

Question			Expected response	Max mark	Additional guidance
9.	(a)		$(f_0 =) 7.0 \times 10^{14} \text{ Hz}$	1	Accept: $7 \times 10^{14} \text{ Hz}$ Accept: $6.9 \times 10^{14} - 7.1 \times 10^{14} \text{ Hz}$
	(b)		$E = hf_0$ (1) $E = 6.63 \times 10^{-34} \times 7.0 \times 10^{14}$ (1) $E = 4.6 \times 10^{-19} \text{ (J)}$ (1) Calcium/Ca (1)	4	OR consistent with (a) Accept: 5, 4.64, 4.641 If calcium is correctly identified with <u>no</u> calculation, maximum (1) mark. If there is a calculation with a value consistent with (a), then the metal chosen must be consistent with their calculation. If this calculated value does not match a value in the table, then maximum (3) marks. A unit is not required but, if a unit is given, it must be correct. If a candidate completes a calculation but does <u>not</u> go on to identify a metal, then a unit is required. In this question, if an incorrect metal or no metal identified, maximum (3) marks. Accept: $E = hf$ Alternative method: $E = hf_0$ (1) $4.6 \times 10^{-19} = 6.63 \times 10^{-34} \times f_0$ (1) $f_0 = 6.9 \times 10^{14} \text{ (Hz)}$ (1) Therefore calcium (1) Accept: 7, 6.94, 6.938 Where more than one calculation is shown all substitutions must be correct for substitution mark, and all calculated values must be correct for calculated value mark. Accept: $E_k = hf - hf_0$ (1) Substituted values must be consistent with the line or the table, depending on the method chosen.