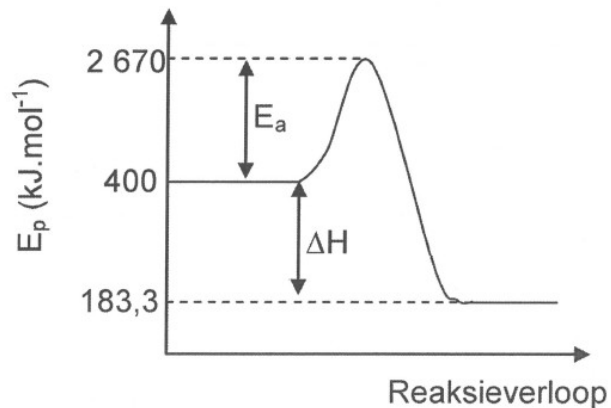


Reaksietipes Memo

November 2018

VRAAG 7 (Begin op 'n nuwe bladsy.)

Die volgende reaksie tussen ammoniak en suurstof vind teen konstante druk en temperatuur in 'n geslote stelsel plaas:



- 7.1 Definieer die term *aktiveringsenergie*. (2)
- 7.2 Gee 'n rede waarom hierdie reaksie eksotermies is. (1)
- 7.3 Bereken die reaksiewarmte. (3)
- 7.4 Teken die grafiek oor en dui met 'n stippellyn die effek van 'n katalisator op die aktiveringsenergie aan. (2)
- 7.5 Stel *Avogadro se wet* in woorde. (2)
- 7.6 Indien $6 \text{ dm}^3 \text{ NH}_3$ en $9 \text{ dm}^3 \text{ O}_2$ gebruik word, bereken die TOTALE VOLUME van die gasse aan die einde van die reaksie. (4)
- 7.7 Die reaksie hierbo is die eerste stap in die vervaardiging van 'n suur. Hierdie suur bevat 1,59% waterstof, 22,2% stikstof en 76,2% suurstof. Bepaal die empiriese formule van die suur. (5)

[19]

Reaksietipes Memo

November 2017

1.3 C ✓✓

(2)

1.7 A ✓✓

(2)

QUESTION/VRAAG 7

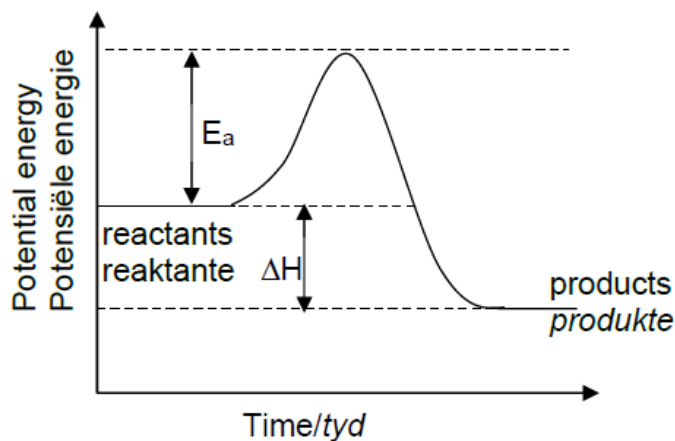
7.1 The minimum energy needed for a reaction to take place. ✓✓
 Die minimum energie benodig vir die reaksie om plaas te vind. ✓✓

(2)

7.2 An exothermic reaction ✓ releases energy **OR** $\Delta H < 0$ ✓
 'n Eksotermiese reaksie ✓ stel energie vry **OF** $\Delta H < 0$ ✓

(2)

7.3



MARKING CRITERIA/NASIENKRITERIA	
Activation energy E_a correct position and labelled <i>Aktiveringsenergie E_a korrekte posisie en benoem</i>	✓
Heat of reaction ΔH correct position and labelled <i>Reaksiewarmte ΔH korrekte posisie en benoem</i>	✓
Products have lower energy than reactants <i>Produkte het laer energie as reaktanse</i>	✓

(3)

7.4 C : $\frac{82,76}{12} = 6,896$ ✓

H : $\frac{17,24}{1} = 17,24$ ✓

Divide by the smallest answer
 Deel deur die kleinste antwoord

$\frac{6,896}{6,896} : \frac{17,24}{6,896}$ ✓
 1 : 2,5

2 : 5
 C_2H_5 ✓

(4)
[11]

