



# STARTER FOR 10!!!

## 6.1. Definitions

Complete the gaps in the boxes below;

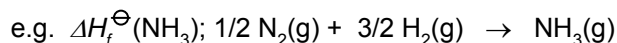
### Standard enthalpy change, $\Delta H^\ominus$

*Definition;* The heat energy change at ..... under standard conditions (pressure ..... ; temperature ..... ).

(2 marks)

### Standard molar enthalpy change of formation, $\Delta H_f^\ominus$

*Definition;* The enthalpy change when one mole .....  
.....  
.....



(3 marks)

### Standard molar enthalpy change of combustion, .....

*Definition;* The enthalpy change when one mole of a compound is completely burned in excess oxygen under standard conditions, all reactants and products in their standard states.



(3 marks)

### Mean bond energy

*Definition;* The .....  
.....  
.....

(2 marks)



# STARTER FOR 10!!!

## 6. Thermodynamics answers

### 6.1. Definitions

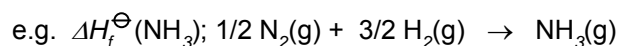
#### **Standard enthalpy change, $\Delta H^\ominus$**

*Definition;* The heat energy change at constant pressure under standard conditions (pressure 100 kPa ; temperature 298 K). (one mark for both conditions)

(2 marks)

#### **Standard molar enthalpy change of formation, $\Delta H_f^\ominus$**

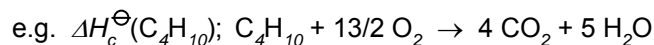
*Definition;* The enthalpy change when one mole of a compound is formed from its constituent elements under standard conditions, with all reactants and products in their standard states.



(3 marks)

#### **Standard molar enthalpy change of combustion, $\Delta H_c^\ominus$**

*Definition;* The enthalpy change when one mole of a compound is completely burned in excess oxygen under standard conditions, all reactants and products in their standard states.



(one mark for symbols, one for balancing)

(3 marks)

#### **Mean bond energy**

*Definition;* The enthalpy change when 1 mole of a particular type of bond is broken or made (all species in the gas phase) averaged over many different molecules

(2 marks)

### 6.2. Calorimetry

*Possible improvements / corrections include (any 10 from);*

1. The beaker needs some form of insulation (or a polystyrene beaker should be used)
2. An accurate thermometer is needed (not one that records  $-10$  to  $100$  °C)
3. The thermometer is placed too near the surface of the mixture. It must be in the centre.