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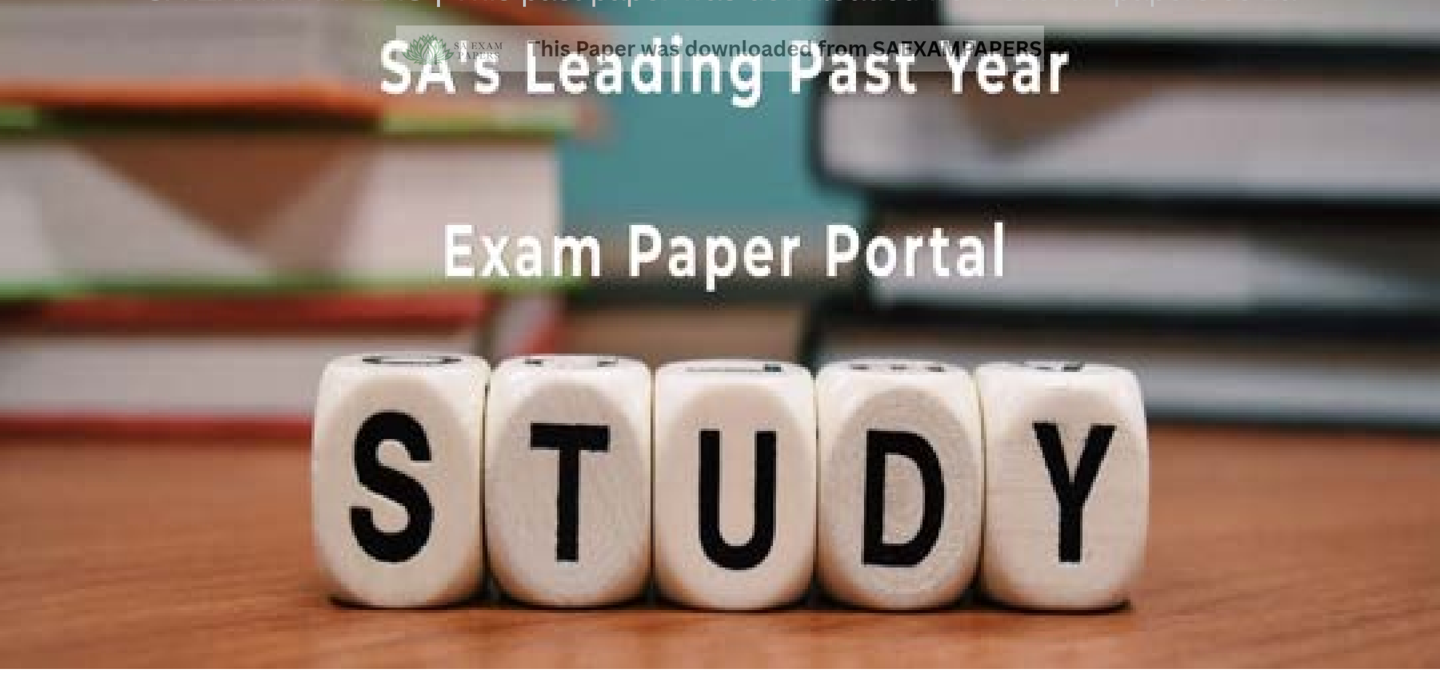


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REPUBLIC OF SOUTH AFRICA

# NASIONALE SENIOR SERTIFIKAAT

## GRAAD 12

## TEGNIESE WETENSKAPPE V2

## NOVEMBER 2025

**PUNTE: 75**

**TYD: 1½ uur**

**Hierdie vraestel bestaan uit 13 bladsye en 4 gegewensblaaie.**

Kopiereg voorbehou

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**INSTRUKSIES EN INLIGTING**

1. Skryf jou sentrumnommer en eksamennommer in die toepaslike ruimtes op die ANTWOORDEBOEK neer.
2. Hierdie vraestel bestaan uit SEWE vrae. Beantwoord AL die vrae in die ANTWOORDEBOEK.
3. Begin ELKE vraag op 'n NUWE bladsy in die ANTWOORDEBOEK.
4. Nommer die antwoorde korrek volgens die nommeringstelsel wat in hierdie vraestel gebruik is.
5. Laat EEN reël tussen twee subvrae oop, bv. tussen VRAAG 2.1 en VRAAG 2.2.
6. Jy mag 'n nieprogrammeerbare sakrekenaar gebruik.
7. Jy word aangeraai om die aangehegte GEGEWENSBLAAIE te gebruik.
8. Rond jou FINALE numeriese antwoorde tot 'n minimum van TWEE desimale plekke af.
9. Gee kort (bondige) motiverings, besprekings, ens. waar nodig.
10. Skryf netjies en leesbaar.



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**VRAAG 1: MEERVOUDIGEKEUSE-VRAE**

Verskeie opsies word as moontlike antwoorde op die volgende vrae gegee. Kies die antwoord en skryf slegs die letter (A–D) langs die vraagnommers (1.1 tot 1.5) in die ANTWOORDEBOEK neer, bv. 1.6 D.

1.1 Watter EEN van die volgende reaksietipes kan vir die voorbereiding van propaan uit propeen gebruik word?

A Oksidasie

B Hidrolise

C Halogenering

D Hidrogenering (2)

1.2 Watter EEN van die volgende lyste van verbindings is in volgorde van afnemende kookpunte gerangskik?

A Pentanoësuur; butan-1-ol; propaan

B Propaan; pentanoësuur; butan-1-ol

C Butan-1-ol; propaan; pentanoësuur

D Propaan; butan-1-ol; pentanoësuur (2)

1.3 … is 'n versadigde koolwaterstof.

A $CH_3(CH_2)_2CHCH_2$

B $CH_3CHCHCH_2CH_3$

C $CH_3C(CH_3)_2CHCH_2$

D $CH_3CH_2CH(CH_3)CH_3$ (2)

1.4 Die elemente in die periodieke tabel wat vir dotering gebruik kan word, is ...

| | TRIVALENTE MATERIAAL | PENTAVALENTE MATERIAAL |
|---|---|---|
| A | Aℓ | Be |
| B | B | As |
| C | C | N |
| D | B | S |

(2)

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1.5 Beskou die volgende stellings:

(i) Die anode van 'n galvaniese sel is positief.

(ii) Elektroplatering van metale vind in 'n elektrolitiese sel plaas.

(iii) Oksidasie vind by die negatiewe elektrode van 'n galvaniese sel plaas.

Watter stelling(s) is KORREK?

A Slegs (i)

B Slegs (iii)

C (ii) en (iii)

D (i), (ii) en (iii) (2)

**[10]**



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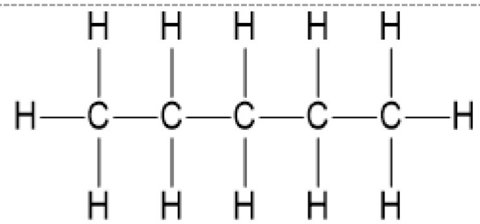
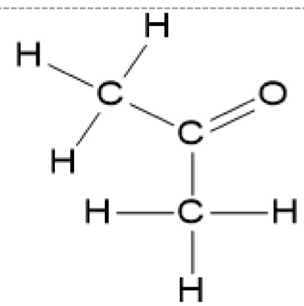
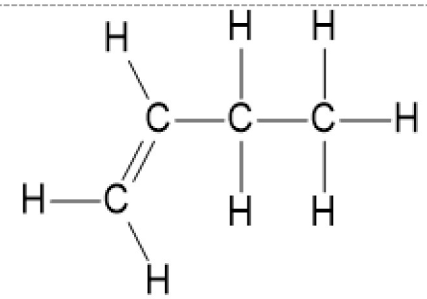
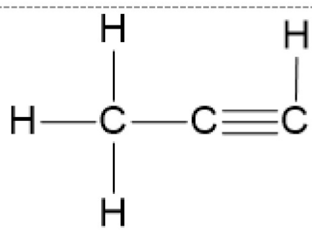
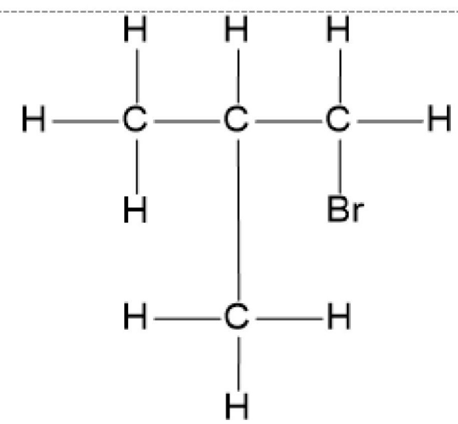
**VRAAG 2 (Begin op 'n nuwe bladsy.)**

Die letters **A** tot **F** in die tabel hieronder verteenwoordig ses organiese verbindings.

| **A** | **B** |
|---|---|
|  | Etielbutanoaat |
| **C** | **D** |
|  |  |
| **E** | **F** |
|  |  |

2.1 Skryf die letter neer wat die volgende verteenwoordig:

2.1.1 'n Versadigde koolwaterstof (1)

2.1.2 'n Verbinding wat 'n isomeer van but-2-een is (1)

2.1.3 'n Alkyn (1)

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2.2 Skryf neer die:

