



**GCSE Chemistry A (Gateway Science)**  
**J248/04 Chemistry A C4-C6 and C7 (Higher Tier)**

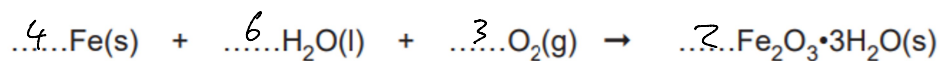
**Question Set 28**

1 Iron rusts when it gets wet.

(a) The word equation for rusting is

iron + water + oxygen → rust (hydrated iron(III) oxide)

Balance the symbol equation for the formation of rust.



[2]

(b) A 1.0 kg iron bar is left outside in the rain.

- All of the iron turns to rust.
- The rust forms at a rate of 60 g per day.

Calculate how long it will take for the iron bar to turn completely to rust.

Give your answer to the nearest day.

$$n_{Fe} = \frac{m}{M_r} = \frac{1000}{56} = 17.9 \text{ mol}$$

$$\Rightarrow n_{rust} = \frac{17.9}{2} = 8.93 \text{ mol}$$

$$m_{rust} = n \times M_r = 8.93 \times 214 = 1911.02$$

$$\begin{aligned} \text{rate} &= \frac{\text{total mass}}{\text{time taken}} \Rightarrow \text{time taken} = \frac{\text{total mass}}{\text{rate}} \\ &= \frac{1911.02}{60} \\ &= 31.9 \text{ days} \end{aligned}$$

Answer = ..... 32 ..... days [6]

**Total Marks for Question Set 28: 8**