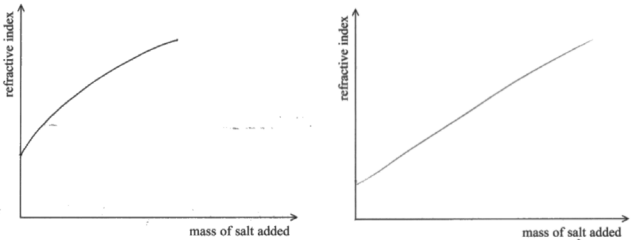


Question Number	Answer	Mark
3(a)	<ul style="list-style-type: none"> Mass (of solution) obtained using a (top pan) balance (1) Volume (of solution) measured with a measuring cylinder (1) Calculate density = mass / volume ($\rho = m / V$) (1) 	3
3(b)	<ul style="list-style-type: none"> Positive intercept on the refractive index axis (1) Refractive index increases as mass of salt added increases (1) 	2
3(c)	<ul style="list-style-type: none"> Measure θ_2 for different θ_1 (1) Measure at least 5 pairs of angles (1) Plot graph of $\sin \theta_1$ against $\sin \theta_2$ (1) Refractive index is the gradient of the line (1) 	4
3(d)(i)	<ul style="list-style-type: none"> Use of $n_1 \sin \theta_1 = n_2 \sin \theta_2$ (with $n_1 = 1$) (1) Max value = 1.38 (1) Min value = 1.30 (1) <p><u>Example of calculation</u></p> $n_{max} = \frac{\sin 33.5^\circ}{\sin 23.5^\circ} = 1.384$ $n_{min} = \frac{\sin 32.5^\circ}{\sin 24.5^\circ} = 1.296$	3
3(d)(ii)	<ul style="list-style-type: none"> Use of half range of values (1) Percentage uncertainty = 3 (%) (1) <p>Allow ecf from (d)(i)</p> <p><u>Example of calculation</u></p> <p>Range of values = $1.38 - 1.30 = 0.08$</p> <p>Half range of values = 0.04</p> $\text{percentage uncertainty} = \frac{0.04}{1.34} \times 100\% = 3\%$	2
Total for question 3		14