2.2.1 NAAM van die funksionele groep van verbinding **C** (1)

2.2.2 IUPAC-naam van verbinding **F** (2)

2.3 Beskou verbinding **B** en skryf neer die:

2.3.1 Homoloë reeks waaraan dit behoort (1)

2.3.2 Struktuurformule (2)

2.3.3 Algemene formule (1)
**[10]**


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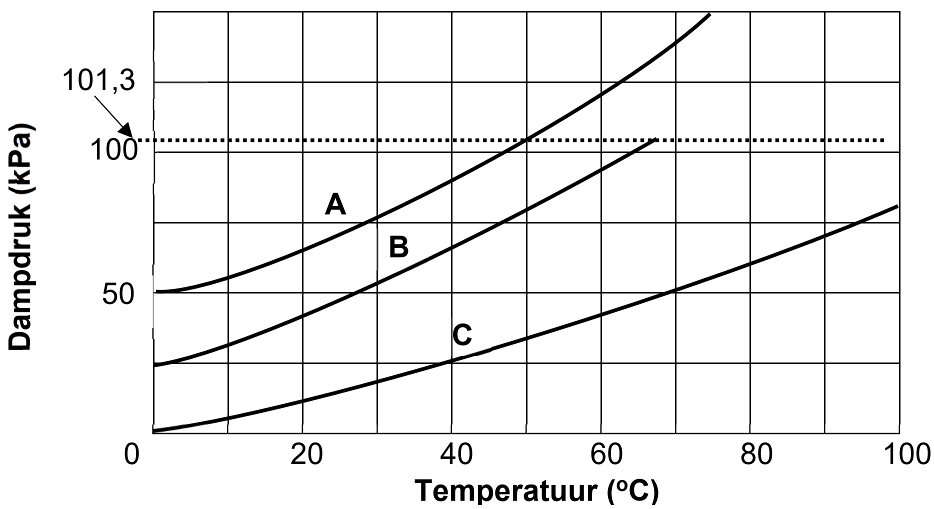
**VRAAG 3 (Begin op 'n nuwe bladsy.)**

Die grafiek hieronder toon die verhouding tussen dampdruk en temperatuur vir drie reguitketting-alkane (**A**, **B** en **C**). Die atmosferiese druk is 101,3 kPa.




3.1 Definieer die term *dampdruk*. (2)

3.2 Gebruik die inligting in die grafiek hierbo om die volgende vrae te beantwoord.

3.2.1 Hoe beïnvloed 'n toename in temperatuur die dampdruk? Skryf slegs NEEM TOE, NEEM AF of GEEN EFFEK NIE neer. (1)

3.2.2 Watter verbinding het 'n kookpunt van ongeveer 68 °C? (1)

3.2.3 Gee 'n rede vir die antwoord op VRAAG 3.2.2. (2)

3.2.4 Watter verbinding het die langste kettinglengte?

Verduidelik die antwoord deur na die DAMPDRUK en RELATIEWE STERKTE VAN DIE INTERMOLEKULÊRE KRAGTE van die verbindings te verwys. (3)

**[9]**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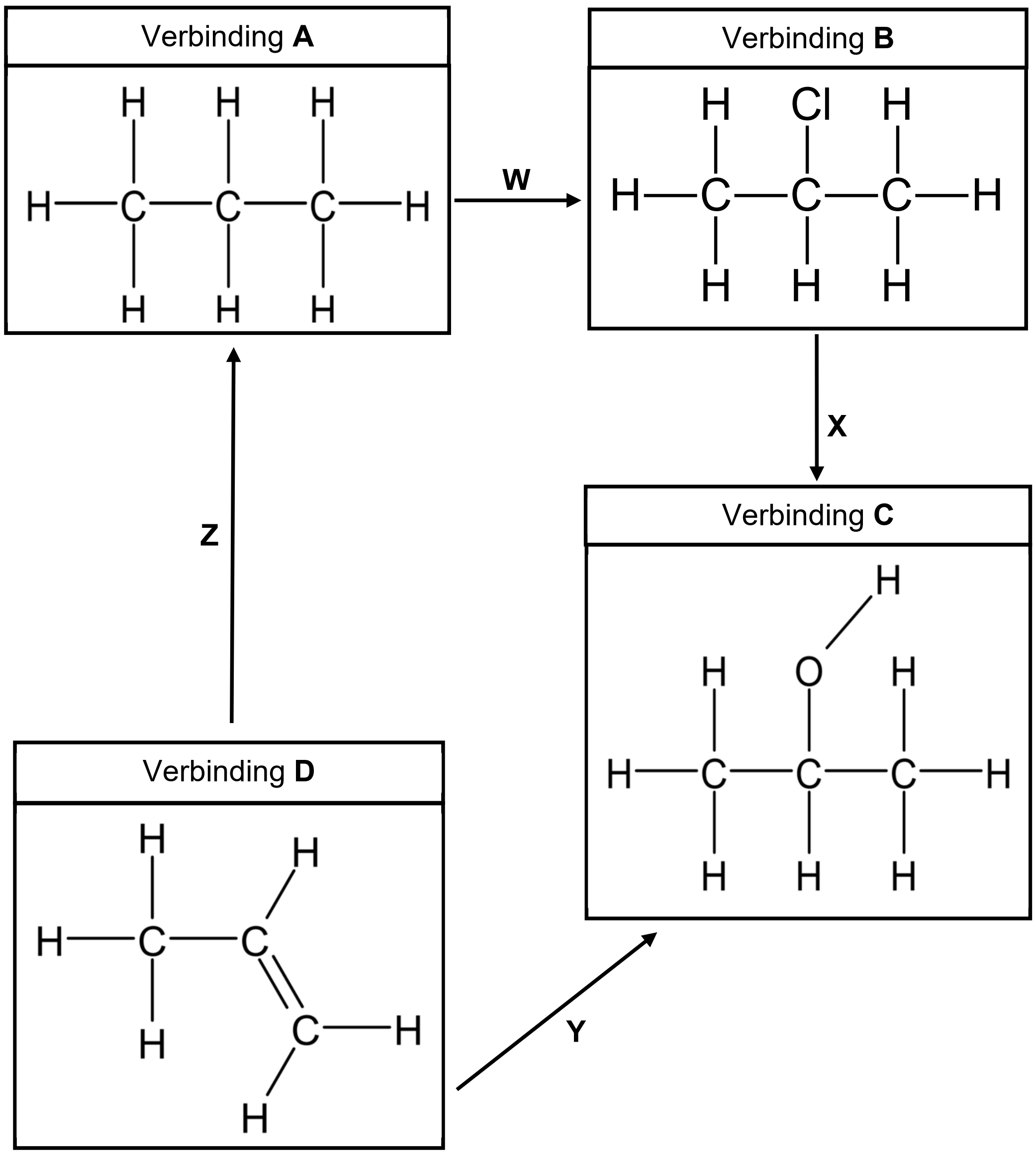
**VRAAG 4 (Begin op 'n nuwe bladsy.)**

Bestudeer organiese reaksies **W**, **X**, **Y** en **Z** in die vloeidiagram hieronder en beantwoord die vrae wat daarop volg.




4.1 Vir reaksie **Y**, skryf neer:

4.1.1 Die NAAM van die reaksie (1)

4.1.2 TWEE toestande wat vir hierdie reaksie benodig word (2)

4.2 Identifiseer die tipe reaksie **Z**. (1)



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4.3 Skryf die CHEMIESE FORMULE neer vir die stof wat met verbinding **A** reageer om verbinding **B** te vorm. (1)

4.4 Skryf die NAAM van reaksie **X** neer. (1)

4.5 Beskou die organiese verbindings in die lys hieronder.

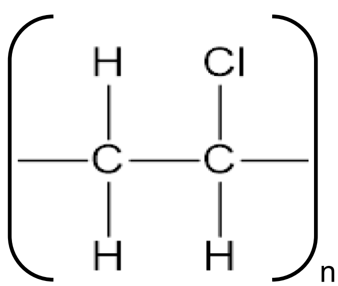
| Propan-2-ol | Propanaal | Propanoësuur | Propanoon |
|---|---|---|---|

4.5.1 Identifiseer TWEE verbindings wat funksionele isomere is in die lys hierbo. (2)

4.5.2 Verduidelik en gebruik STRUKTUURFORMULES om die antwoord op VRAAG 4.5.1 te staaf. Benoem elke struktuurformule. (4)

4.6 Definieer die term *polimeer*. (2)

4.7 Teken die struktuurformule van die monomeer wat tydens die vervaardiging van die polimeer hieronder gebruik is.




(2)
**[16]**



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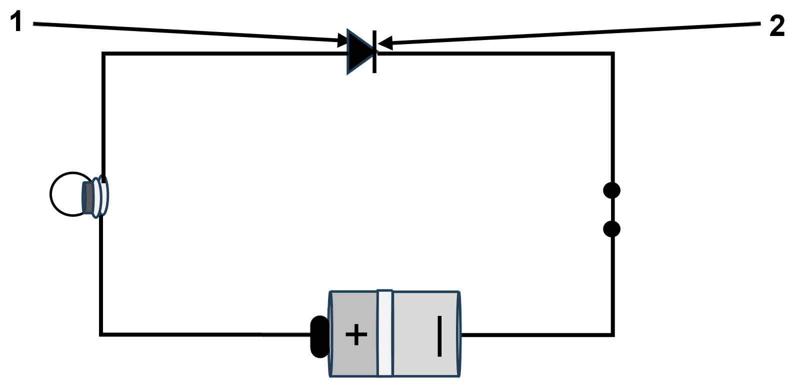
**VRAAG 5 (Begin op 'n nuwe bladsy.)**

Bestudeer die diagram hieronder en beantwoord die vrae wat volg.




