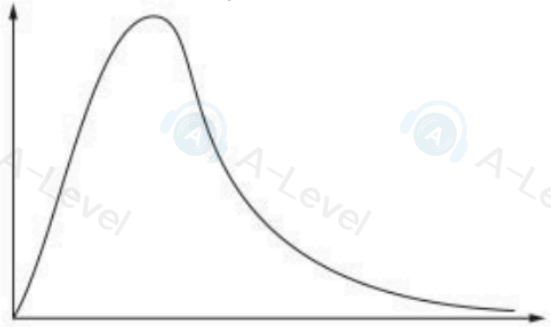
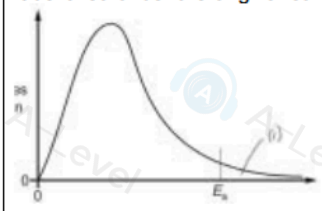
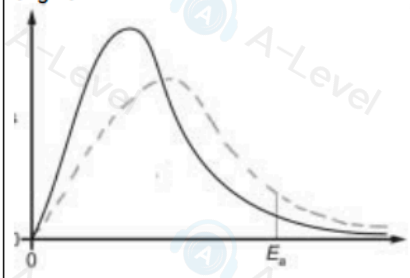
Question	Answer	Marks
1(a)(i)	*vertical axis*: number of particles  *horizontal axis:* (kinetic / particle) energy **M1:** shape of curve correct **M2:** labelled axes	**2**
1(a)(ii)	Labelled line (**T2**) with lower peak to right of original	**1**
1(b)(i)	Any two from: • no VdW forces present / no forces of attraction between particles • (ideal gas) particles have no / negligible volume (compared to container) • collisions between (ideal gas) particles / walls of container are perfectly elastic • (ideal gas) particles behave as rigid spheres	**2**
1(b)(ii)	**M1:** moles of krypton = 2.00 ÷ 83.8 (= 0.0239 mol) **M2:** conversion of value into consistent units for $pV = nRT$ **M3:** $p = \frac{M1 \times 8.31 \times 393}{5.00 \times 10^{-3}}$ = 15600 Pa	**3**
1(c)(i)	$K_p = \frac{p\mathrm{HI}^2}{p\mathrm{H}_2 \; p\,\mathrm{I}_2}$	**1**
1(c)(ii)	28.76 **OR** 28.8 **OR** 29	**1**
1(c)(iii)	**EITHER** **option 1** which assumes $\Delta H_{reaction}$ *is (still) endothermic (using the value shown in (b)).* **M1** (K_p) decreases **AND** endothermic / $\Delta H_{(f)}$ = + / positive **M2** reaction favours formation of reactants / hydrogen and iodine OR (product) yield / partial pressure of HI decreases / equilibrium shifts to the left **OR** **option 2** which realises that $\Delta H_{reaction}$ *is in fact exothermic (using bond energy data in Data Booklet)* **M1** (K_p) increases **AND** exothermic / $\Delta H_{(f)}$ = + / negative **M2** reaction favours formation of products / hydrogen iodide yield increases / partial pressure of HI increases / equilibrium shifts to the right	**2**

Question	Answer	Mark
3(a)	change in amount of substance with time	1
3(b)(i)	label **area** under the original curve to the right of E_a. 	1
3(b)(ii)	**M1** *curve starts at the origin but peak lies to the right of original.*	1
	M2 *peak at higher temperature is lower than the original AND graph crosses the original once only – beyond the peak of original* 	1
3(b)(iii)	no change / none	1