AQA AS/A-level Year 1 Chemistry exam practice answers

**6 Equilibria**

**1 (a)** A low temperature [1]; encourages the exothermic route (the forward process) [1]

**(b) (i)** Increases [1]

**(ii)** Decreases [1]

**(c)** At the higher temperature, more molecules have energy greater than the activation energy [1]; at lower pressure, there are fewer molecules present in a given volume, so fewer collisions and hence fewer productive collisions [1]

**(d)** To increase the rate of reaction [1]; 450°C is a compromise between a reasonable rate and an acceptable yield [1]

**(e)** Expensive plant [1]; safety issues [1]

**(f) (i)** total cost = 200 × 8 × 106 = $1.6 × 109 [1]

**(ii)** 28 g of N2 gives 34 g of NH3; so 28 tonnes of N2 gives 34 tonnes of NH3; so mass in millions of tonnes of nitrogen used = (8 × 28)/34 [1] = 6.59 million tonnes [1]

**(g)** (6.59/15) × 100 = 43.9 million tonnes [1]

**2 (a)** amount of X = 0.50 − 0.20 = 0.30 mol [1]

amount of Y = 0.50 − (2 × 0.20) = 0.10 mol [1]

**(b)** expression = *K*c = [Z]/[X][Y]2 [1]

[Y]2 = [Z]/[X]*K*c [1]

[Y] = (0.35/0.40 × 2.9)0.5 = 0.5493 = 0.55 mol dm3 [1]

**(c)** Darkened/went more orange [1]; the equilibrium moved to the right [1]; to oppose the increased concentration of Y [1]