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	Name	Dr. Swapan Kumar Biswas
	Date of Birth	01/04/1978
	Phone	+91-890-247-7241(India), +91-908-843-8550(India)
	E-mail	swapankumarbiswas@tripurauniv.ac.in , swapaniict@gmail.com
	Academic Qualifications	M. Sc. (Kalyani University), Ph.D. (Worked at IICT-Hyd, Degree-Kalyani University), Post-Doctorate (MSU-MT, USA).
	Present designation/position	Associate Professor
	Key Expertise	Natural Product Synthesis, Asymmetric synthesis, Heterocyclic Chemistry, Methodology Development, Peptide Synthesis, Medicinal Chemistry and Solid Phase Synthesis, NMR and HPLC analysis.

Teaching & Research Experience:

Duration	Possition	Key Expertise
Dec2023-Till Date	Associate Professor , Department of Chemistry, Tripura University (A Central University), Agartala, Tripura, India.	Teaching PG student and Natural Product Synthesis, Asymmetric synthesis, Methodology Development, Peptide Synthesis, Medicinal Chemistry and Solid Phase Synthesis, NMR and HPLC analysis.
Apr2015-Nov2023	Assistant Professor , Department of Chemistry, Sree Chiatanya College, Habra, 24-Pgs(N), WB, India.	Teaching UG & PG student and Supervising PG project work, synthesis of small molecules for H ₂ O-spleting
Sept 2014-Mar 2015	Project Leader, Senior Research Scientist Jubilant Chemsys, Sector 58, Noida, India	Asymmetric synthesis, Medicinal Chemistry and Contact research.
Feb2013-Aug2014:	Project Leader, Senior Research Scientist TCG Lifesciences Pvt. Ltd, Kolkata, West Bengal, India.	Asymmetric synthesis, Medicinal Chemistry and Contact research, Heterocyclic Chemistry.
Jul 2010-Jul2012	Post-Doctoral Research with Prof. Paul A Grieco. Montana State University, Bozeman, MT, USA.	Synthesis of highly water soluble zwitterionic fluorescent dyes for application in two-dimensional difference gel electrophoresis (2D-DIGE). Synthesis of thiotriphenylphosphene carboxylic acid derivative for RSNO rate determining project to bind the protein.
Aug2009-Jun 2010	Senior Research Associate. Escientia BioPharma Pvt. Ltd, Nacharam Industrial Area, Hyderabad.	Synthesis of Biologically active molecules, intermediates and process development for large scale reactions.

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Aug 2003-Jan 2004	Process R&D Chemist, DABUR-Pharma, Industrial Area, Kalyani, India.	Process R&D and production of Irinotecan Hydrochloride as trihydrate (IR-8), (FDA, TGA approved).
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- **Feb 2006- Jul 2009:**

Place: Indian Institute of Chemical Technology, Hyderabad, India.

Position: Senior Research Scholar under the supervision of Dr. J. S. Yadav, FNA. **Projects:**

- Studies directed towards the synthesis of 2,3-dihydroxytrinitervitanes *via-Diels-Alder* Intramolecular cyclization, using **Julia-Kocienski** olefination and **Yadav's protocol** as the key steps.
- Gallium chloride catalyzed three components coupling of naphthol, alkyne and aldehyde: a novel synthesis of 1,3-dialkyl-3H-benzo[f]chromenes.
- Indium-mediated allylation/propargylation of α -diazoketones: a facile synthesis of 1-bromo-2-alkyl- or 2-arylpent-4-en-2-ols and *vic*-diallylation/propargylation of phenacyl bromides: a facile synthesis of 4-arylocta-1,7-dien-4-ol derivatives.

- **Feb 2004-Feb 2006:**

Place: Indian Institute of Chemical Technology, Hyderabad, India.

Position: Junior Research Scholar under the supervision of Dr. J. S. Yadav, FNA. **Projects:**

- IBX mediated facile conversion of 1,3 diols to 1,2 diketones by oxidative cleavage of C-C bond.
- Rapid and Efficient Protocol for the Synthesis of 4-chlorotetrahydropyrans using Niobium (V) chloride or Gallium halides.

- **Nov 2002- Jun 2003:**

Place: University of Kalyani, India.

Position: M.Sc. Research project under the supervision of Prof. S. P. Das.

Projects:

- **Isolation and Transformations of Triterpenoids.**

Education

Feb 2004-Jul 2009

Degree: Ph.D. in Organic Chemistry.

Institute: Degree awarded from University of Kalyani. Thesis title: "*Studies directed towards the synthesis of 2,3-dihydroxytrinitervitanes and development of new methodologies*"

2003

Degree: **M. Sc. in Organic Chemistry.**

Institute: University of Kalyani, Kalyani, India.

2001

Degree: **B. Sc. in Chemistry** (Hons) with Physics and Mathematics as electives,

Institute: University of Kalyani, Kalyani, India.

Awards & Fellowship

- **Dr. D.S Kothari Post-Doctoral Fellowship** 2014-2015
- **Best Scientist award from TCG Lifesciences Kolkata-Roche** Collaboration year 2013-2014
- Awarded **Senior Research Fellowship (SRF)** by the Council of Scientific & Industrial Research, New Delhi, India (2006-2009).

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- Awarded *Junior Research Fellowship (JRF)* by the Council of Scientific & Industrial Research, New Delhi, India (2004-2006).
- Qualified *Graduate Aptitude Test in Engineering* by Indian Institute of Technology (2003).

