MARKSCHEME - SL MATTER

P1A Answer Key:

1.B, 2.B, 3.B, 4.C, 5.B, 6.A, 7.B, 8.C, 9.C, 10.C, 11.A, 12.C, 13.C, 14.B, 15.B, 16.B, 17.C, 18.B, 19.C, 20.B

P1B Q1: (a) 3 isotopes [1]. (b) (24 * 78.99 + 25 * 10 + 26 * 11.01) / 100 = 24.32 [3]. (c) 24-12 Mg [1].

P1B Q2: (a) Coexistence of two phases [1]; rate of phase change in both directions is equal (or energy added goes to breaking IMFs rather than increasing temp) [1]. (b) Solid and Liquid [1]. (c) Longer plateau for Substance Y [1]; stronger IMFs require more energy to overcome during vaporization [1]; therefore more time is needed to add this latent heat at a constant rate [1]. (d) Yes [1]; temperature is increasing, and temperature is a measure of average kinetic energy [1].

P2 Q1: (a) Atom as positive sphere [1] with negative electrons embedded [1]. (b) Most alpha particles passed through (empty space) [1]; some deflected at large angles (hit small positive nucleus) [2]. (c) Electrons would spiral into nucleus due to energy loss (stability) [1].

P2 Q2: (a) 37-Cl: 17p, 20n, 17e [2]; 35-Cl-: 17p, 18n, 18e [2]. (b) $35x + 37(1-x) = 35.45 \rightarrow 2x = 1.55 \rightarrow x=0.775$. 77.5% Cl-35, 22.5% Cl-37 [3].

P2 Q3: (a) Solid: regular/close; Gas: random/distant [2]. (b) Gases have large empty spaces between particles [1]; solids are tightly packed with little free space [1].