M1. (a)	reversible allow equilibrium					
	(b)	The colour changed from blue to pink	1			
	(c)	8.3 (°C)	1			
	(d)	endothermic allow dehydration ignore reversible	1	[4]		

M2. (a)	natural	ural gas				
				allow correct answer shown in box if answer line blank	1	
	(b)	(i)	450	allow correct answer shown in box if answer line blank	1	
		(ii)	iron	allow correct answer shown in boy if answer line blank	-	
				allow correct answer shown in box if answer line blank	1	
		(iii)	The c	atalyst lowers the activation energy.	1	
	(c)	(the	gases a	are) cooled	1	
		amr	nonia c	ondenses		
				allow ammonia liquefies	1	
		nitr	ogen ar	nd hydrogen are recycled		
				if no other mark awarded allow ammonia is separated for 1 mark	1	[7]

М3.		(a) reversible	1
	(b)	(from blue) to pink do not accept incorrect initial colour	1
	(c)	sensible answers such as: • stop water reaching papers	
		 accept stop entry of moisture / wet / dampness / condensation water (vapour) in air ignore references to toxicity of cobalt chloride 	

[3]

M4.	(a) (i	i) 10	1	
		(ii)	OH ⁻	1	
	(b)	(i)	air	1	
		(ii)	particles move faster	1	
			particles collide more often	1	
		(iii)	catalyst(s)	1	
	(c)	liqui	d	1	[7]

M5.	(a	i) 2:	2	1	
	(b)	(i)	exothermic	1	
		(ii)	C	1	
			gives out most heat energy accept has largest temperature change / increase allow has highest (final) temperature or hottest	1	
	(c)	(i)	increases	1	
		(ii)	blue ignore pale / dark etc	1	
		(iii)	reversible (reaction) allow goes both ways or two / either way	1	
		(iv)	anhydrous copper sulfate	1	[8]

M6. (a) gases

white

white

solid

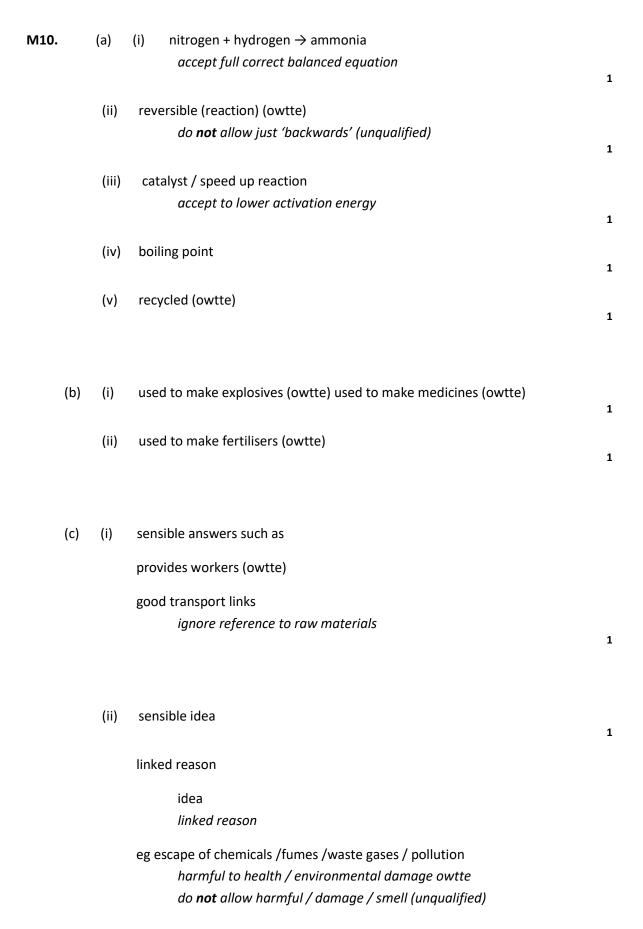
ammonium chloride

allow phonetic spelling
allow goes both / two / either way(s)

[5]

M7.	(a) increases	1	
	(b) the reaction is reversible	1	
	(c) A liquid	1	
	(d) recycled / reused (owtte) accept returned to pump / start	1	[4]
M8.	(a) white to blue accept colourless to blue	1	
	(b) reversible	1	[2]

M9.		(a)	water			
		2 n	nust be t	accept H ₂ O or 5H ₂ O below halfway	1	
	(b)	the	e cold wa	ater / ice / cubes (owtte) accept 'cooled down' or references to cold	1	
	(c)	rev	ersible r	reaction	1	
	(d)	(i)	0.87§	5	1	
		(ii)		tudent made errors in weighing during experiments	1	
			the st	tudent did not heat the copper sulfate for long enough in one of the expe	riments 1	
	(e)	wh	iite		1	
		blu	ıe	allow 1 mark for blue to white	1	[8]



risk of explosion

because of high pressures / may endanger local people / dangerous

risk of fire

because of high temperatures / may endanger local people

noise

any detrimental effect on quality of life **or** night and day

lorries / traffic

danger / noise / pollution etc

unsightly

detrimental effect on quality of life / house prices / reduced tourism

uses a lot of land

loss of habitats

1

[10]