

| Question | Marking guidance                                                                                                                                             | Mark        | AO                   | Comments                                                        |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------|-----------------------------------------------------------------|
| 04.1     | amount of X = $0.50 - 0.20 = 0.30$ (mol)<br>amount of Y = $0.50 - 2 \times 0.20 = 0.10$ (mol)                                                                | 1<br>1      | AO2h<br>AO2h         |                                                                 |
| 04.2     | Axes labelled with values, units and scales that use over half of each axis<br>Curve starts at origin<br>Then flattens at 30 seconds at 0.20 mol             | 1<br>1<br>1 | AO2h<br>AO2h<br>AO2h | All three of values, units and scales are required for the mark |
| 04.3     | Expression = $K_c = \frac{[Z]}{[X][Y]^2}$<br>$[Y]^2 = \frac{[Z]}{[X] K_c}$<br>$[Y] = (0.35 / 0.40 \times 2.9)^{0.5} = 0.5493 = 0.55$ (mol dm <sup>-3</sup> ) | 1<br>1<br>1 | AO1a<br>AO2b<br>AO1b | Answer must be to 2 significant figures                         |
| 04.4     | Darkened / went more orange<br>The equilibrium moved to the right<br>To oppose the increased concentration of Y                                              | 1<br>1<br>1 | AO2g<br>AO2g<br>AO2g |                                                                 |
| 04.5     | The orange colour would fade                                                                                                                                 | 1           | AO3 1a               |                                                                 |