

# APPENDIX – I

Element	Symbol	Atomic no.	Atomic weight	Element	Symbol	Atomic no.	Atomic weight
Actinium	Ac	89	(227)	Mercury	Hg	80	200.59
Aluminium	Al	13	26.981 539	Molybdenum	Mo	42	95.94
Americium	Am	95	(243)	Neodymium	Nd	60	144.24
Antimony	Sb	51	121.75	Neon	Ne	10	20.179 7
Argon	Ar	18	39.948	Neptunium	Np	93	(237)
Arsenic	As	33	74.921 59	Nickel	Ni	28	58.69
Astatine	At	85	(210)	Niobium	Nb	41	92.906 38
Barium	Ba	56	137.327	Nitrogen	N	7	14.006 74
Berkelium	Bk	97	(247)	Nobelium	No	102	(255)
Beryllium	Be	4	9.012 182	Osmium	Os	76	199.24
Bismuth	Bi	83	208.980 37	Oxygen	O	8	15.999 4
Boron	B	5	10.811	Palladium	Pd	46	106.42
Bromine	Br	35	79.904	Phosphorus	P	15	30.973 762
Cadmium	Cd	48	112.411	Platinum	Pt	78	195.08
Caesium	Cs	55	132.905 43	Plutonium	Pu	94	(244)
Calcium	Ca	20	40.078	Polonium	Po	84	(209)
Californium	Cf	98	(251)	Potassium	K	19	39.098 3
Carbon	C	6	12.011	Praseodymium	Pr	59	140.907 65
Cerium	Ce	58	140.115	Promethium	Pm	61	(145)
Chlorine	Cl	17	35.452 7	Protactinium	Pa	91	231.035
Chromium	Cr	24	51.996 1	Radium	Ra	88	226.025 4
Cobalt	Co	27	58.933 20	Radon	Rn	86	(222)
Copper	Cu	29	63.546	Rhenium	Re	75	186.207
Curium	Cm	96	(247)	Rhodium	Rh	45	101.905 50
Dysprosium	Dy	66	162.50	Rubidium	Rb	37	85.467 8
Einsteinium	Ea	99	(254)	Ruthenium	Ru	44	101.07
Erbium	Er	68	167.26	Samarium	Sm	62	150.36
Europtium	Eu	63	151.965	Scandium	Sc	21	44.955 910
Fermium	Fm	100	(257)	Selenium	Se	34	78.96
Fluorine	F	9	18.998 403 2	Silicon	Si	14	28.085 5
Francium	Fr	87	(223)	Silver	Ag	47	107.868 2
Gadolinium	Gd	64	157.25	Sodium	Na	11	22.989 768
Gallium	Ga	31	69.723	Strontium	Sr	38	87.62
Germanium	Ge	32	72.61	Sulphur	S	16	32.066
Gold	Au	79	196.966 54	Tantalum	Ta	73	180.947 9
Hafnium	Hf	72	178.49	Technetium	Tc	43	(97)
Helium	He	2	4.002 602	Tellurium	Te	52	127.60
Holmium	Ho	67	164.930 32	Terbium	Tb	65	158.925 34
Hydrogen	H	1	1.007 94	Thallium	Tl	81	204.383 3
Iodine	I	53	126.904 47	Thulium	Tm	69	168.934 21
Indium	In	49	114.82	Thorium	Th	90	232.038 1
Iridium	Ir	77	192.22	Tin	Sn	50	118.710
Iron	Fe	26	55.847	Titanium	Ti	22	47.88
Krypton	Kr	36	83.80	Tungsten	W	74	183.85
Lanthanum	La	57	138.905 5	Uranium	U	92	238.028 9
Lawrencium	Lr	103	(260)	Vanadium	V	23	50.941 5
Lead	Pb	82	207.2	Xenon	Xe	54	131.29
Lithium	Li	3	6.941	Ytterbium	Yb	70	173.04
Lutetium	Lu	71	174.967	Yttrium	Y	39	88.905 85
Magnesium	Mg	12	24.305 0	Zinc	Zn	30	65.38
Manganese	Mn	25	54.938 05	Zirconium	Zr	40	91.224
Mendelevium	Md	101	(258)				

Notes:

(1) This table is scaled to the relative atomic mass  $A_r(^{12}\text{C}) = 12$ .

(2) Values in parentheses refer to the isotope of longest known half-life for radioactive elements.

(3) Information provided here is based mainly upon the Report of the Commission on Relative Atomic Masses, *Pure and Applied Chemistry*, 1986, 58, 1678.

**Base and dimensionless SI units**

Physical quantity	Name	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic Temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	Mole	mol

**APPENDIX II (B)****Derived SI units with special names**

Physical quantity	Name of SI unit	Symbol of SI unit
Frequency	Hertz	Hz
Energy	Joule	J
Force	Newton	N
Power	Watt	W
Pressure	Pascal	Pa
Electric charge	Coulomb	C
Electric potential different	Volt	V
Electrical resistance	Ohm	$\Omega$
Electrical capacitance	Farad	F
Electrical conductance	Siemens	S
Magnetic flux	Weber	Wb
Magnetic flux density (magnetic induction)	Tesla	T
Inductance	Henry	H
Luminous flux	Lumen	lm
Illuminance	Lux	lx