5.1 Benoem deel **1**. (1)

5.2 Watter tipe p-n-voegvlakdiode is dit? Skryf slegs MEEVOORSPANNING of TEENVOORSPANNING of NULVOORSPANNING neer. (1)

5.3 Gee 'n rede vir die antwoord op VRAAG 5.2. (2)

5.4 Skryf TWEE eienskappe van die p-n-voegvlakdiode in VRAAG 5.2 neer. (2)
**[6]**

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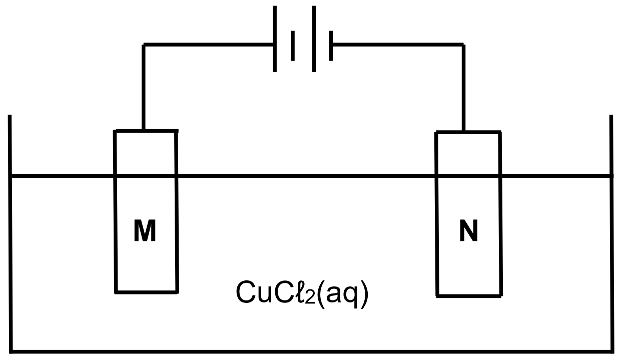
**VRAAG 6 (Begin op 'n nuwe bladsy.)**

Die diagram hieronder verteenwoordig 'n elektrolitiese sel wat in die ontbinding van 'n koper(II)chloriedoplossing gebruik word.




6.1 Definieer die term *elektroliet*. (2)

6.2 Watter elektrode, **M** of **N**, is die anode? (1)

6.3 Skryf die halfreaksie neer wat by elektrode **M** plaasvind. (2)

6.4 Skryf neer die:

6.4.1 Chemiese formule van die stof wat by elektrode **N** vorm (1)

6.4.2 Naam van die oksideermiddel in hierdie reaksie (1)



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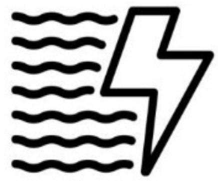
6.5 Beskou die vorme van alternatiewe energiebronne in die tabel hieronder en beantwoord die vrae wat volg.

| | TIPE ENERGIE | DIAGRAM |
|---|---|---|
| A | Windenergie | |
| B | Sonligenergie | |
| C | Hidroëlektriese energie |  |
| D | Biodiesel | |

6.5.1 Noem EEN voordeel van alternatiewe energie. (1)

6.5.2 Skryf die letter neer van die energiebron wat met die werking van 'n fotovoltaïese sel verbind word. (1)

6.5.3 Skryf die energie-omskakeling neer wat plaasvind in die sel waarna in VRAAG 6.5.2 verwys is. (1)

6.5.4 Wat is *biodiesel*? (2)
**[12]**

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**VRAAG 7 (Begin op 'n nuwe bladsy.)**

Die tabel hieronder toon halfsel **A** en 'n onbekende halfsel **B** wat gebruik is om 'n galvaniese sel onder standaardtoestande op te stel.

| | |
|---|---|
| Halfsel **A** | $Ni^{2+}(aq)/Ni(s)$ |
| Halfsel **B** | Onbekend |

Die aanvanklike emk-lesing van die sel is 0,17 V wanneer dit in werking is en die polariteit van halfsel **B** is NEGATIEF.

7.1 Definieer die term *reduksie* in terme van elektronoordrag. (2)

7.2 Gebruik 'n berekening om die elektrode in halfsel **B** te identifiseer. (5)

7.3 Vir hierdie sel, skryf neer die:

7.3.1 Halfreaksie vir halfsel **A** (2)

7.3.2 Selnotasie (3)
**[12]**

**TOTAAL: 75**



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**DATA FOR TECHNICAL SCIENCES GRADE 12**
**PAPER 2**
***GEGEWENS VIR TEGNIESE WETENSKAPPE GRAAD 12***
***VRAESTEL 2***

**TABLE 1/*TABEL 1*: PHYSICAL CONSTANTS/*FISIESE KONSTANTES***

| NAME/*NAAM* | SYMBOL/*SIMBOOL* | VALUE/*WAARDE* |
|---|---|---|
| Standard pressure<br>*Standaarddruk* | $p^{\theta}$ | $1{,}01 \times 10^{5}$ Pa |
| Standard temperature<br>*Standaardtemperatuur* | $T^{\theta}$ | 0 °C/273 K |

**TABLE 2/*TABEL 2*: FORMULAE/*FORMULES***

| | |
|---|---|
| Emf/*Emk* | $E^{\theta}_{cell} = E^{\theta}_{cathode} - E^{\theta}_{anode}$ / $E^{\theta}_{sel} = E^{\theta}_{katode} - E^{\theta}_{anode}$<br><br>or/*of*<br><br>$E^{\theta}_{cell} = E^{\theta}_{reduction} - E^{\theta}_{oxidation}$ / $E^{\theta}_{sel} = E^{\theta}_{reduksie} - E^{\theta}_{oksidasie}$<br><br>or/*of*<br><br>$E^{\theta}_{cell} = E^{\theta}_{oxidising\ agent} - E^{\theta}_{reducing\ agent}$ / $E^{\theta}_{sel} = E^{\theta}_{oksideermiddel} - E^{\theta}_{reduseermiddel}$ |

