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List of Abbreviations

3T3-L1 - Mouse Embryonic Fibroblast Cell Line

Abs - Absorbance of sample

Ac - Absorbance of Control

ACTB - Beta-Actin (Housekeeping Gene)

AKT - Protein Kinase B

AL - Aluminum

ALL - Acute Lymphocytic Leukemia

AML - Acute Myeloid Leukemia

ATP - Adenosine Triphosphate

AXL - AXL Receptor Tyrosine Kinase

AXL - AXL Receptor Tyrosine Kinase

B.C. - Before Christ

BBB - Blood-Brain Barrier

Bcl-2 - B-Cell Lymphoma 2 (Anti-apoptotic Protein)

BE - Binding Energy

Ca - Calcium

Caspase-3 (CASP3) - Cysteine-Aspartic Acid Protease 3 (Apoptotic Gene)

CD3OD - Deuterated Methanol

CLL - Chronic Lymphocytic Leukemia

CML - Chronic Myeloid Leukemia

CNS - Central Nervous System

Ct - Cycle Threshold

Cu - Copper

CVD - Cardiovascular Disease

DKA - Diabetic Ketoacidosis

DLS - Dynamic Light Scattering

DMEM - Dulbecco's Modified Eagle Medium

DNA - Deoxyribonucleic Acid

DNase - Deoxyribonuclease

DPP-4 - Dipeptidyl Peptidase-4

DPPH - 2,2-Diphenyl-1-Picrylhydrazyl

EDS - Energy Dispersive Spectroscopy

EGFR - Epidermal Growth Factor Receptor

FBS - Fetal Bovine Serum

Fe - Iron

FITC - Fluorescein Isothiocyanate

FRAP - Ferric Reducing Antioxidant Power

FT-IR - Fourier-Transform Infrared Spectroscopy

g/mol - Grams per Mole

GA Runs - Genetic Algorithm Runs

GDM - Gestational Diabetes Mellitus

GLP-1 - Glucagon-like Peptide-1

GLUT-4 - Glucose Transporter Type 4

HER2 - Human Epidermal Growth Factor Receptor 2

HI ZnOxNP - *Hemidesmus Indicus* Zinc Oxide Nanoparticles

HPLC - High-Performance Liquid Chromatography

HR-LCMS - High-Resolution Liquid Chromatography-Mass Spectrometry

HR-MS / HRMS - High-Resolution Mass Spectrometry

IC_{50} - Half-Maximal Inhibitory Concentration

IDF - International Diabetes Federation

IF ZnOxNP - *Ichnocarpus Frutescens* Zinc Oxide Nanoparticles

IR - Insulin Receptor

IV – Intravenous

kcal/mol - Kilocalories per mole (energy unit).

Km - Michaelis-Menten Constant

LogP - Partition Coefficient

m/z - Mass-to-Charge Ratio

MAPK - Mitogen-Activated Protein Kinase

MD - Molecular Dynamics

MFI - Mean Fluorescence Intensity

Mg - Magnesium

mg/mL - Milligrams per Milliliter

mL - Milliliter

mM - Millimolar

MM/GBSA - Molecular Mechanics/Generalized Born Surface Area

mRNA - Messenger RNA

MS/MS - Tandem Mass Spectrometry

MTT - 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide

Na - Sodium

NaCl - Sodium Chloride

nm - Nanometer

NMR - Nuclear Magnetic Resonance

NPT - Constant Number of Particles, Pressure, and Temperature

ns - Nanoseconds

NVT - Constant Number of Particles, Volume, and Temperature

OD - Optical Density

P - Phosphorus

p21 (CDKN1A) - Cyclin-Dependent Kinase Inhibitor 1A

p53 - Tumor Suppressor Gene

PBS - Phosphate-Buffered Saline

PDB - Protein Data Bank

PDBQT - Protein Data Bank Quaternion Translation Format

PDGFR - Platelet-Derived Growth Factor Receptor

PDI - Polydispersity Index

PI - Propidium Iodide

PSA - Polar Surface Area

qRT-PCR - Quantitative Real-Time Polymerase Chain Reaction

RMSD - Root Mean Square Deviation

RMSF - Root Mean Square Fluctuation

RNA - Ribonucleic Acid

RNAse - Ribonuclease

RoG - Radius of Gyration

ROS - Reactive Oxygen Species

rpm - Revolutions per Minute

rRNA - Ribosomal RNA

RTK - Receptor Tyrosine Kinase

SAED - Selected Area Electron Diffraction

SASA - Solvent Accessible Surface Area

SDF - Structure Data File

SEM - Scanning Electron Microscopy

SGLT2 - Sodium-Glucose Cotransporter-2

Si - Silicon

SP - Standard Precision

SYBR - SYBR Green (Fluorescent Dye)

T1DM - Type 1 Diabetes Mellitus

T2DM - Type 2 Diabetes Mellitus

TEM - Transmission Electron Microscopy

TIP3P - Transferable Intermolecular Potential with 3 Points (Water Model)

TLC - Thin Layer Chromatography

TMS – Tetramethylsilane

U/mL - Units per milliliter (enzyme activity).

UV-VIS - Ultraviolet-Visible Spectroscopy

VEGFR - Vascular Endothelial Growth Factor Receptor

Vmax - Maximum Reaction Rate

WBC - White Blood Cells

WHO - World Health Organization

XP - Extra Precision

Zn – Zinc

List of Symbols

Å - Angstrom (Unit of Length)

α-A - α-Amylase

α-G - α-Glucosidase

µg/mL (µg) - Micrograms per milliliter (concentration unit).

% - Percentage (used for proportions, concentrations, and statistical data).

> - Greater than (used in comparisons).

+ - Addition or increase (used in reactions or combinations).

→ - Process or transition indicator.

/ - Denotes a ratio.

= - Equality or equivalence.

Fe^{3+} - Ferric ion (oxidized iron).

Fe^{2+} - Ferrous ion (reduced iron).

°C - Degrees Celsius (temperature).

pH - Measure of acidity or alkalinity.

× 100 - Multiplication factor for percentage calculation.

ΔG - Change in free energy (binding or reaction energy).

≥ - Greater than or equal to.

≤ - Less than or equal to.

$Å^2$ - Square Ångström.

ΔGbind - Binding free energy.

ΔEcoulomb - Coulomb energy (electrostatic interaction energy).

ΔElipo - Lipophilic energy (from hydrophobic interactions).

ΔEele - Electrostatic solvation energy (polar solvation effects).

ΔEvdW - Van der Waals energy (non-covalent interaction energy).

2-NBDG - A fluorescent glucose analog.

μM - Micromolar (concentration unit).

μL - Microliter (volume unit).

V: Reaction velocity (rate of enzymatic reaction)

Vmax: Maximum reaction velocity (enzyme saturation point)

Km: Michaelis-Menten constant (substrate concentration at half Vmax)

ΔGtotal - Total free energy

ΔGprotein - protein free energy

ΔGligand - ligand free energy

TΔS - Entropic contribution to free energy.

m/z - Mass-to-charge ratio (mass spectrometry).

± - Plus-minus (standard deviation).

$p < 0.05$ - Statistical significance indicator.

× g - Gravitational force (centrifuge speed).

M - Molar concentration.