**Decimal multiples and submultiples to be used with SI units**

Multiple	Prefix	Symbol	Submultiple	Prefix	Symbol
$10^1$	deca	da	$10^{-1}$	Deci	d
$10^2$	hecto	h	$10^{-2}$	centi	c
$10^3$	kilo	k	$10^{-3}$	Mili	m
$10^6$	mega	M	$10^{-6}$	micro	$\mu$
$10^9$	giga	G	$10^{-9}$	nano	n
$10^{12}$	tera	T	$10^{-12}$	Pico	p
$10^{15}$	peta	P	$10^{-15}$	femto	f
$10^{18}$	exa	E	$10^{-18}$	Atto	a
$10^{21}$	zetta	Z	$10^{-21}$	zepto	z
$10^{24}$	yotta	Y	$10^{-24}$	yocto	y

APPENDIX – II(D)

**Conversion of units to SI units**

From	To	Multiply by
m	m	$2.54 \times 10^{-2}$
ft	m	0.3048
sq in	$m^2$	$6.4516 \times 10^{-4}$
sq ft	$m^2$	$9.2903 \times 10^{-2}$
cu in	$m^3$	$1.63871 \times 10^{-5}$
cu ft	$m^3$	$2.83168 \times 10^{-2}$
liter	$m^3$	$10^{-3}$
gallon	l	4.54609
lb	kg	0.453592
$g\ cm^{-3}$	$kg\ m^{-3}$	$10^3$
dyne	N	$10^{-5}$
atmosphere	Pa	$1.01325 \times 10^5$
mmHg	Pa	133.22
hp	W	745.7
erg	J	$10^{-7}$
eV	J	$1.60210 \times 10^{-19}$
kWh	J	$3.6 \times 10^6$
cal	J	4.1868

## International Standards for Drinking water

Parameter	Max. allowable limit (mg/liter)		
	WHO standard	USPH standard	European standard
BOD	6.0	5.0	-
Dissolved oxygen	-	4-6	-
COD	10.0	4.0	15.0
Arsenic	0.05	0.05	-
Boron	-	1.0	-
Calcium	100	100	100
Cadmium	0.01	0.01	-
Chromium	0.05	0.05	-
Chromium	0.05	0.05	-
Ammonia	0.5	0.5	-
Copper	1.5	1.0	-
Iron	1.0	0.3	-
Lead	0.1	0.05	-
Chloride	500	250	25
Cyanide	0.05	0.05	-
Mercury	0.001	0.001	-
Magnesium	150	30	-
Manganese	0.05	0.05	-
Nitrate + Nitrite	45	10	-
Total hardness (as CaCO <sub>3</sub> )	500	-	-
Pesticides	-	0.005	0.005
Total dissolved solids	500	-	-
E. Coli	100/100 ml	100/100 ml	-
Sp. Conductance	-	300 $\mu$ mho/cm	400

Parameters For Water Quality Characterization And Standards (Domestic Water Supplies)	
Parameter	USPHS (1969)
Physical Parameters	
Color	Colorless
Odor	Odorless
Taste	Tasteless
pH	6.0 - 8.5
Specific conductance	300 $\mu$ mho $cm^{-1}$
Dissolved oxygen (DO)	4 to 6 ppm
COD	4 ppm
BOD	5 ppm
Total dissolved solids	500 ppm
Suspended solids	5.0 ppm
Inorganic substances	
Chlorides	250 ppm
Sulphate	250 ppm
Cyanide	0.05 ppm
Fluoride	1.5 ppm
Nitrate - nitrite	<10 ppm
Phosphate	0.1 ppm
Sulphide	1.0 $\mu$ g $L^{-1}$ (ppb)
Boron	1.0 ppm
Calcium	100 ppm
Magnesium	30 ppm
Ammonia	0.5 ppm
Arsenic	0.05 ppm
Barium	1.0 ppm
Cadmium	0.01 ppm
Copper	1.0 ppm
Chromium (VI)	0.05 ppm
Lead	<0.05 ppm
Iron (filterable)	<0.3 ppm

**Average Composition of Clear Dry Air near Sea Level (ppm by Volume)**

Components	Concentration in	
	Average concentration ppm	Volume percent
<b>Major</b>		
N <sub>2</sub>	780900	$7.809 \times 10^1$
O <sub>2</sub>	209400	$2.094 \times 10^1$
<b>Minor</b>		
Ar	9300	$9.3 \times 10^{-1}$
CO <sub>2</sub>	318.0	$3.18 \times 10^{-1}$
<b>Trace</b>		
Ne	18.0	$1.8 \times 10^{-2}$
He	5.2	$5.2 \times 10^{-4}$
CH <sub>4</sub>	1.3	$1.3 \times 10^{-4}$
Kr	1.0	$1.0 \times 10^{-4}$
H <sub>2</sub>	0.5	$5.0 \times 10^{-5}$
H <sub>2</sub> O	0.25	$2.5 \times 10^{-5}$
CO	0.1	$1.0 \times 10^{-5}$
NH <sub>3</sub>	0.01	$1.0 \times 10^{-6}$
NO <sub>2</sub>	0.001	$2.0 \times 10^{-7}$
SO <sub>2</sub>	0.002	$2.0 \times 10^{-8}$

## **Nepal Engineering College (nec)**

Changunarayan, Bhaktapur

GPO Box: 10210, Kathmandu, Nepal

Phone: 611744, Fax: 977-1-611681

E-mail: [nec@healthnet.org.np](mailto:nec@healthnet.org.np) Web: [www.nec.edu.np](http://www.nec.edu.np)