

Potable water and water treatment (required practical)

Q1. (2018)

A)

03.1	16(.0)		1	AO2 5.10.1.2
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B)

03.2	advantage: more accurate result	do not accept reliable	1	AO3 5.10.1.2
	disadvantage: takes a long(er) time, more energy needed (to heat more water)	ignore expensive	1	

Q2. (2018)

03.3		a clear comparative statement referring to solutes gains the mark		AO1 5.8.1.1 5.10.1.2
	pure: no dissolved solids / impurities or no (dissolved) chlorine	allow only water / H ₂ O ignore safe to drink	1	
	and potable: has dissolved solids / impurities or has (dissolved) chlorine	ignore safe to drink		

Q3. (2018)

03.4	groundwater: • filtered	allow acceptable method of filtration	1	AO1 5.10.1.2
	• sterilised	allow acceptable method of sterilisation	1	
	seawater: • distilled or reverse osmosis	allow desalination ignore salt removed ignore boiling alone ignore filtering do not accept fractional distillation	1	

Q4. (2018)

03.5		an answer of 0.143 (g) or 0.14 (g) scores 2 marks		AO2 5.10.1.2
	$\frac{2.2}{100} \times 6.50$		1	
	(=) 0.143 (g)		1	

Q5. (2019)

01.1	potable		1	AO1.1 5.10.1.2	A
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Q6. (2019)

01.2		allow boils at 100°C for 2 marks		AO2 5.8.1.1	E
	boil (water)	ignore heat do not accept filter do not accept incorrect test	1		
	(boils) at 100°C	alternative approach freeze (water) (1) (freezes) at 0°C (1) if no other mark awarded, allow 1 mark for evaporate or distil water and no solid left	1		

Q7. (2019)

01.3	Level 2: The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	3–4	AO1.1 5.10.1.2 10.2.13	E
	Level 1: The design/plan would not necessarily lead to a valid outcome. Some steps are identified, but the plan may not be logically sequenced.	1–2		
	No relevant content	0		
	Indicative content <ul style="list-style-type: none"> weigh container. measure volume (100 cm³) of water into container. evaporate / heat until dry. weigh container and remaining solids. determine mass of dissolved solids <p>To access Level 2 there should be an indication of using a known volume of water, heating until dry and determining the mass of solid.</p>			

Q8. (2019)

01.4		an answer of 0.031 (g) scores 4 marks		AO2 5.3.2.5 10.2.13	E
	(conversion of cm ³ to dm ³) (250 cm ³ =) $\frac{250}{1000}$ or 0.25 (dm ³)		1		
	(conversion of mg to g) (125 mg =) $\frac{125}{1000}$ or 0.125 (g)		1		
	(0.25 × 0.125) = 0.03125	allow correct calculation from incorrect attempt(s) at conversion	1		
	=0.031 (g)	allow an answer correctly rounded to 2 significant figures from an incorrect calculation that uses the values in the question	1		

Q9. (2019)

01.5	$\frac{44}{500} \times 100$	an answer of 8.8 (%) or 9 (%) scores 2 marks	1	AO2 5.10.1.2 10.2.13	E
	= 8.8 (%)	allow 9 (%)	1		

Q10. (2020)

03.1	microbes	allow bacteria / pathogens	1	AO1 5.10.1.3
	chemicals		1	

Q11. (2020)

03.2	anaerobic digestion		1	AO1 5.10.1.3
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Q12. (2020)

A)

04.1	dependent		1	AO1 5.10.1.2
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B)

04.2	not all water had been removed from the sample	allow description of process	1	AO3 5.10.1.2
	heat to constant mass		1	
	alternative approach:			
	mass included (droplets of) water on the bottom of the evaporating basin (1)	allow bottom of evaporating basin was wet ignore spillages ignore weighing errors		
	dry the bottom of the evaporating basin (1)	allow wipe off droplets		

C)

