What is Titration?

Titration is a quantitative chemical analysis method which involves the slow addition of a solution of a known concentration (titrant) to a known volume of another solution of unknown concentration until the reaction reaches endpoint which is often indicated by a colour change.

Volumetric titration is based on a complete chemical reaction between the analyte and a reagent (titrant) of known concentration which is added to the sample. In a broad sense, titration is a technique to determine the concentration of an unknown solution and has been included in most of the key international pharmacopoeias and other regulations. Titration results are influenced by the following factors:

- Measuring method
- Instrument (instrument error/abrasion of the burette)
- Equipment (electrode error/alteration of electrodes)
- Solution preparation (e.g. preparation of dilution)
- Sample Weighing (weighing error)
- Temperature
- Change of the volumetric solution because of influences through environmental oxygen, carbon dioxide, microorganisms

What are Titration Reactions?

Type	Theory	Scope	Application
Acid-Base	Proton Transfer Acid + Base ⇌ Conjugate Base + Conjugate Acid	Acidimetry ✔ Hydrochloric acid ✔ Sulfuric Acid ✔ Perchloric Acid Alkalimetry ✔ Sodium Hydroxide ✔ Potassium Hydroxide	Saponification value
REDOX	Electron Transfer $A_{red} + B_{ox} \rightleftharpoons A_{ox} + B_{red}$	Bromatometry ✔ Potassium Bromate Cerimetry ✔ Cerium(IV) sulfate Dichrometry ✔ Chromium (II) sulfate Iodometry ✔ Potassium Triiodate ✔ Sodium Thiosulfate Permanganimetry ✔ Potassium Permanganate Ferrometry ✔ Iron(II) Sulfate	Vitamin C content
Precipitation	Formation of sparingly soluble precipitate	Argentometry ✔ Silver Nitrate	Salt as chloride content
Complexometric	Metals ions combine with ligands to form soluble and stable complexes	EDTA ✔ Disodium EDTA	Calcium content

Can Titration be carried out in Different Media?

Media	Description	Application
Aqueous	Solvent and Titrant are in aqueous solution	Wide variety of analytes that that soluble in water.
Non-Aqueous	Solvent and titrant contain practically no water **Aprotic Solvents** Benzene, Toluene, Carbon tetrachloride **Protophilic Solvents** Amine, Ether, Liquid ammonia **Protogenic Solvents** Formic Acid **Amphiprotic Solvents** Alcohols Acetic acid	Pharamacopoeial assays
Two-Phase Transition	A suitable non-miscible solvent like e.g. chloroform toluene or dichloromethane is added to the aqueous sample solution	Anionic surfactant

Takween Titrant Quality

TAKWEEN understands the importance of the exact concentration of the titrant. TAKWEEN titrant solution are prepared using ASTM Type 1 water to ensure quality of titrant solutions and highly purity solute.

Takween Titrant Traceability

No.	Code	Name	Traceability	Provider
1	84L	Potassium Hydrogen Phthalate (Acidimetric Primary Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
2	136f	Potassium Dichromate (Oxidimetric Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
3	185i	Potassium Hydrogen Phthalate (pH Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
4	186g	Potassium Dihydrogen Phosphate (186-I-g) Disodium Hydrogen Phosphate (186-II-g) (pH Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
5	187e	Sodium Tetraborate Decahydrate (Borax) (pH Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
6	188	Potassium Hydrogen Tartrate (pH Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
7	189c	Potassium Tetroxalate Dihydrate (pH Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
8	191d	Sodium Bicarbonate (191d-I) Sodium Carbonate (191d-II) (pH Standard)	NIST SRM	National Institute of Standards & Technology (NIST)
9	351a	Sodium Carbonate (Acidimetric Standard)	NIST SRM	National Institute of Standards & Technology (NIST)

No.	Code	Name	Traceability	Provider
10	PH216.L5	pH 4.008 at 25°C Potassium Hydrogen Phtalate (Primary pH-buffer Solution)	Certified Reference Material (CRM) Metrological Traceability: NIST 185i SRM	CPA Chem, ISO 17034:2016, ISO/IEC 17025:2017, ISO 9001:2015
11	PH217.L5	pH 6.865 at 25°C Potassium Dihydrogen Phosphate/ Hydrogen Phosphate (Primary pH-buffer Solution)	Certified Reference Material (CRM) Metrological Traceability: NIST 186g SRM	CPA Chem, ISO 17034:2016, ISO/IEC 17025:2017, ISO 9001:2015
12	PH220.L5	H 10.01 at 25°C Sodium Carbonate/Sodium Hydrogen Carbonate (Primary pH-buffer Solution)	Certified Reference Material (CRM) Metrological Traceability: NIST 191d SRM	CPA Chem, ISO 17034:2016, ISO/IEC 17025:2017, ISO 9001:2015

