Question	Marking Guidance	Mark	Comments
3(a)(i)	(At 0 K) particles are stationary / not moving / not vibrating	1	Allow have zero energy. Ignore atoms / ions.
	No disorder / perfect order / maximum order	1	Mark independently.
3(a)(ii)	As *T* increases, particles start to move / vibrate	1	Ignore atoms / ions. Allow have more energy. If change in state, CE = 0
	Disorder / randomness increases / order decreases	1	
3(a)(iii)	Mark on temperature axis vertically below second 'step'	1	Must be marked as a line, an 'x' , T_b or 'boiling point' on the temperature axis.
3(a)(iv)	L_2 corresponds to boiling / evaporating / condensing / $l \rightarrow g$ / $g \rightarrow l$ And L_1 corresponds to melting / freezing / $s \rightarrow l$ / $l \rightarrow s$	1	There must be a clear link between L_1, L_2 and the change in state.
	Bigger change in disorder for L_2 / boiling compared with L_1 / melting	1	M2 answer must be in terms of changes in state and not absolute states eg must refer to change from liquid to gas not just gas. Ignore reference to atoms even if incorrect.

3(b)(i)	$\Delta G = \Delta H - T\Delta S$ $\Delta H = c$ and $(-)\Delta S = m$ / ΔH and ΔS are constants (approx)	1 1	 Allow ΔH is the intercept, and $(-)\Delta S$ is the slope / gradient. Can only score M2 if M1 is correct.
3(b)(ii)	Because the entropy change / ΔS is positive / $T\Delta S$ gets bigger	1	Allow $-T\Delta S$ gets more negative.
3(b)(iii)	Not feasible / unfeasible / not spontaneous	1	
3(c)(i)	+ 44.5 J K^{-1} mol^{-1}	1	Allow answer without units but if units given they must be correct (including mol^{-1})
3(c)(ii)	At 5440 $\Delta H = T\Delta S$ = 5440 × 44.5 = 242 080 (***OR*** using given value = 5440 × 98 = 533 120) ΔH = 242 kJ mol^{-1} (***OR*** using given value ΔH = 533 kJ mol^{-1})	1 1 1	 Mark is for answer to (c)(i) × 5440 Mark is for correct answer to M2 with correct units (J mol^{-1} or kJ mol^{-1}) linked to answer. If answer consequentially correct based on (c)(i) except for incorrect sign (eg -242), max 1/3 provided units are correct.