

## Chemguide – questions

### VARIOUS ENTHALPY CHANGE DEFINITIONS

1. This question is about the word “standard” as in *standard conditions* and *standard states*.

a) What do you understand by standard conditions as applied to:

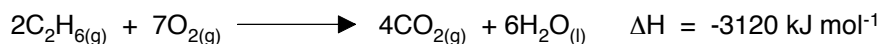
- (i) temperature;
- (ii) pressure;
- (iii) concentrations of solutions?

b) What are the standard states for the following substances?

- (i) oxygen
- (ii) hydrogen
- (iii) H<sub>2</sub>O
- (iv) CO<sub>2</sub>
- (v) carbon
- (vi) NaCl
- (vii) sodium
- (viii) CH<sub>4</sub>
- (ix) bromine
- (x) ammonia

2. a) Define the term *enthalpy change*.

b) Define the term *standard enthalpy change of reaction*, using the following equation as an illustration:



c) This reaction shows the combustion of ethane, but the standard enthalpy change of combustion of ethane is *not* -3120 kJ mol<sup>-1</sup>. Define the term *standard enthalpy change of combustion*, and explain why the standard enthalpy change of combustion of ethane isn't -3120 kJ mol<sup>-1</sup>.

3. a) Define the term *standard enthalpy change of formation*.

b) Write equations for the reactions for the enthalpy changes of formation for the following compounds. State symbols are *essential*.

- (i) H<sub>2</sub>O(l)
- (ii) C<sub>3</sub>H<sub>8</sub>(g)
- (iii) NaCl(s)
- (iv) C<sub>2</sub>H<sub>5</sub>OH(l)
- (v) NH<sub>4</sub>Cl(s)
- (vi) Na<sub>2</sub>SO<sub>4</sub>(s)