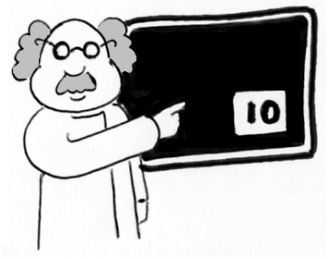


STARTER FOR 10...

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 .....

.....

.....

e.g. $\Delta H_f^{\ominus}(NH_3)$; $1/2\ N_2(g) + 3/2\ H_2(g) \rightarrow NH_3(g)$ (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.

e.g. $\Delta H_c^{\ominus}$ (C_4H_{10}); .....

(3 marks)

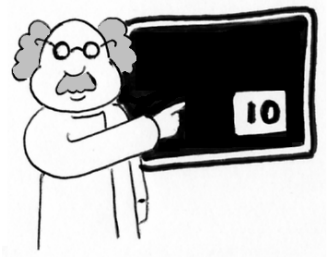
Mean bond energy

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.

e.g. $\Delta H_f^{\ominus}(NH_3)$; $1/2\ N_2(g) + 3/2\ H_2(g) \rightarrow NH_3(g)$

(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.

e.g. $\Delta H_c^{\ominus}(C_4H_{10})$; $C_4H_{10} + 13/2\ O_2 \rightarrow 4\ CO_2 + 5\ H_2O$

(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.