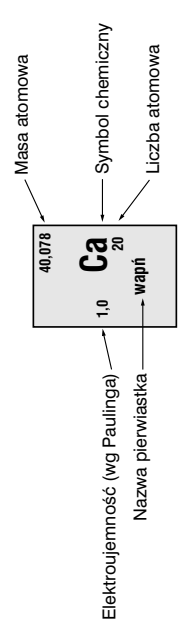


UKŁAD OKRESOWY PIERWIASTKÓW

Wszystkie arkusze maturalne znajdziesz na stronie: arkuszematuralne.pl

| IA | | IIA | | IIIA | | IVA | | VA | | VIA | | VIIA | | VIIIA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,00794 H 1 wodór | 6,941 Li 3 lit | 22,989770 Na 11 sód | 40,078 K 19 potas | 87,62 Rb 37 rubid | 132,90545 Cs 55 cez | 44,955910 Sc 21 skand | 47,867 Ti 22 tytan | 50,9415 V 23 wanad | 51,9961 Cr 24 chrom | 54,938049 Mn 25 mangan | 55,845 Fe 26 żelazo | 58,932000 Co 27 kobalt | 58,6934 Ni 28 nikiel | 59,723 Ga 31 gal | 69,723 Ge 32 german | 72,61 As 33 arsen | 74,92160 Se 34 selen | 78,96 Br 35 brom | 79,904 Kr 36 krypton | 85,4678 Sr 38 stront | 87,62 Y 39 itr | 88,90585 Zr 40 cyrkon | 91,224 Nb 41 niob | 92,90638 Mo 42 molibden | 95,94 Tc 43 technet | 101,07 Ru 44 ruten | 102,90550 Rh 45 rod | 106,42 Pd 46 pallad | 107,8682 Ag 47 srebro | 114,818 In 49 ind | 118,710 Sn 50 cyna | 121,760 Sb 51 antymon | 127,60 Te 52 tellur | 126,90447 I 53 jod | 131,29 Xe 54 ksenon | 132,90545 Ba 56 bar | 137,327 La* 57 lantan | 138,9055 Ce 58 cer | 140,116 Pr 59 prazeodym | 140,90765 Ce 58 cer | 144,24 Nd 60 neodym | 144,913 Pm 61 promet | 150,36 Sm 62 samar | 151,964 Eu 63 europ | 157,25 Gd 64 gadolin | 158,92534 Tb 65 terb | 162,50 Dy 66 dysproz | 164,93032 Ho 67 holm | 167,26 Er 68 erb | 168,93421 Tm 69 tul | 173,04 Yb 70 iterb | 174,967 Lu 71 lutet | 226,025 Fr 87 frans | 226,025 Ra 88 rad | 227,028 Ac** 89 aktyn | 227,03686 Th 90 tor | 228,0289 Pa 91 protaktyn | 231,03686 U 92 uran | 238,0289 Np 93 neptun | 238,0289 Pu 94 pluton | 244,064 Am 95 ameryk | 247,070 Cm 96 kiur | 247,070 Bk 97 berkel | 251,1080 Cf 98 kaliforn | 252,083 Es 99 einstein | 257,1080 Fm 100 ferm | 258,1080 Md 101 mendelew | 259,1080 No 102 nobel | 262,1080 Lr 103 lorens | 226,025 Rn 86 radon | 226,025 At 85 astat | 208,982 Po 84 polon | 208,982 Bi 83 bizmut | 208,982 Pb 82 ołow | 208,982 Tl 81 tal | 208,982 Pt 80 rtęć | 208,982 Hg 80 rtęć | 208,982 Au 79 złoto | 196,96655 Pt 78 platyna | 192,227 Ir 77 iryd | 192,227 Os 76 osm | 186,207 Re 75 ren | 183,84 W 74 wolfram | 180,9479 Ta 73 tantal | 178,49 Hf 72 hafn | 178,49 Ta 73 tantal | 180,9479 Nb 41 niob | 183,84 Mo 42 molibden | 192,227 Rh 45 rod | 196,96655 Pd 46 pallad | 197,027 Ag 47 srebro | 200,59 Cd 48 kadm | 200,59 Hg 80 rtęć | 208,982 Pb 82 ołow | 208,982 Bi 83 bizmut | 208,982 Po 84 polon | 208,982 At 85 astat | 208,982 Rn 86 radon | 226,025 Ra 88 rad | 226,025 Ac** 89 aktyn | 227,028 Th 90 tor | 227,028 Pa 91 protaktyn | 228,0289 U 92 uran | 231,03686 Np 93 neptun | 231,03686 Pu 94 pluton | 238,0289 Am 95 ameryk | 238,0289 Cm 96 kiur | 247,070 Bk 97 berkel | 251,1080 Cf 98 kaliforn | 252,083 Es 99 einstein | 257,1080 Fm 100 ferm | 258,1080 Md 101 mendelew | 259,1080 No 102 nobel | 262,1080 Lr 103 lorens |



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|-----------------------------------|---|-------------------------------------|--------------------------------------|------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|----------------------------------|-------------------------------------|------------------------------------|-------------------------------------|
| 140,116 Ce 58 cer | 140,90765 Pr 59 prazeodym | 144,24 Nd 60 neodym | 144,913 Pm 61 promet | 150,36 Sm 62 samar | 151,964 Eu 63 europ | 157,25 Gd 64 gadolin | 158,92534 Tb 65 terb | 162,50 Dy 66 dysproz | 164,93032 Ho 67 holm | 167,26 Er 68 erb | 168,93421 Tm 69 tul | 173,04 Yb 70 iterb | 174,967 Lu 71 lutet |
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ROZPUSZCZALNOŚĆ SOLI I WODOROTLENKÓW W WODZIE W TEMP. 25°C

| Anion \ Kation | Na ⁺ | K ⁺ | NH ₄ ⁺ | Mg ²⁺ | Ca ²⁺ | Sr ²⁺ | Ba ²⁺ | Ag ⁺ | Cu ²⁺ | Zn ²⁺ | Al ³⁺ | Fe ²⁺ | Fe ³⁺ | Pb ²⁺ | Sn ²⁺ | Mn ²⁺ |
|----------------------------------|-----------------|----------------|------------------------------|------------------|------------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| OH ⁻ | ■ | ■ | ■ | ▲ | ■ | ■ | ■ | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Cl ⁻ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ● | ■ | ■ | ■ | ■ | ■ | ▲ | ■ | ■ |
| Br ⁻ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ● | ■ | ■ | ■ | ■ | ■ | ▲ | ■ | ■ |
| I ⁻ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ● | * | ■ | ■ | ■ | * | ● | ■ | ■ |
| S ²⁻ | ■ | ■ | ■ | ■ | ▲ | ■ | ■ | ● | ● | ● | * | ● | ● | ● | ● | ● |
| SO ₃ ²⁻ | ■ | ■ | ■ | ▲ | ▲ | ▲ | ● | ● | * | ▲ | * | ▲ | * | ● | * | ● |
| SO ₄ ²⁻ | ■ | ■ | ■ | ■ | ▲ | ▲ | ● | ▲ | ■ | ■ | ■ | ■ | ■ | ● | ■ | ■ |
| NO ₃ ⁻ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| PO ₄ ³⁻ | ■ | ■ | ■ | ▲ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| CO ₃ ²⁻ | ■ | ■ | ■ | ▲ | ● | ● | ● | ● | ● | ● | * | ● | * | ● | * | ● |
| SiO ₃ ²⁻ | ■ | ■ | ■ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| CH ₃ COO ⁻ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| CrO ₄ ²⁻ | ■ | ■ | ■ | ■ | ▲ | ▲ | ● | ● | ● | ▲ | ● | * | ● | ● | ● | ● |

Objaśnienia:

- – substancja dobrze rozpuszczalna
- ▲ – substancja słabo rozpuszczalna (wytrąca się w formie osadu tylko ze stężonego roztworu)
- – substancja praktycznie nierozpuszczalna (wytrąca się w formie osadu z rozcieńczonego roztworu)
- *

SZEREG ELEKTROCHEMICZNY METALI

| Elektroda | E ⁰ [V] |
|---------------------------------|--------------------|
| Li/Li ⁺ | -3,04 |
| Ca/Ca ²⁺ | -2,86 |
| Mg/Mg ²⁺ | -2,36 |
| Al/Al ³⁺ | -1,69 |
| Mn/Mn ²⁺ | -1,18 |
| Zn/Zn ²⁺ | -0,76 |
| Cr/Cr ³⁺ | -0,74 |
| Fe/Fe ²⁺ | -0,44 |
| Cd/Cd ²⁺ | -0,40 |
| Co/Co ²⁺ | -0,28 |
| Ni/Ni ²⁺ | -0,26 |
| Sn/Sn ²⁺ | -0,14 |
| Pb/Pb ²⁺ | -0,14 |
| Fe/Fe ³⁺ | -0,04 |
| H ₂ /2H ⁺ | 0,00 |
| Bi/Bi ³⁺ | +0,32 |
| Cu/Cu ²⁺ | +0,34 |
| Ag/Ag ⁺ | +0,80 |
| Hg/Hg ²⁺ | +0,85 |
| Au/Au ³⁺ | +1,52 |

STAŁE DYSOCJACJI WYBRANYCH KWASÓW W ROZTWORACH WODNYCH

| Kwas | Stała dysocjacji K _a lub K _{a1} |
|---------------------------------|---|
| HF | 6,3 · 10 ⁴ |
| HCl | 1 · 10 ⁷ |
| HBr | 3 · 10 ⁹ |
| HI | 1 · 10 ¹⁰ |
| H ₂ S | 1,02 · 10 ⁻⁷ |
| H ₂ Se | 1,9 · 10 ⁻⁴ |
| H ₂ Te | 2,5 · 10 ⁻³ |
| HCIO | 5,0 · 10 ⁻⁸ |
| HCIO ₂ | 1 · 10 ⁻² |
| HCIO ₃ | 10 |
| HNO ₂ | 2 · 10 ⁻⁴ |
| HNO ₃ | 25 |
| H ₂ SO ₃ | 1,54 · 10 ⁻² |
| H ₃ BO ₃ | 5,8 · 10 ⁻¹⁰ |
| H ₃ AsO ₃ | 6 · 10 ⁻¹⁰ |
| H ₃ AsO ₄ | 5,62 · 10 ⁻³ |
| H ₃ PO ₄ | 7,52 · 10 ⁻³ |
| H ₄ SiO ₂ | 2,2 · 10 ⁻¹⁰ |

ELEKTROUJEMNOŚĆ WG PAULINGA NA PODSTAWIE UKŁADU OKRESOWEGO PIERWIĄSTKÓW

| | | | | | | | | | | | | | | | | | |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|
| 1 H 2,1 | | | | | | | | | | | | | | | | | 2 He |
| 3 Li 1,0 | 4 Be 1,5 | | | | | | | | | | | 5 B 2,0 | 6 C 2,5 | 7 N 3,0 | 8 O 3,5 | 9 F 4,0 | 10 Ne |
| 11 Na 0,9 | 12 Mg 1,2 | | | | | | | | | | | 13 Al 1,5 | 14 Si 1,8 | 15 P 2,1 | 16 S 2,5 | 17 Cl 3,0 | 18 Ar |
| 19 K 0,9 | 20 Ca 1,0 | 21 Sc 1,3 | 22 Ti 1,5 | 23 V 1,7 | 24 Cr 1,9 | 25 Mn 1,7 | 26 Fe 1,9 | 27 Co 2,0 | 28 Ni 2,0 | 29 Cu 1,9 | 30 Zn 1,6 | 31 Ga 1,6 | 32 Ge 1,8 | 33 As 2,0 | 34 Se 2,4 | 35 Br 2,8 | 36 Kr |
| 37 Rb 0,8 | 38 Sr 1,0 | 39 Y 1,3 | 40 Zr 1,4 | 41 Nb 1,6 | 42 Mo 2,0 | 43 Tc 1,9 | 44 Ru 2,2 | 45 Rh 2,2 | 46 Pd 2,2 | 47 Ag 1,9 | 48 Cd 1,7 | 49 In 1,7 | 50 Sn 1,8 | 51 Sb 1,9 | 52 Te 2,1 | 53 I 2,5 | 54 Xe |
| 55 Cs 0,7 | 56 Ba 0,9 | 57 La 1,1 | 72 Hf 1,3 | 73 Ta 1,5 | 74 W 2,0 | 75 Re 1,9 | 76 Os 2,2 | 77 Ir 2,2 | 78 Pt 2,2 | 79 Au 2,4 | 80 Hg 1,9 | 81 Tl 1,8 | 82 Pb 1,8 | 83 Bi 1,9 | 84 Po 2,0 | 85 At 2,2 | 86 Rn |
| 87 Fr 0,7 | 88 Ra 0,9 | | | | | | | | | | | | | | | | |

Źródło: W. Mizerski, *Tablice Chemiczne*, Adamantan, 2004