PRODUCT CATALOG

PRODUCT NAME	PRODUCT CODE
Hyamine Solution 0.005N	HYNV000050
Hyamine Solution 0.008N	HYNV000080
Hydrochloric Acid 0.01N (0.01M)	HANV000100
Hydrochloric Acid 0.02N (0.02M)	HANV000200
Hydrochloric Acid 0.1000N (0.1000M) in IPA	HINV001000
Hydrochloric Acid 0.10N (0.10M)	HANV001000
Hydrochloric Acid 0.10N (0.10M)	HANV001000
Hydrochloric Acid 0.50N (0.50M)	HANV005000
Hydrochloric Acid 1.00N (1.00M)	HANV010000
Hydrochloric Acid 1.00N (1.00M)	HANV010000
Hydrochloric Acid 10%(w/v)	HAPV01000/WV
Hydrochloric Acid 10%wt.	HAPV01000/WW
Hydrochloric Acid 10,000ppm	HAAR1000000
Hydrochloric Acid 2.00N (2.00M)	HANV020000
Hydrochloric Acid 25%vol.	HAPV02500/VV
Hydrochloric Acid 5%vol.	HAPV00500/VV
Hydrochloric Acid 6.00N (6.00M)	HANV060000
Hydrogen Peroxide 0.10%wt. in Methanol	HMPL00010/WW
Hydrogen Peroxide 0.70%wt. in Methanol	HMPL00070/WW
Hydrogen Peroxide 3%(w/v)	HRPV00300/WV
Hydrogen Sulfide 30ppm	HSAR0003000
Hydrogen Sulfide 5ppm	HSAR0000500

PRODUCT NAME	PRODUCT CODE
o-Phosphoric Acid 0.02M	PAMV000200
o-Phosphoric Acid 0.10M	PAMV001000
o-Phosphoric Acid 0.20M	PAMV002000
o-Phosphoric Acid 0.30M	PAMV003000
o-Phosphoric Acid 0.60M	PAMV006000
o-Phosphoric Acid 0.69M	PAMV006900
o-Phosphoric Acid 1.00M	PAMV010000
o-Phosphoric Acid 1.50M	PAMV015000
o-Phosphoric Acid 1.55M	PAMV015500
o-Phosphoric Acid 10%(w/v)	PAPV01000/WV
o-Phosphoric Acid 10%vol	PAPV01000/VV
o-Phosphoric Acid 6.00M	PAMV060000
Perchloric acid 0.10N (0.10M) in Glacial Acetic Acid	PENV001000
Perchloric acid 0.10N (0.10M) in Glacial Acetic Acid	PENV001000
Perchloric acid 0.10N (0.10M) in Glacial Acetic Acid as per USP 39	PENV001000/USP
Perchloric acid 0.10N (0.10M) in IPA	PLNV001000
Perchloric acid 0.50N (0.50M) in Glacial Acetic Acid	PENV005000
Potassium Hydroxide 0.05N (0.05M) in Ethanol	PTNV000500
Potassium Hydroxide 0.05N (0.05M) in Methanol	PMNV000500
Potassium Hydroxide 0.10N (0.10M)	PXNV001000
Potassium Hydroxide 0.10N (0.10M)	PXNV001000
Potassium Hydroxide 0.10N (0.10M) in Ethanol	PTNV001000
Potassium Hydroxide 0.10N (0.10M) in IPA	PINV001000
Potassium Hydroxide 0.10N (0.10M) in Methanol	PMNV001000
Potassium Hydroxide 0.10N (0.10M) in Methanol	PMNV001000
Potassium Hydroxide 0.50N (0.50M) in Ethanol	PTNV005000
Potassium Hydroxide 0.77N (0.77M)	PXNV007700
Potassium Hydroxide 1.00N (1.00M)	PXNV010000
Potassium Hydroxide 1.00N (1.00M) in Methanol	PMNV010000
Potassium Hydroxide 30%(w/v)	PXPV03000/WV
Sodium Hydroxide 0.01N (0.01M)	SHNV000100
Sodium Hydroxide 0.05N (0.05M)	SHNV000500
Sodium Hydroxide 0.06N (0.06M)	SHNV000600
Sodium Hydroxide 0.10N (0.10M)	SHNV001000
Sodium Hydroxide 0.10N (0.10M)	SHNV001000
Sodium Hydroxide 0.50N (0.50M)	SHNV005000

