

Hard and soft water and purifying water

**Mark scheme**

1.	(a)	(i)	dissolve	1	
		(ii)	calcium	1	
		(iii)	sodium carbonate	1	
		(iv)	precipitates	1	
	(b)	any <b>two</b> from:		2	
		•	(lime)scale <i>accept precipitate</i> <i>ignore scum</i>		
		•	acts as insulator / covers element / prevents heat passing through		
		•	requires more energy <i>ignore references to time</i>		
	(c)	(i)	flask <i>accept clear misspellings</i>	1	
		(ii)	condenser <i>accept clear misspellings</i>	1	
					<b>[8]</b>
2.	(a)	calcium <i>allow formulae</i>		1	
		carbonate		1	
	(b)	(i)	soap <i>allow 2 marks for "contains CaSO<sub>4</sub> / Ca(HCO<sub>3</sub>)<sub>2</sub> / Ca<sup>2+</sup> / Mg<sup>2+</sup>"</i> forms scum / no bubbles / no lather <i>allow 1 mark for "contains Ca / Mg"</i> <i>do <b>not</b> allow "contains CaCO<sub>3</sub>"</i>	1	
		(ii)	taste / strengthen bones, teeth etc / health reason e.g. less heart disease / makes better beer	1	
	(c)	(shake with) soap; makes scum / no lather		1	
		boil (a fresh sample)		1	
		retest with soap		1	
		result/comparison		1	
		alternative answers:			
		•	boil (not to dryness)		
		•	cloudiness in water/some deposit formed <i>if a comparison is made with a sample of a soft water, a further 2 marks would be possible</i>		
	(d)	ion-exchange		1	

[10]

3. (a) contains (large amounts of) dissolved solids / difficult to remove dissolved solids 1  
*allow salty / too much salt*  
*allow sea water makes you thirsty / vomit*  
*allow polluted / untreated / contaminated*
- (b) filtered: removes solids / removes insoluble material / dirt 1  
*ignore large objects*
- chlorine: kills/destroy bacteria/microbes/ germs etc 1  
*allow disinfect / sterilise or gets rid of bacteria*  
*ignore purify / clean*

[3]