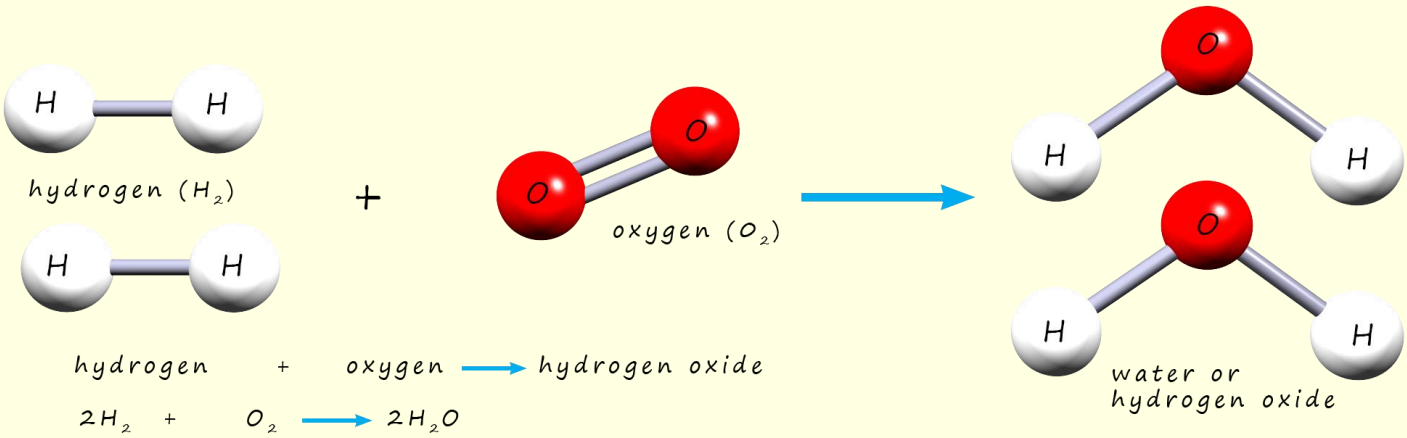
Answer all the questions below then check your answers

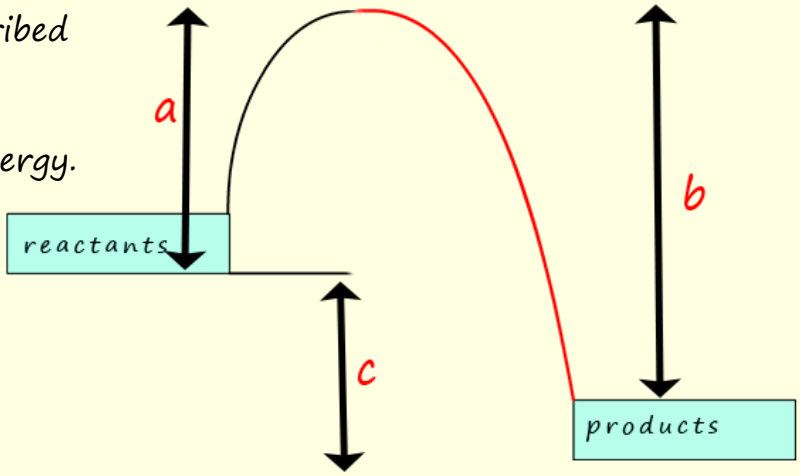
1. The equations and model equation below represents the reaction of hydrogen and oxygen to form water.



a. In terms of bond breaking and bond making explain what happens to the bonds holding the hydrogen and oxygen molecules together in the reactants when they combine to form water.

b. Is bond breaking an exothermic or endothermic process?

c. The formation of water described above is a highly exothermic reaction, it releases lots of energy. An energy profile diagram for this reaction is shown opposite.



i. identify the changes labelled a, b and

ii. What is the activation energy of a reaction?

iii. In terms of bond making and bond breaking explain why the combustion of hydrogen to form water is highly exothermic reaction.

