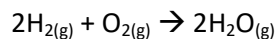


# Bond Energy and the Types of Reactions

## Exit Quiz – Teacher's Edition

When water vapor is produced from hydrogen and oxygen gases, the equation for the reaction is:



Bond	Bond Energy ( $\text{kJ mol}^{-1}$ )
H—O	463
O = O	498
H—H	436

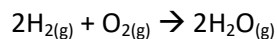
Use the equation and the bond energies in the table above complete the tasks below.

1. Draw the compounds in the reaction
2. Calculate the energy required to break the bonds in the reaction.
3. Calculate the energy released when the new bonds are formed.
4. Give the enthalpy change for the reaction.

# Bond Energy and the Types of Reactions

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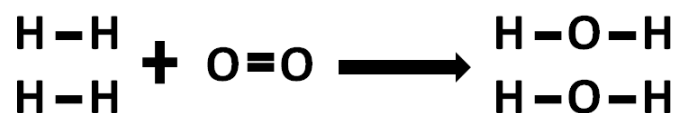
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Bond	Bond Energy ( $\text{kJ mol}^{-1}$ )
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Use the equation and the bond energies in the table above complete the tasks below.

1. Draw the compounds in the reaction



2. Calculate the energy required to break the bonds in the reaction.

**Bonds broken:**

$$\text{H}_2 \quad 2 \text{ mol} \times \text{H}-\text{H} \quad 2 \times 436 \text{ kJ mol}^{-1} = 872 \text{ kJ}$$

$$\text{O}_2 \quad 1 \text{ mol} \times \text{O}=\text{O} \quad 1 \times 498 \text{ kJ mol}^{-1} = 498 \text{ kJ}$$

**Total energy required for the reaction:**

$$872 + 498 = 1370 \text{ kJ}$$

3. Calculate the energy released when the new bonds are formed.

**Bonds formed:**

$$\text{H}_2\text{O} \quad 4 \text{ mol} \times \text{H}-\text{O} \quad 4 \times 463 \text{ kJ mol}^{-1} = 1852 \text{ kJ}$$

**Total energy released from the reaction:**

$$1852$$

4. Give the enthalpy change for the reaction.

**Difference = bonds broken – bonds made**

$$\text{Difference} = 1370 - 1852 = -482 \text{ kJ}$$