH_3)(OH)CH_3$ Allow a fully correct displayed or skeletal formula	**(1)**

ASB16 Observation exercise on organic compounds – 2

Mark scheme

Activity b Qualitative observation

Question Number	Observation	Mark
(a)(i)	Yellow / non-smoky / no soot / clear / blue (flame)	**(1)**

Question Number	Observations	Mark
(a)(ii)	Miscible / clear / solution / **K** soluble **(1)** Green / no change in colour / neutral / pH 7 **(1)** Accept yellow as colour and corresponding pH	**(2)**

Question Number	Observations	Mark
(a)(iii)	Any two from: Bubbles / effervescence / fizzes **(1)** Not gas, not hydrogen Sodium disappears / dissolves **(1)** White solid remains / forms on surface of sodium **(1)**	**(2)**

Question Number	Observation	Mark
(a)(iv)	(Solution turns) green / blue / brown	**(1)**

Question Number	Answer	Mark
(a)(v)	Alcohol **(1)** Any one from: saturated polar (molecule) forms H-bonds with water primary or secondary (alcohol) not tertiary (alcohol) neutral short chain (alcohol) less than 4 C atoms **(1)**	**(2)**

Question Number	Answer	Mark
(b)(i)	46 (ignore any units) C_2H_6O Allow C_2H_5OH / CH_3CH_2OH Reject skeletal or displayed formula	**(1)**

Question Number	Answer	Mark
(b)(ii)	Displayed formula of ethanol **(1)** CH_2-OH group circled **(1)**	**(2)**

Question Number	Observations	Mark
(c)(i)	Cream **(1)** Allow off-white / pale yellow Reject white / yellow Precipitate **(1)**	**(2)**

Question Number	Answer	Mark
(c)(ii)	C—Br / —Br / bromoalkane (if cream precipitate in (c)(i)) Allow C—I / —I / iodoalkane (if yellow precipitate in (c)(i)) Or C—Cl / —Cl / chloroalkane (if white precipitate in (c)(i)) Reject any halide **ion**	**(1)**

ASB19 Observation exercise on organic compounds – 1

Mark scheme

Activity b Qualitative observation

Question Number	Observation	Mark
(a)(i)	Yellow / non-smoky / no soot / clear / blue (flame)	**(1)**

Question Number	Observation	Mark
(a)(ii)	Miscible / clear / solution / **G** is soluble / no layers	**(1)**

Question Number	Observations	Mark
(a)(iii)	Misty fumes / white fumes / steamy fumes / evidence of vigorous reaction **(1)** Reject smoke but allow gas instead of fumes. (Damp blue litmus) turns red **(1)**	**(2)**

Question Number	Answer	Mark
(a)(iv)	OH / hydroxyl (group) / (since miscible) no more than 3 carbon atoms in molecule Allow alcohol (and carboxylic acid) Reject primary or secondary alcohol / named alcohol	**(1)**

Question Number	Observations	Mark
(a)(v)	(Solution turns) green / blue / brown Reject two colours eg blue and green or blue / green	**(1)**

Question Number	Answer	Mark
(a)(vi)	Primary or secondary alcohol (both needed for mark) / alcohol which is oxidized / alcohol but not tertiary	**(1)**

Question Number	Answer	Mark
(b)(i)	Aldehyde **(1)** C═O bond absorption at 1740–1720 (cm^{-1})/ C—H bond absorption at 2900–2820 or 2775–2700 (cm^{-1}) **(1)** Allow Carboxylic acid **(1)** C═O bond absorption at 1725–1700 (cm^{-1}) / O—H bond absorption at 3300–2500 (cm^{-1}) **(1)** Reject ketone	**(2)**

Question Number	Answer	Mark
(b)(ii)	Primary alcohol / —CH_2—OH	**(1)**

Question Number	Observations	Mark
(c)(i)	On addition of ethanol: solution (formed) / **H** dissolves (in ethanol) / no layers **(1)** On addition of silver nitrate: (any) yellow **(1)** Reject white or cream Precipitate **(1)**	**(3)**

