

Question Number	Answer	Acceptable answers	Mark
1(a)	$\text{CaCl}_2 = 40 + 35.5 + 35.5$ (=111) (1) THEN moles = $11.1 / 111$ (= 0.1) (1) conc = moles x 1000/500 (=0.2) (1) OR mass conc = $11.1 \times 1000/500$ (=22.2) (1) conc = mass conc /111 (= 0.2) (1)	<u>0.2 scores 3</u> ecf: 11.1 / Mr ecf: mass conc / 111	(3)

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	A description linking <ul style="list-style-type: none"> • pipette (1) • one practical point eg draw liquid <u>up to line</u>/ use pipette filler/ rinse first / read at eye level (1) 	ignore burette etc for 1 st mpt if using measuring cylinder/ burette allow suitable practical point eg read at eye level/ add dropwise from burette near 25 cm ³ (1) ignore as 2 nd point: transfer liquid to flask / safety precautions	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	D 25.20 cm ³		(1)

Question Number	Indicative Content	Mark
QWC	<p>*1(c)</p> <p>A description / explanation including some of the following points</p> <p>soft</p> <ul style="list-style-type: none"> • add soap (solution) • shake/ mix • lather (immediately) • no scum/ no precipitate <p>permanent hard</p> <ul style="list-style-type: none"> • add soap (solution) • shake • no lather / less than with soft water • scum/ precipitate • boiled sample • same results / boiling does not change • becomes soft after ion exchange but not after boiling <p>temporary hard</p> <ul style="list-style-type: none"> • add soap (solution) • shake • no lather / less than with soft water • scum/ precipitate • boiled sample • after boiling precipitate / (lime)scale formed • lather (immediately) <p>credit quantitative approaches e.g. titration with soap solution</p>	(6)

Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited description e.g. test and one result / when shaken with soap, soft water makes lather but no scum • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple description e.g. describe test and results to distinguish the soft water and the two samples that are hard water / when shaken with a small amount of soap, soft water makes a lather and no scum but the other waters make scum but no (less) lather • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed description e.g. describe test and results to identify all three of the samples / as 3-4 and boil the two hard water samples and repeat test. That which now gives a lather is temporarily hard • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors