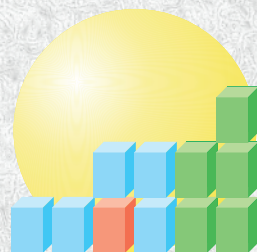


## PHYSICAL CONSTANTS

|                                  |                                                         |
|----------------------------------|---------------------------------------------------------|
| Absolute zero .....              | -273.15 °C                                              |
| Avogadro constant .....          | $6.022\,140\,857 \cdot 10^{23} \text{ mol}^{-1}$        |
| Base of natural logarithms ..... | 2.718 281 828...                                        |
| Electronvolt .....               | $1.602\,176\,6208 \cdot 10^{-19} \text{ J}$             |
| Faraday constant .....           | $96\,485.332\,89 \text{ C mol}^{-1}$                    |
| Constant of gravitation .....    | $6.674\,08 \cdot 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$ |
| Molar volume of ideal gas .....  | $0.022\,710\,947 \text{ m}^3 \text{ mol}^{-1}$          |
| Elementary charge .....          | $1.602\,176\,6208 \cdot 10^{-19} \text{ C}$             |
| Standard pressure .....          | 101 325 Pa                                              |
| Molar gas constant .....         | $8.314\,4598 \text{ J mol}^{-1} \text{ K}^{-1}$         |
| Pi .....                         | 3.141 592 653 589 793...                                |
| Planck constants .....           | $6.626\,070\,040 \cdot 10^{-34} \text{ J s}$            |



www.periodni.com

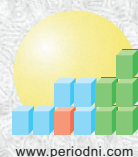
© 2017 Eni Generalić

## GUIDELINES FOR BALANCING REDOX EQUATIONS

1. Write a skeleton equation
  2. Separate the redox reaction into half-reactions
    - a) Assign oxidation numbers for each atom
    - b) Identify and write out all redox couples in reaction
    - c) Combine these redox couples into two half-reactions
  3. Balance the atoms in each half reaction
    - a) Balance all other atoms except H and O
    - b) Balance the oxygen atoms with  $\text{H}_2\text{O}$
    - c) Balance the hydrogen atoms with  $\text{H}^+$
    - d) In a basic medium, add one  $\text{OH}^-$  to each side for every  $\text{H}^+$  ion
  4. Balance the charge with  $e^-$
  5. Make electron gain equivalent to electron loss in the half-reactions
  6. Add the half-reactions together
  7. Simplify the equation
- Finally, check that the elements and charges are balanced

www.periodni.com

## PERIODIC TABLE OF THE ELEMENTS



www.periodni.com

|                                                        |                                                       |                                             |
|--------------------------------------------------------|-------------------------------------------------------|---------------------------------------------|
| <span style="color:blue">■</span> Metal                | <span style="color:red">■</span> Semimetal            | <span style="color:green">■</span> Nonmetal |
| <span style="color:blue">■</span> Alkali metal         | <span style="color:green">■</span> Chalcogens element |                                             |
| <span style="color:blue">■</span> Alkaline earth metal | <span style="color:green">■</span> Halogens element   |                                             |
| <span style="color:blue">■</span> Transition metals    | <span style="color:green">■</span> Noble gas          |                                             |
| <span style="color:purple">■</span> Lanthanide         |                                                       |                                             |
| <span style="color:purple">■</span> Actinide           |                                                       |                                             |

STANDARD STATE (25 °C; 101 kPa)

■ Ne - gas    ■ Fe - solid

■ Hg - liquid    ■ Te - synthetic

|                    |                      |
|--------------------|----------------------|
| GROUP (IUPAC 1985) | GROUP (CAS 1986)     |
| ATOMIC NUMBER      | SYMBOL               |
| PERIOD             | RELATIVE ATOMIC MASS |

# PERIODIC TABLE OF THE ELEMENTS

1  
1.0079  
**H**

2  
4.0026  
**He**

3  
6.941  
**Li**

4  
9.0122  
**Be**

5  
10.811  
**B**

6  
12.011  
**C**

7  
14.007  
**N**

8  
15.999  
**O**

9  
18.998  
**F**

10  
20.180  
**Ne**

11  
22.990  
**Na**

12  
24.305  
**Mg**

13  
26.982  
**Al**

14  
28.086  
**Si**

15  
30.974  
**P**

16  
32.065  
**S**

17  
35.453  
**Cl**

18  
39.948  
**Ar**

19  
39.098  
**K**

20  
40.078  
**Ca**

21  
63.546  
**Sc**

22  
65.38  
**Ti**

23  
69.723  
**V**

24  
72.64  
**Cr**

25  
74.922  
**Mn**

26  
78.96  
**Fe**

27  
83.798  
**Co**

28  
85.468  
**Ni**

29  
87.62  
**Cu**

30  
89.904  
**Zn**

31  
91.224  
**Ga**

32  
92.906  
**Ge**

33  
95.96  
**As**

34  
(98)  
**Se**

35  
101.07  
**Br**

36  
102.91  
**Kr**

37  
88.906  
**Rb**

38  
87.62  
**Sr**

39  
88.906  
**Y**

40  
91.224  
**Zr**

41  
92.906  
**Nb**

42  
95.96  
**Mo**

43  
(98)  
**Tc**

44  
101.07  
**Ru**

45  
102.91  
**Rh**

46  
106.42  
**Pd**

47  
107.87  
**Ag**

48  
112.41  
**Cd**

49  
114.82  
**In**

50  
118.71  
**Sn**

51  
121.76  
**Sb**

52  
127.60  
**Te**

53  
126.90  
**I**

54  
131.29  
**Xe**

55  
132.91  
**Cs**

56  
137.33  
**Ba**

57  
140.12  
**La**

58  
140.12  
**Ce**

59  
140.91  
**Pr**

60  
144.24  
**Nd**

61  
(145)  
**Pm**

62  
150.36  
**Sm**

63  
151.96  
**Eu**

64  
157.25  
**Gd**

65  
158.93  
**Tb**

66  
162.50  
**Dy**

67  
164.93  
**Ho**

68  
167.26  
**Er**

69  
168.93  
**Tm**

70  
173.05  
**Yb**

71  
174.97  
**Lu**

72  
178.49  
**Hf**

73  
180.95  
**Ta**

74  
183.84  
**W**

75  
186.21  
**Re**

76  
190.23  
**Os**

77  
192.22  
**Ir**

78  
195.08  
**Pt**

79  
196.97  
**Au**

80  
200.59  
**Hg**

81  
204.38  
**Tl**

82  
207.2  
**Pb**

83  
208.98  
**Bi**

84  
(209)  
**Po**

85  
(210)  
**At**

86  
(222)  
**Rn**

87  
(223)  
**Fr**

88  
(226)  
**Ra**

89  
(227)  
**Ac**

90  
232.04  
**Th**

91  
231.04  
**Pa**

92  
238.03  
**U**

93  
(237)  
**Np**

94  
(244)  
**Pu**

95  
(243)  
**Am**

96  
(247)  
**Cm**

97  
(247)  
**Bk**

98  
(251)  
**Cf**

99  
(252)  
**Es**

100  
(257)  
**Fm**

101  
(258)  
**Md**

102  
(259)  
**No**

103  
(262)  
**Lr**

104  
(267)  
**Rf**

105  
(268)  
**Db**

106  
(271)  
**Sg**

107  
(272)  
**Bh**

108  
(277)  
**Hs**

109  
(276)  
**Mt**

110  
(281)  
**Ds**

111  
(280)  
**Rg**

112  
(285)  
**Cn**

113  
(285)  
**Nh**

114  
(287)  
**Fl**

115  
(289)  
**Mc**

116  
(291)  
**Lv**

117  
(294)  
**Ts**

118  
(294)  
**Og**

Metal

Semimetal

Nonmetal

Alkali metal

Alkaline earth metal

Transition metals

Lanthanide

Actinide

Chalcogens element

Halogens element

Noble gas

- synthetic

STANDARD STATE (25 °C; 101 kPa)

Ne - gas

Fe - solid

Hg - liquid

GROUP (IUPAC 1985)

GROUP (CAS 1986)

ATOMIC NUMBER

SYMBOL

PERIOD

RELATIVE ATOMIC MASS

1

1.0079

**H**

|          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 21<br>Sc | 22<br>Ti | 23<br>V  | 24<br>Cr | 25<br>Mn | 26<br>Fe | 27<br>Co | 28<br>Ni | 29<br>Cu | 30<br>Zn | 31<br>Ga | 32<br>Ge | 33<br>As | 34<br>Se | 35<br>Br | 36<br>Kr |
| 41<br>Nb | 42<br>Mo | 43<br>Tc | 44<br>Ru | 45<br>Rh | 46<br>Pd | 47<br>Ag | 48<br>Cd | 49<br>In | 50<br>Sn | 51<br>Sb | 52<br>Te | 53<br>I  | 54<br>Xe | 55<br>Cs | 56<br>Ba |
| 71<br>Lu | 72<br>Hf | 73<br>Ta | 74<br>W  | 75<br>Re | 76<br>Os | 77<br>Ir | 78<br>Pt | 79<br>Au | 80<br>Hg | 81<br>Tl | 82<br>Pb | 83<br>Bi | 84<br>Po | 85<br>At | 86<br>Rn |

www.periodni.com