Question			Answer	Marks	Guidance
3	(a)		(Increase in pressure) increases the rate **AND** because molecules are closer together… ✓ … so there are more collisions per unit time ✓	2	**ALLOW** more particles per unit volume **NOT** molecules move faster or have more energy
	(b)	(i)	*Expression:* $K_c = [NH_3]^2 / [H_2]^3[N_2]$ ✓ *Calculation:* $= (0.877)^2/(2.00)^3(1.20)$ ✓ $= 0.0801$ ✓ ($dm^6\ mol^{-2}$)	3	Square brackets required **ALLOW** from 1 sig fig up to calculator display Correct answer alone scores all marks
		(ii)	*Catalyst:* No effect, it only changes the rate of reaction ✓ *Higher temperature:* Forward reaction is exothermic ✓ so position of equilibrium moves to the left and there will be less NH_3 ✓	3	

Question			Answer	Marks	Guidance
	(c)		**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **IF** answer = 76.5 (%) award 3 marks $n(NH_3) = (1 \times 10^6) / 17 = 5.88 \times 10^4$ (58824) (mol) **AND** *Theoretical yield:* $n(NH_2CONH_2) = 5.88 \times 10^4 / 2 = 2.94 \times 10^4$ (29412) (mol) ✓ *Actual yield:* $n(NH_2CONH_2) = 1.35 \times 10^6 / 60 = 2.25 \times 10^4$ (22500) (mol) ✓ % yield = $(2.94 \times 10^4 / 2.25 \times 10^4) \times 100\% = 76.5(\%)$ ✓	**3**	**If there is an alternative answer, check to see if there is any ECF credit possible using working below** **ALLOW** up to full calculator display For 2nd and 3rd marks, **ALLOW** calculation in mass. *Theoretical mass yield:* $m(NH_2CONH_2) = 60 \times 5.88 \times 10^4 / 2 = 1.764$ tonne ✓ % yield = (1.35 / 1.764) × 100 = 76.5% ✓ **ALLOW** 76% (2 sig figs) up to calculator answer correctly rounded from previous values **ALLOW ECF** from calculated actual and theoretical yields
			Total	**11**	