Question Number	Answer	Mark
(c)(ii)	C—I / —I Ignore any H atoms bonded to the carbon atom Allow C—Br / —Br (if cream precipitate in (c)(i)) Or C—Cl / —Cl (if white precipitate in (c)(i)) Reject I^-	**(1)**

ASB20 Observation exercise on organic compounds – 2

Mark scheme

Activity b Qualitative observation

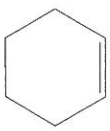
Question Number	Observations	Mark
(a)(i)	**I** Smoke / smoky / black / sooty flame **(1)** **J** Yellow / non-smoky / no soot / clear / blue flame / any reasonable description of the flame being less smoky etc than the flame from **I** **(1)**	**(2)**

Question Number	Observations	Mark
(a)(ii)	**I** Non-miscible / cloudy / **I** is insoluble / layers **(1)** **J** Miscible / clear / solution / **J** is soluble / no layers **(1)**	**(2)**

Question Number	Answer	Mark
(a)(iii)	Any one from **I** is non-polar and **J** is polar **J** forms H-bonds with water (**I** does not) **I** is unsaturated and **J** is saturated **J** is a smaller molecule than **I** since it is soluble in water. Reject **J** is an alcohol / **I** is an alkene	**(1)**

Question Number	Observation	Mark
(b)(i)	(Solution turns) colourless / brown	**(1)**

Question Number	Observation	Mark
(b)(ii)	(Bromine water turns) colourless / decolorised	**(1)**

Question Number	Answer	Mark
(b)(iii)	82 **(1)** Skeletal formula of cyclohexene **(1)**  Allow correct diene or alkyne formula e.g.  Allow correct structural or displayed formula	**(2)**

Question Number	Observations	Mark
(c)(i)	Any two from: Bubbles / effervescence / fizzes **(1)** Not just gas, not just hydrogen Sodium disappears / dissolves **(1)** White solid **(1)**	**(2)**

Question Number	Observation	Mark
(c)(ii)	(Solution turns) green / blue / brown Reject two colours e.g. blue and green or blue / green	**(1)**

Question Number	Answer	Mark
(c)(iii)	Primary or secondary alcohol (both needed for mark) / alcohol which is oxidized / alcohol but not tertiary	**(1)**

Question Number	Answer	Mark
(d)	Group is O—H / alcohol (So) spectrum is for compound **J** Both needed for the mark	**(1)**

ASB23 Observation exercise on organic compounds – 1

Mark scheme

Activity b Qualitative observation

Question Number	Observations	Mark
(a)(i)	**G** Non-miscible / cloudy / **G** is insoluble / layers **H** Non-miscible / cloudy / **H** is insoluble / layers **G** and **H** correct **(1)** **I** Miscible / clear / solution / **I** is soluble / no layers **(1)**	**(2)**

Question Number	Answer	Mark
(a)(ii)	Any one from **G** and **H** are non-polar, **I** is polar **I** forms H-bonds with water	**(1)**

Question Number	Observations	Mark
(a)(iii)	**G** (Bromine water turns) colourless / decolorised **(1)** **H** No change / (bromine water) remains yellow / no reaction **(1)**	**(2)**

Question Number	Observations	Mark
(a)(iv)	**G** (Solution turns) colourless / brown **(1)** **H** No change / (solution) remains purple / no reaction **(1)**	**(2)**

Question Number	Answer	Mark
(a)(v)	**G** Alkene / unsaturated **H** Alkane / saturated	**(1)**

Question Number	Observations	Mark
(b)(i)	Misty fumes / white fumes / steamy fumes / evidence of vigorous reaction **(1)** Reject smoke but allow gas instead of fumes (Damp blue litmus) turns red **(1)**	**(2)**

Question Number	Observation	Mark
(b)(ii)	(Solution turns) green / blue / brown Reject two colours e.g. blue and green or blue-green	**(1)**

Question Number	Answer	Mark
(c)(i)	Alcohol / O—H / primary or secondary alcohol (either or both) **(1)** Absorption at 3750–3200 (cm^{-1}) **(1)** Allow other absorption ranges between 3800 and 3000 (cm^{-1})	**(2)**

Question Number	Answer	Mark
(c)(ii)	Propan-1-ol and propan-2-ol Both needed for mark	**(1)**