04.3	$\frac{0.22 + 0.23 + 0.20 + X}{4} = 0.21$		1	AO2 5.10.1.2
	(X =) 0.19 (g)		1	

D)

04.4		allow ecf from question 04.3		AO2 5.10.1.2
	C		1	
	biggest difference between the maximum and minimum values	allow calculated range if all ranges are shown A 0.04; B 0.06; C 0.15 and D 0.12	1	

Q13. (2020)

04.5	(conversion m^3 to cm^3) $1 \text{ m}^3 = 1 \times 10^6 \text{ cm}^3$		1	AO2 5.3.2.5 5.10.1.2
	(mass =) $1 \times 10^6 \times \frac{0.016}{25}$	allow correct use of an incorrect / no conversion value	1	
	= 640 (g)		1	
	= 6.4×10^2 (g)	allow a correctly calculated answer in standard form from an incorrect calculation of mass	1	

Q14. (2021)

03.1	add water to anhydrous copper sulfate	allow a description of heating hydrated copper sulfate to produce anhydrous copper sulfate, followed by addition of water	1	AO2
	colour changes from white		1	AO1
	to blue		1	AO1
				5.6.2.1

Q15. (2021)

03.4	heat salty water	allow boil salty water	1	AO1
	(so) water evaporates (as water vapour)		1	5.10.1.2 RPA13
	cool the (water) vapour		1	
	(which) condenses to form potable / liquid water		1	

Q16. (2021)

03.5	distillation requires energy (to boil salty water)	allow distillation requires fuel (to boil salty water)	1	AO1 5.10.1.3 RPA13
	(but) ground water only needs filtering and sterilising		1	

Q17. (2022)

02.1	Level 2: Scientifically relevant features are identified, the way(s) in which they are similar / different is made clear and (where appropriate) the magnitude of the similarity / difference is noted.	4–6	AO1 5.10.1.3																														
	Level 1: Relevant features are identified and differences noted.	1–3																															
	No relevant content	0																															
Indicative content																																	
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Q18. (2022)

A)

02.2	distillation	1	AO1 5.10.1.2
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B)

02.3	(conversion) $\frac{150}{1000} = 0.15 \text{ (dm}^3\text{)}$		1	AO2 5.3.2.5
	(concentration =) $\frac{2.40}{0.15}$	allow correct use of incorrect / no conversion	1	
	= 16 (g/dm ³)		1	
	OR (conversion) $\frac{1000}{150} (1)$			
	= 6.67 (1)			
	(6.67 × 2.4) = 16 (g/dm ³) (1)			
	OR (concentration =) $\frac{2.4}{150} (1)$			
	= 0.016 (1)			
	(conversion) (0.016 × 1000) = 16 (g/dm ³) (1)			

Q19. (2023)

A)

04.1	heat the evaporating basin and contents to constant mass	allow heat until all of the water has evaporated	1	AO3 5.10.1.2 RPA13
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B)

04.2	(mass X =) [0.29 × 3] – [0.30 + 0.26]	allow 0.87 – 0.56	1	AO2 5.10.1.2 RPA13
	= 0.31 (g)	allow $\frac{0.3 + X + 0.26}{3} = 0.29$	1	

C)

04.7	the dissolved solids pass through filter paper		1	AO2 5.10.1.2 RPA13
	(because) the dissolved solid (particles) are very small		1	

Q20. (2024)

A)

06.1	large amounts of energy required	ignore references to time and/or cost	1	AO1 5.10.1.2
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B)

06.2	reverse osmosis	ignore desalination	1	AO1 5.10.1.2
	using membranes		1	

Q21. (2024)

A)

06.3	(heat) until the mass is constant		1	AO3 5.10.1.2 RPA13
	to ensure that all the water has evaporated		1	

B)

06.4	(mass =) $\frac{77.8}{100} \times 3.50$		1	AO2 5.10.1.2 RPA13
	= 2.72 (g)		1	