PRODUCT NAME	PRODUCT CODE
Sodium Hydroxide 0.50N (0.50M) in Ethanol	SXNV005000
Sodium Hydroxide 1.00N (1.00M)	SHNV010000
Sodium Hydroxide 1.00N (1.00M)	SHNV010000
Sodium Hydroxide 1.20N (1.20M)	SHNV012000
Sodium Hydroxide 1.20N (Biotector)	SHNV012000/BIO
Sodium Hydroxide 10% (w-v)	SHPV01000/WV
Sodium Hydroxide 10.00N (10.00M)	SHNV100000
Sodium Hydroxide 16% (w-v)	SHPV01600/WV
Sodium Hydroxide 18%wt.	SHPV01800/WW
Sodium Hydroxide 2.00N (2.00M)	SHNV020000
Sodium Hydroxide 2.00N (2.00M)	SHNV020000
Sodium Hydroxide 25,000ppm	SHAR2500000
Sodium Hydroxide 32%wt.	SHPV03200/WW
Sodium Hydroxide 4% (w-v)	SHPV00400/WV
Sodium Hydroxide 4.00N (4.00M)	SHNV040000
Sodium Hydroxide 4.00N (Biotector)	SHNV040000/BIO
Sodium Hydroxide 5% (w-v)	SHPV00500/WV
Sodium Hydroxide 50% (w-v)	SHPV05000/WV
Sodium Hydroxide 6.00N (6.00M)	SHNV060000
Sodium Hydroxide 6.00N (Biotector)	SHNV060000/BIO
Sodium Hydroxide 8.00N (8.00M)	SHNV080000
Sodium Hydroxide Standard for 40mL of 0.10N HCl (8mL x 12vials)	SHNR0050008/12
Sodium Hypochlorite 10.00%wt. available Cl	SYPV01000/WW
Sodium Hypochlorite 10ppm available Cl	SYAR0001000
Sodium Hypochlorite 4.00%wt. available Cl	SYPV00400/WW
Sodium Hypochlorite 6.36%(w/v) available Cl	SYPV00636/WV
Sodium Hypochlorite 6.36%wt. available Cl	SYPV00636/WW
Sodium Hypochlorite 80ppm available Cl	SYAR0008000
Sodium Lauryl Sulfate 0.003N	SLNV000030
Sodium Sulfite 0.002N	SFNV000020
Sodium Sulfite 0.02N	SFNV000200
Sodium Sulfite 5%(w/v)	SFPV00500/WV
Sodium Sulfite Analyzer 1.0M	SFMV010000
Sodium Thiosulfate 0.002N (0.002M)	STNV000020

PRODUCT NAME	PRODUCT CODE
Sodium Thiosulfate 0.005N (0.005M)	STNV000050
Sodium Thiosulfate 0.01N (0.01M)	STNV000100
Sodium Thiosulfate 0.01N (0.01M)	STNV000100
Sodium Thiosulfate 0.0394N (0.0394M)	STNV000394
Sodium Thiosulfate 0.0473N (0.0473M)	STNV000473
Sodium Thiosulfate 0.05N (0.05M)	STNV000500
Sodium Thiosulfate 0.10N (0.10M)	STNV001000
Sodium Thiosulfate 1.00N (1.00M)	STNV010000
Silver Nitrate 0.0141N (0.0141M)	SNNT000141
Silver Nitrate 0.01N (0.01M)	SNNT000100
Silver Nitrate 0.01N (0.01M)	SNNT000100
Silver Nitrate 0.02N (0.02M)	SNNT000200
Silver Nitrate 0.02N (0.02M)	SNNT000200
Silver Nitrate 0.05N (0.05M)	SNNT000500
Silver Nitrate 0.10N (0.10M)	SNNT001000
Silver Nitrate 0.10N (0.10M)	SNNT001000
Silver Nitrate 0.10N (0.10M) in Ethanol	SENV001000
Silver Nitrate 0.171N (0.171M)	SNNT001710
Silver Nitrate 0.282N (0.282M)	SNNT002820
Silver Nitrate 1.00N (1.00M)	SNNT010000
Iodine Solution 0.0473N	IONV000473
Iodine Solution 0.10N	IONV001000
Iodine Solution 1.00N	IONV010000
Iodine Standard Solution 10ppm	IOAR0001000

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