

The moles for ethanol will be multiplied by 2 because 1 mole of ethanol produces 2 moles of carbon dioxide.

Convert to grams

$$\text{mass} = n \times M$$

$$\text{mass} = (17.15 \times 2) \times 44$$

$$\text{mass} = 1509.4 \text{ g}$$

$$\text{mass} = 1.51 \text{ kg}$$

*∴ There is 1.51 kg of CO<sub>2</sub> released per litre of ethanol*

Moles of water vapor produced

Relative molecular mass:

Mass of hydrogen = 1

Mass of oxygen = 16

$$(2 \times 1) + (1 \times 16)$$

$$= 2 + 16$$

$$= 18 \text{ g}$$

The moles for ethanol will be multiplied by 3 because 1 mole of ethanol produces 3 moles of water vapor.

Convert to grams

$$\text{mass} = n \times M$$

$$\text{mass} = (17.15 \times 3) \times 18$$

$$\text{mass} = 926.2 \text{ g}$$

$$\text{mass} = 0.926 \text{ kg}$$

*∴ There is 0.926 kg of H<sub>2</sub>O released per litre of ethanol*

*∴ The total amount of gas released per litre of ethanol =*

$$1.51 + 0.926$$

$$= 2.436 \text{ kg}$$

Change in enthalpy for ethanol:

$$\begin{aligned} \Delta H &= \text{energy required to break bonds} - \text{energy released when new bonds form} \\ &= H(\text{reactants}) - H(\text{products}) \end{aligned}$$