1.9 C ✓✓

5.2.1 $n(\text{CaO}) = m/M \checkmark = 11,76/56 \checkmark = 0,21 \text{ mol}$

$n(\text{CaCO}_3) = n(\text{CaO}) \checkmark = 0,21 \text{ mol}$

$m(\text{CaCO}_3) = n/M = (0,21)(100) \checkmark = 21 \text{ g}$

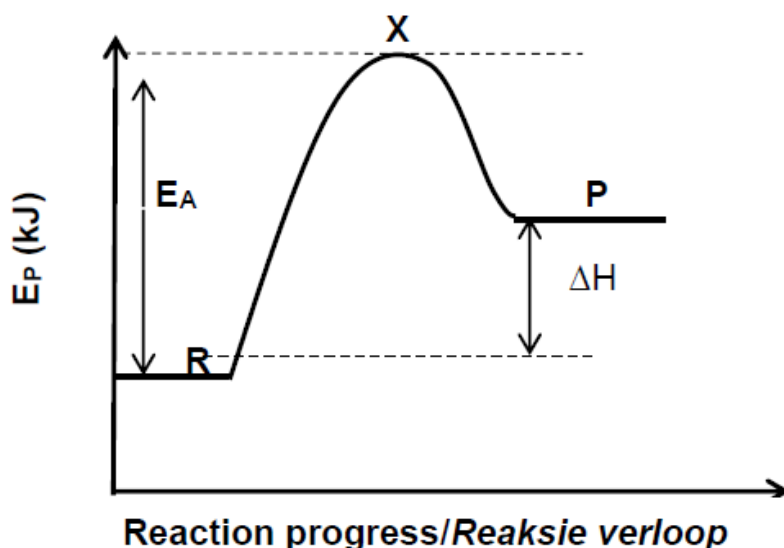
$\% \text{ purity} = m(\text{pure compound}/m(\text{impure sample}) \times 100$

$\% \text{ suiwerheid} = m(\text{suiwer verbinding})/m(\text{onsuiwer monster}) \times 100$

Impure mass/Onsuiwer massa = $2100/80 \checkmark = 26,25 \text{ g} \checkmark$

(6)

5.2.2



Marking criteria <i>Nasienriglyne</i>	Marks <i>Punte</i>
Correct shape as shown. <i>Korrekte vorm soos getoon.</i>	✓
Reactants(R) and Products (P) correctly labelled. <i>Reagense (R) en Produkte (P) korrek benoem.</i>	✓
Activation energy (E_A) correctly indicated. <i>Aktiveringsenergie (E_A) korrek aangedui.</i>	✓
Activated complex (X) correctly indicated. <i>Geaktiveerde kompleks (X) korrek aangedui.</i>	✓
ΔH correctly indicated. <i>ΔH korrek aangedui.</i>	✓

Notes/Aantekeninge:

If graph drawn for exothermic reaction:

Max. 2/5

Indien grafiek geteken is vir eksotermiese reaksie. Maks. 2/5

(5)

QUESTION 4 / VRAAG 4

4.1 4.1.1 bond length ✓ / *bindingslengte* (1)

4.1.2 bond energy ✓ / *bindingsenergie* (1)

4.1.3 NO ✓ / *NEE* (1)

4.1.4 ↙

Negative marking/Negatiewe merk

or there is more than one independent variable ✓✓

- The variables are not controlled ✓ / *Die veranderlikes word nie konstant gehou nie*
- Bonds should be between atoms of the same elements ✓ / *Bindings moet tussen atome van dieselfde elemente wees* (2)

