

**GCSE Chemistry B (Twenty First Century Science)**  
**J258/01 Breadth in Chemistry (Foundation Tier)**

**Question Set 16**

1

This question is about the efficiency of LED light-bulbs in 2015 compared to 2011.



The table shows part of a life-cycle assessment for the two light-bulbs. The numbers in the table compare the energy used to give the same amount of light in a certain time.

Stage in life cycle	2011 light (MJ)	2015 light (MJ)
Manufacture	343	132
Transport	3	2
Use of the light-bulb	3540	1630
Total energy used		

- (a) (i) Which **stage** uses the most energy? [1]
- (ii) In total, the 2011 light-bulb uses more energy than the 2015 light-bulb.

Calculate the difference in the **total** energy used.

Difference in total energy = ..... MJ

- (b) The **last** stage in the life-cycle assessment is missing. [2]

Name the **last** stage.

[1]

- (c) The percentage decrease in energy use at 'manufacture' stage from 2011 to 2015 is given by:

$$\frac{343 - 132}{343} \times 100 = 62\%$$

Calculate the percentage decrease in energy use at 'use of the light-bulb' stage from 2011 to 2015.

Give your answer to **2** significant figures.

Percentage decrease = .....% **[2]**

**Total Marks for Question Set 16: 6**

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