**TABLE 3: THE PERIODIC TABLE OF ELEMENTS/*TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE***

**KEY/*SLEUTEL***: Atomic number/*Atoomgetal*: 29; Symbol/*Simbool*: Cu; Electronegativity/*Elektronegatiwiteit*: 1,9; Approximate relative atomic mass/*Benaderde relatiewe atoommassa*: 63,5

Each cell: electronegativity (where given), atomic number, symbol, approximate relative atomic mass.

| 1 (I) | 2 (II) | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 (III) | 14 (IV) | 15 (V) | 16 (VI) | 17 (VII) | 18 (VIII) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,1 1 H 1 | | | | | | | | | | | | | | | | | 2 He 4 |
| 1,0 3 Li 7 | 1,5 4 Be 9 | | | | | | | | | | | 2,0 5 B 11 | 2,5 6 C 12 | 3,0 7 N 14 | 3,5 8 O 16 | 4,0 9 F 19 | 10 Ne 20 |
| 0,9 11 Na 23 | 1,2 12 Mg 24 | | | | | | | | | | | 1,5 13 Aℓ 27 | 1,8 14 Si 28 | 2,1 15 P 31 | 2,5 16 S 32 | 3,0 17 Cℓ 35,5 | 18 Ar 40 |
| 0,8 19 K 39 | 1,0 20 Ca 40 | 1,3 21 Sc 45 | 1,5 22 Ti 48 | 1,6 23 V 51 | 1,6 24 Cr 52 | 1,5 25 Mn 55 | 1,8 26 Fe 56 | 1,8 27 Co 59 | 1,8 28 Ni 59 | 1,9 29 Cu 63,5 | 1,6 30 Zn 65 | 1,6 31 Ga 70 | 1,8 32 Ge 73 | 2,0 33 As 75 | 2,4 34 Se 79 | 2,8 35 Br 80 | 36 Kr 84 |
| 0,8 37 Rb 86 | 1,0 38 Sr 88 | 1,2 39 Y 89 | 1,4 40 Zr 91 | 41 Nb 92 | 1,8 42 Mo 96 | 1,9 43 Tc | 2,2 44 Ru 101 | 2,2 45 Rh 103 | 2,2 46 Pd 106 | 1,9 47 Ag 108 | 1,7 48 Cd 112 | 1,7 49 In 115 | 1,8 50 Sn 119 | 1,9 51 Sb 122 | 2,1 52 Te 128 | 2,5 53 I 127 | 54 Xe 131 |
| 0,7 55 Cs 133 | 0,9 56 Ba 137 | 57 La 139 | 1,6 72 Hf 179 | 73 Ta 181 | 74 W 184 | 75 Re 186 | 76 Os 190 | 77 Ir 192 | 78 Pt 195 | 79 Au 197 | 80 Hg 201 | 1,8 81 Tℓ 204 | 1,8 82 Pb 207 | 1,9 83 Bi 209 | 2,0 84 Po | 2,5 85 At | 86 Rn |
| 0,7 87 Fr | 0,9 88 Ra 226 | 89 Ac | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 Ce 140 | 59 Pr 141 | 60 Nd 144 | 61 Pm | 62 Sm 150 | 63 Eu 152 | 64 Gd 157 | 65 Tb 159 | 66 Dy 163 | 67 Ho 165 | 68 Er 167 | 69 Tm 169 | 70 Yb 173 | 71 Lu 175 |
| 90 Th 232 | 91 Pa | 92 U 238 | 93 Np | 94 Pu | 95 Am | 96 Cm | 97 Bk | 98 Cf | 99 Es | 100 Fm | 101 Md | 102 No | 103 Lr |

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## TABLE 4A: STANDARD REDUCTION POTENTIALS
## *TABEL 4A: STANDAARD-REDUKSIEPOTENSIALE*

Increasing strength of oxidising agents/*Toenemende sterkte van oksideermiddels* (↑)