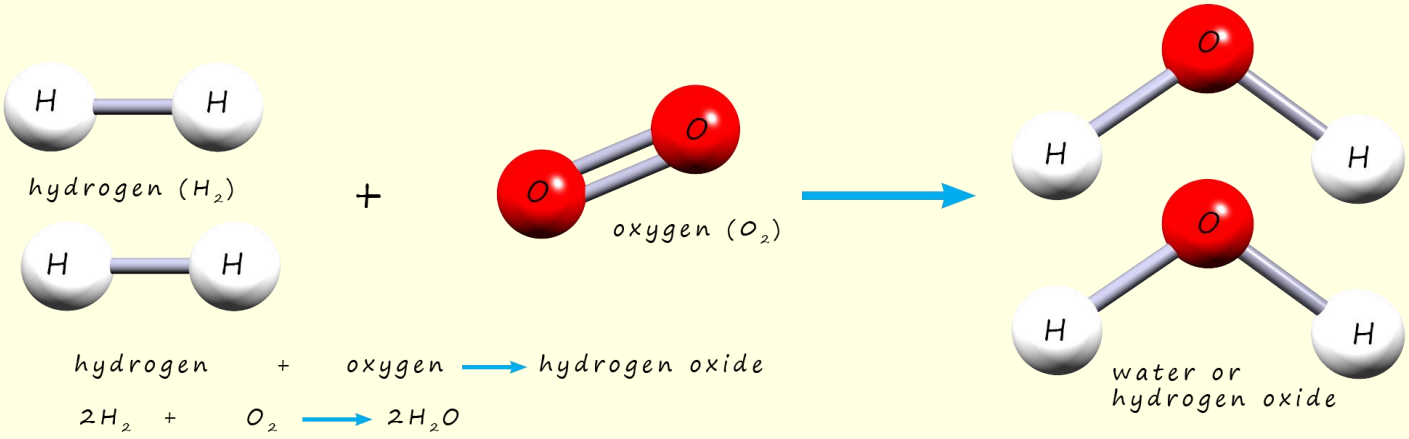
2. Draw an energy profile diagram for an endothermic reaction.

i. What can you say about the amount of energy required for bond breaking and that released by bond formation in an endothermic reaction?

Energy profile diagrams

Answers

1. The equation and model equation below represents the reaction of hydrogen and oxygen to form water.

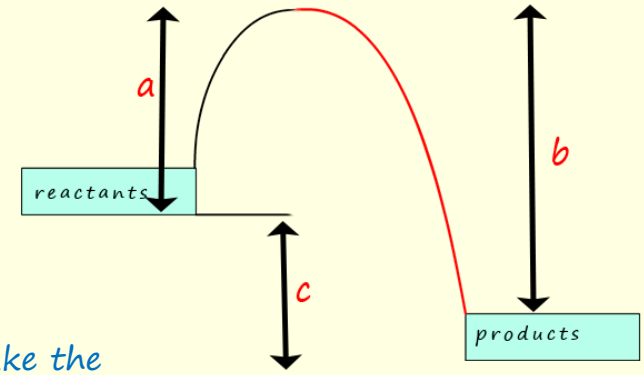


a. In terms of bond breaking and bond making explain what happens to the bonds holding the hydrogen and oxygen molecules together in the reactants when they combine to form water.

Before hydrogen and oxygen molecules can combine to form water the bonds holding these molecules must be broken, this is an endothermic process and requires an input of energy. This energy required to break the bonds in the reactants is called the activation energy, it is the energy needed to start the reaction.

b. Is bond breaking an exothermic or endothermic process? Its endothermic - requires energy to break apart molecules.

c. The formation of water described above is a highly exothermic reaction, it releases lots of energy. An energy profile diagram for this reaction is shown opposite.



i. identify the changes labelled a, b and c

a: energy required to break the bonds in the reactants. The activation energy

b: energy released by bonds forming to make the products.

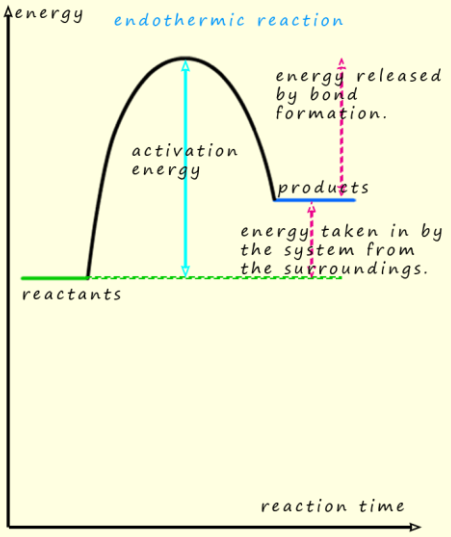
c: overall energy (enthalpy change) released by the reaction, it's the difference between b-c.

ii. What is the activation energy of a reaction? Energy needed to break bonds in reactants and start the reaction.

iii. In terms of bond making and bond breaking explain why the combustion of hydrogen to form water is highly exothermic reaction.

More energy is released by forming the bonds in the products than is required to break the bonds in the reactants. The bonds in the products are stronger than the bonds in the reactants and release more energy when they form.

2. Draw an energy profile diagram for an endothermic reaction.



i. What can you say about the amount of energy required for bond breaking and that released by bond formation in an endothermic reaction?

More energy required to break reactant bonds than is released by bond formation in the products. The bonds in the reactants are stronger than the bonds in the products.