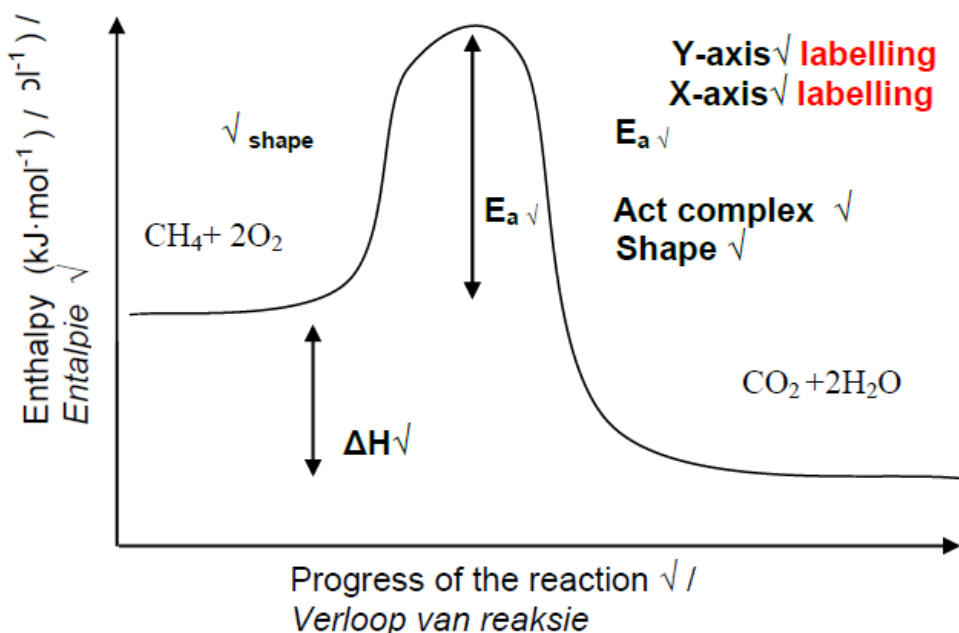
4.2 4.2.1 Energy required: $4 \times \text{C-H} \checkmark = 4 \times 413 = 1\,652 \checkmark$
 $2 \times \text{O=O} \checkmark = 2 \times 498 = 996 \checkmark$ (4)

4.2.2 Energy released: $2 \times \text{C=O} \checkmark = 2 \times 804 = 1608 \checkmark$
 $4 \times \text{H-O} \checkmark = 4 \times 463 = 1852 \checkmark$ (4)

4.2.3 $\Delta H = (1\,652 + 996) - (1\,852 + 1\,608) = 2648 - 3460 \checkmark = \underline{-812 \text{ kJ}} \checkmark$ (2)

activated complex ✓
geaktiveerde kompleks

4.2.4



Reaksietipes

November 2015/2

$$4.3.1 \quad n = \frac{m}{M} \checkmark = \frac{125}{32} \checkmark = 3,906 \text{ mol} \checkmark$$

$$\begin{array}{l} 1 \text{ mol CH}_3\text{OH} : 2 \text{ mol H}_2 \checkmark \\ 3,906 \text{ mol} \quad : 7,8125 \end{array}$$

$$V = nV_m \checkmark = 7,8125 \times 22,4 \checkmark = 175 \text{ dm}^3 \checkmark \quad (7)$$

$$4.3.2 \quad \frac{150}{175} \checkmark \times 100\% \checkmark = 85,71\% \checkmark$$

(3)

[31]

Reaksietipes

November 2014

1.7 B ✓✓

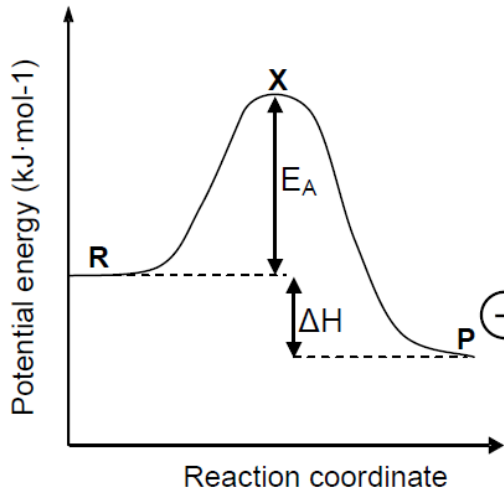
(2)

QUESTION 8/VRAAG 8

8.1 The minimum energy needed ✓ for a reaction to take place. ✓
 Die minimum energie nodig vir 'n reaksie om plaas te vind.

(2)

8.2



Marking guidelines/Nasienriglyne:	
Reactants and products correctly labelled. <i>Reaktanse en produkte korrek benoem.</i>	✓
Activated complex <i>Geaktiveerde kompleks</i>	✓
Correct shape as shown. <i>Korrekte vorm soos getoon.</i>	✓
ΔH correctly indicated. <i>ΔH korrek aangetoon.</i>	✓
E _A correctly indicated. <i>E_A korrek aangetoon</i>	✓

Note: If graph drawn for endothermic reaction:

Nota: Indien grafiek geteken is vir endotermiese reaksie: Max/Maks. $\frac{2}{5}$

(5)

8.3

8.3.1 - 241,8 kJ·mol⁻¹ ✓

(1)

8.3.2 1 611,8 kJ·mol⁻¹ ✓✓

IF: No unit or incorrect unit: Max. $\frac{1}{2}$

INDIEN: Geen eenheid of foutiewe eenheid:

(2)

[10]