| Half-reactions/*Halfreaksies* | | | $E^\theta$ (V) |
|---|---|---|---|
| $F_2(g) + 2e^-$ | ⇌ | $2F^-$ | + 2,87 |
| $Co^{3+} + e^-$ | ⇌ | $Co^{2+}$ | + 1,81 |
| $H_2O_2 + 2H^+ + 2e^-$ | ⇌ | $2H_2O$ | +1,77 |
| $MnO_4^- + 8H^+ + 5e^-$ | ⇌ | $Mn^{2+} + 4H_2O$ | + 1,51 |
| $C\ell_2(g) + 2e^-$ | ⇌ | $2C\ell^-$ | + 1,36 |
| $Cr_2O_7^{2-} + 14H^+ + 6e^-$ | ⇌ | $2Cr^{3+} + 7H_2O$ | + 1,33 |
| $O_2(g) + 4H^+ + 4e^-$ | ⇌ | $2H_2O$ | + 1,23 |
| $MnO_2 + 4H^+ + 2e^-$ | ⇌ | $Mn^{2+} + 2H_2O$ | + 1,23 |
| $Pt^{2+} + 2e^-$ | ⇌ | $Pt$ | + 1,20 |
| $Br_2(\ell) + 2e^-$ | ⇌ | $2Br^-$ | + 1,07 |
| $NO_3^- + 4H^+ + 3e^-$ | ⇌ | $NO(g) + 2H_2O$ | + 0,96 |
| $Hg^{2+} + 2e^-$ | ⇌ | $Hg(\ell)$ | + 0,85 |
| $Ag^+ + e^-$ | ⇌ | $Ag$ | + 0,80 |
| $NO_3^- + 2H^+ + e^-$ | ⇌ | $NO_2(g) + H_2O$ | + 0,80 |
| $Fe^{3+} + e^-$ | ⇌ | $Fe^{2+}$ | + 0,77 |
| $O_2(g) + 2H^+ + 2e^-$ | ⇌ | $H_2O_2$ | + 0,68 |
| $I_2 + 2e^-$ | ⇌ | $2I^-$ | + 0,54 |
| $Cu^+ + e^-$ | ⇌ | $Cu$ | + 0,52 |
| $SO_2 + 4H^+ + 4e^-$ | ⇌ | $S + 2H_2O$ | + 0,45 |
| $2H_2O + O_2 + 4e^-$ | ⇌ | $4OH^-$ | + 0,40 |
| $Cu^{2+} + 2e^-$ | ⇌ | $Cu$ | + 0,34 |
| $SO_4^{2-} + 4H^+ + 2e^-$ | ⇌ | $SO_2(g) + 2H_2O$ | + 0,17 |
| $Cu^{2+} + e^-$ | ⇌ | $Cu^+$ | + 0,16 |
| $Sn^{4+} + 2e^-$ | ⇌ | $Sn^{2+}$ | + 0,15 |
| $S + 2H^+ + 2e^-$ | ⇌ | $H_2S(g)$ | + 0,14 |
| **$2H^+ + 2e^-$** | **⇌** | **$H_2(g)$** | **0,00** |
| $Fe^{3+} + 3e^-$ | ⇌ | $Fe$ | – 0,06 |
| $Pb^{2+} + 2e^-$ | ⇌ | $Pb$ | – 0,13 |
| $Sn^{2+} + 2e^-$ | ⇌ | $Sn$ | – 0,14 |
| $Ni^{2+} + 2e^-$ | ⇌ | $Ni$ | – 0,27 |
| $Co^{2+} + 2e^-$ | ⇌ | $Co$ | – 0,28 |
| $Cd^{2+} + 2e^-$ | ⇌ | $Cd$ | – 0,40 |
| $Cr^{3+} + e^-$ | ⇌ | $Cr^{2+}$ | – 0,41 |
| $Fe^{2+} + 2e^-$ | ⇌ | $Fe$ | – 0,44 |
| $Cr^{3+} + 3e^-$ | ⇌ | $Cr$ | – 0,74 |
| $Zn^{2+} + 2e^-$ | ⇌ | $Zn$ | – 0,76 |
| $2H_2O + 2e^-$ | ⇌ | $H_2(g) + 2OH^-$ | – 0,83 |
| $Cr^{2+} + 2e^-$ | ⇌ | $Cr$ | – 0,91 |
| $Mn^{2+} + 2e^-$ | ⇌ | $Mn$ | – 1,18 |
| $A\ell^{3+} + 3e^-$ | ⇌ | $A\ell$ | – 1,66 |
| $Mg^{2+} + 2e^-$ | ⇌ | $Mg$ | – 2,36 |
| $Na^+ + e^-$ | ⇌ | $Na$ | – 2,71 |
| $Ca^{2+} + 2e^-$ | ⇌ | $Ca$ | – 2,87 |
| $Sr^{2+} + 2e^-$ | ⇌ | $Sr$ | – 2,89 |
| $Ba^{2+} + 2e^-$ | ⇌ | $Ba$ | – 2,90 |
| $Cs^+ + e^-$ | ⇌ | $Cs$ | – 2,92 |
| $K^+ + e^-$ | ⇌ | $K$ | – 2,93 |
| $Li^+ + e^-$ | ⇌ | $Li$ | – 3,05 |

Increasing strength of reducing agents/*Toenemende sterkte van reduseermiddels* (↓)

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**TABLE 4B: STANDARD REDUCTION POTENTIALS**
***TABEL 4B: STANDAARD-REDUKSIEPOTENSIALE***

Increasing strength of oxidising agents/*Toenemende sterkte van oksideermiddels* (↓)

