Question	Marking Guidance	Mark	Comments
3(a)(i)	ΔH = Σ bonds broken – Σbonds formed = 944/2 + 3/2 $\times$ 436 –3 $\times$ 388 = –38 (kJ mol^{-1})	1 1 1	 ignore units even if incorrect correct answer scores 3 –76 scores 2/3 +38 scores 1/3
3(a)(ii)	mean / average bond enthalpies are from a range of compounds or mean / average bond enthalpies differ from those in a single compound / ammonia	1	
3(b)	ΔS = Σ S products – Σ S reactants = 193 – (192/2 + 131 $\times$ 3/2) = –99.5 J K^{-1} mol^{-1}	1 1 1	 units essential for M3 correct answer with units scores 3 –199 J K^{-1} mol^{-1} & –99.5 score 2/3 – 199 and + 99.5 J K^{-1} mol^{-1} score 1/3

3(c)(i)	$\Delta G = \Delta H - T\Delta S = -46 + 800 \times 99.5/1000$ = 33.6 or 33600 kJ mol^{-1} with J mol^{-1}	1 1 1	mark is for putting in numbers with 1000 if factor of 1000 used incorrectly CE = 0 allow 33 to 34 (or 33000 to 34000) correct units for answer essential if answer to part (b) is wrong or if -112 used, mark consequentially e.g. • –199 gives 113 to 114 kJ mol^{-1} (scores 3/3) • –112 gives 43 to 44 kJ mol^{-1} (scores 3/3)
3(c)(ii)	If answer to (c) (i) is positive: not feasible / not spontaneous If answer to (c) (i) is negative: feasible / spontaneous	1	if no answer to (c) (i) award zero marks