

REVERSIBLE REACTIONS

&

LE CHATELIER'S PRINCIPLE 1

MARK SCHEME

Q1.

Question	Answer	Extra information	Marks
	an equilibrium is achieved when rate of the forward reaction is exactly the same as the rate of the backward reaction		1
Total marks			1

Q2.

Question	Answer	Extra information	Marks
(a)	fewer product molecules than reactant molecules (owtte) or 3 reactant molecules and 1 product or 3 volumes of gas becomes 1 volume of gas	accept forward reaction produces fewer molecules accept left hand side for reactants and right-hand side for products accept high pressure favours the side with fewer molecules ignore references to reaction rate	1
(b)	any three from: <ul style="list-style-type: none"> • low temperature gives best yield or high temperature gives poor yield • because the reaction is Exothermic • reaction too slow at low temperature or reaction faster at high temperature • temperature used gives a 	accept add heat as increased temperature or 'less' as poor yield accept reverse argument if clearly expressed accept add heat and reaction goes faster	3

	reasonable yield at a fast rate / compromise explained	allow get less product but it takes less time for 2 marks	
Total marks			4

Q3.

Question	Answer	Extra information	Marks
(a)	same number of (gaseous) molecules / moles / volume on both sides of the equation	allow particles for molecules do not accept atoms ignore amount	1
(b)	(forward) reaction is exothermic	accept reverse answer	1
Total marks			2

Q4.

Question	Answer	Extra information	Marks
(a)	22		1
(b)(i)	exothermic		1
(ii)	C gives out most heat energy	accept has largest temperature change / increase allow has highest (final) temperature or hottest	1 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
Total marks			8

Q5.

Question	Answer	Extra information	Marks
(a)	water		1
(b)	the cold water / ice / cubes		1
(c)(i)	0.87g		1
(ii)	the student made errors in weighing during the experiments		1

	the student did not heat the copper sulfate for long enough in one of the experiments		1
(d)	white blue	allow 1 mark for blue to white	1 1
Total marks			7

Q6.

Question	Answer	Extra information	Marks
(i)	ammonia can break up to form nitrogen and hydrogen ammonia is made from nitrogen and hydrogen	list principle applies	2
(ii)	air		1
Total marks			3

Q7.

Question	Answer	Extra information	Marks
(a)	O ₂ in correct space correct balancing	accept multiples	1 1
(b)	rate increases because particles are closer together so frequency of collisions increases	incorrect reference to energy = max 2 ignore references to equilibrium accept because there are more particles (per unit volume) allow particles have less space / room to move around accept particles are more likely to collide ignore more collisions ignore more successful collisions	1 1 1
Total marks			5