Increasing strength of reducing agents/*Toenemende sterkte van reduseermiddels* (↑)

| Half-reactions/*Halfreaksies* | | | $E^\theta$ (V) |
|---|---|---|---|
| $Li^+ + e^-$ | ⇌ | $Li$ | – 3,05 |
| $K^+ + e^-$ | ⇌ | $K$ | – 2,93 |
| $Cs^+ + e^-$ | ⇌ | $Cs$ | – 2,92 |
| $Ba^{2+} + 2e^-$ | ⇌ | $Ba$ | – 2,90 |
| $Sr^{2+} + 2e^-$ | ⇌ | $Sr$ | – 2,89 |
| $Ca^{2+} + 2e^-$ | ⇌ | $Ca$ | – 2,87 |
| $Na^+ + e^-$ | ⇌ | $Na$ | – 2,71 |
| $Mg^{2+} + 2e^-$ | ⇌ | $Mg$ | – 2,36 |
| $A\ell^{3+} + 3e^-$ | ⇌ | $A\ell$ | – 1,66 |
| $Mn^{2+} + 2e^-$ | ⇌ | $Mn$ | – 1,18 |
| $Cr^{2+} + 2e^-$ | ⇌ | $Cr$ | – 0,91 |
| $2H_2O + 2e^-$ | ⇌ | $H_2(g) + 2OH^-$ | – 0,83 |
| $Zn^{2+} + 2e^-$ | ⇌ | $Zn$ | – 0,76 |
| $Cr^{3+} + 3e^-$ | ⇌ | $Cr$ | – 0,74 |
| $Fe^{2+} + 2e^-$ | ⇌ | $Fe$ | – 0,44 |
| $Cr^{3+} + e^-$ | ⇌ | $Cr^{2+}$ | – 0,41 |
| $Cd^{2+} + 2e^-$ | ⇌ | $Cd$ | – 0,40 |
| $Co^{2+} + 2e^-$ | ⇌ | $Co$ | – 0,28 |
| $Ni^{2+} + 2e^-$ | ⇌ | $Ni$ | – 0,27 |
| $Sn^{2+} + 2e^-$ | ⇌ | $Sn$ | – 0,14 |
| $Pb^{2+} + 2e^-$ | ⇌ | $Pb$ | – 0,13 |
| $Fe^{3+} + 3e^-$ | ⇌ | $Fe$ | – 0,06 |
| **$2H^+ + 2e^-$** | **⇌** | **$H_2(g)$** | **0,00** |
| $S + 2H^+ + 2e^-$ | ⇌ | $H_2S(g)$ | + 0,14 |
| $Sn^{4+} + 2e^-$ | ⇌ | $Sn^{2+}$ | + 0,15 |
| $Cu^{2+} + e^-$ | ⇌ | $Cu^+$ | + 0,16 |
| $SO_4^{2-} + 4H^+ + 2e^-$ | ⇌ | $SO_2(g) + 2H_2O$ | + 0,17 |
| $Cu^{2+} + 2e^-$ | ⇌ | $Cu$ | + 0,34 |
| $2H_2O + O_2 + 4e^-$ | ⇌ | $4OH^-$ | + 0,40 |
| $SO_2 + 4H^+ + 4e^-$ | ⇌ | $S + 2H_2O$ | + 0,45 |
| $Cu^+ + e^-$ | ⇌ | $Cu$ | + 0,52 |
| $I_2 + 2e^-$ | ⇌ | $2I^-$ | + 0,54 |
| $O_2(g) + 2H^+ + 2e^-$ | ⇌ | $H_2O_2$ | + 0,68 |
| $Fe^{3+} + e^-$ | ⇌ | $Fe^{2+}$ | + 0,77 |
| $NO_3^- + 2H^+ + e^-$ | ⇌ | $NO_2(g) + H_2O$ | + 0,80 |
| $Ag^+ + e^-$ | ⇌ | $Ag$ | + 0,80 |
| $Hg^{2+} + 2e^-$ | ⇌ | $Hg(\ell)$ | + 0,85 |
| $NO_3^- + 4H^+ + 3e^-$ | ⇌ | $NO(g) + 2H_2O$ | + 0,96 |
| $Br_2(\ell) + 2e^-$ | ⇌ | $2Br^-$ | + 1,07 |
| $Pt^{2+} + 2e^-$ | ⇌ | $Pt$ | + 1,20 |
| $MnO_2 + 4H^+ + 2e^-$ | ⇌ | $Mn^{2+} + 2H_2O$ | + 1,23 |
| $O_2(g) + 4H^+ + 4e^-$ | ⇌ | $2H_2O$ | + 1,23 |
| $Cr_2O_7^{2-} + 14H^+ + 6e^-$ | ⇌ | $2Cr^{3+} + 7H_2O$ | + 1,33 |
| $C\ell_2(g) + 2e^-$ | ⇌ | $2C\ell^-$ | + 1,36 |
| $MnO_4^- + 8H^+ + 5e^-$ | ⇌ | $Mn^{2+} + 4H_2O$ | + 1,51 |
| $H_2O_2 + 2H^+ + 2e^-$ | ⇌ | $2H_2O$ | +1,77 |
| $Co^{3+} + e^-$ | ⇌ | $Co^{2+}$ | + 1,81 |
| $F_2(g) + 2e^-$ | ⇌ | $2F^-$ | + 2,87 |

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