Professional Competence

- Synthesis of biologically active natural products and expertise in **multi-step synthesis**.
- Development of new methodologies for **organic synthesis**.
- Profound efficiency in **handling of hygroscopic and air sensitive reactions**.
- Synthesis of peptides liquid phase as well as solid phase.
- Expertised in **HPLC (Both analytical and preparative) and GC**.
- Analysis and handling instrument of spectroscopic data viz., **NMR, IR, UV and Mass spectrometer**.
- Capable of performing collaborative and independent work.
- Expertised in various analytical techniques in organic synthesis like flash chromatography, LC-MS, DSC, TGA and various other chromatographic techniques.
- Expertised in the preparation of research reports and manuscripts using MS office, ChemDraw, NMR software etc.
- Familiarised with SciFinder Scholar.

Publications

Dr. Swapan Kumar Biswas & Titas Biswas, *A Book for CBCS-UG& PG, Organic Name Reaction*, Rohini Nandan, ISSN/ ISBN No.978-93-91572-39-2

Swapan Kumar Biswas* Sipak Joyasawal; Conversion of α -Diazoketones into 1-Bromo-2-alkyl- or 2-arylpent-4-en-2-ols using Tin-Mediated Allylation/Propargylation. *SynOpen* 2023; 07(02): 161-164. DOI: [10.1055/a-2068-5625](https://doi.org/10.1055/a-2068-5625)

Swapan Kumar Biswas* and Titas Biswas; Metal-free one-pot oxidative conversion: Molecular Iodine Mediated Oxidation Organic Reactions. *Int. J. Exp. Res. Rev.* Vol. 27: 45-52(2022). DOI: [10.52756/ijerr.2022.v27.005](https://doi.org/10.52756/ijerr.2022.v27.005).

Swapan Kumar Biswas* and Titas Biswas; Utility of iodine catalyzed tandem oxidation, cross-coupling and cyclisation reactions in organic synthesis. *Int. J. Exp. Res. Rev.* Vol. 27: 39-44 (2022). DOI: [10.52756/ijerr.2022.v27.004](https://doi.org/10.52756/ijerr.2022.v27.004).

Swapan Kumar Biswas*; Recent development of Silver-catalyzed Oxo- and Aza cyclization. *Int. J. Exp. Res. Rev.*, Vol. 26: 90-98 (2021). DOI: [10.52756/ijerr.2021.v26.007](https://doi.org/10.52756/ijerr.2021.v26.007).

Swapan Kumar Biswas* and Debasis Das*, One-pot Synthesis of Pyrano[2,3-c]pyrazole Derivatives via Multicomponent Reactions (MCRs) and their Applications in Medicinal Chemistry. *Bentham Science*, 552 - 568, Volume 19, Issue 5, 2022. DOI: [10.2174/1570193x19666211220141622](https://doi.org/10.2174/1570193x19666211220141622).

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Swapan Kumar Biswas* and Sushanta Saha, A report groundwater arsenic contamination assay in the delta area of West Bengal. International Academic Publishing House., Vol. 25: 84-88 (2021). <https://doi.org/10.52756/ijerr.2021.v25.008>.

Walid S. Maaty¹, Joseph D. Steffens¹, Joshua Heinemann¹, Alice C. Ortmann², Benjamin D. Reeves¹, **Swapan K. Biswas**¹, Edward A. Dratz¹, Paul A. Grieco¹, Mark J. Young^{3,4} and Brian Bothner^{1*}, Global Analysis of Viral Infection in an Archaeal Model System; *Frontiers in Microbiology*, 2012, Volume 3, Article 411, DOI: [10.3389/fmicb.2012.00411](https://doi.org/10.3389/fmicb.2012.00411)

J. S. Yadav, **S. K. Biswas**, S. Sengupta, Progress towards the total synthesis of 2,3-dihydroxytrinervitanes. *Tetrahedron Letters*, **2010**, 51, 4014. DOI: [10.1016/j.tetlet.2010.03.065](https://doi.org/10.1016/j.tetlet.2010.03.065)

J. S. Yadav, B. V. S. Reddy, **S. K. Biswas**, S. Sengupta, Gallium chloride catalyzed three component coupling of naphthol, alkyne and aldehyde: a novel synthesis of 1,3-diaryl-3H-benzo[f]chromenes. *Tetrahedron Letters*, **2009**, 50, 5798. DOI: [10.1016/j.tetlet.2009.07.134](https://doi.org/10.1016/j.tetlet.2009.07.134)

J. S. Yadav, B. V. S. Reddy, S. Sengupta, **S. K. Biswas**, Gallium(III) chloride catalyzed hydroarylation of aryl acetylenes with naphthols and phenols: a facile synthesis of vinyl arenes. *Synthesis* **2009**, 1301. DOI: [10.1055/s-0028-1088027](https://doi.org/10.1055/s-0028-1088027)

J. S. Yadav, B. V. S. Reddy, **S. K. Biswas**, S. Sengupta and P. Vishnumurthy Indium-mediated vic-diallylation/propargylation of phenacyl bromides: a facile synthesis of 4-arylocta-1,7-dien-4-ol derivatives. *Tetrahedron Letters* **49**, **2008**, 1034. DOI: [10.1016/j.tetlet.2007.12.005](https://doi.org/10.1016/j.tetlet.2007.12.005)

J. S. Yadav, B. V. S. Reddy, P. Vishnumurthy and **S. K. Biswas**, Indium-mediated allylation/propargylation of α -diazoketones: a facile synthesis of 1-bromo-2-alkyl- or 2-arylpent-4-en-2-ols. *Tetrahedron Letters* **48**, **2007**, 6641. DOI: [10.1016/j.tetlet.2007.07.136](https://doi.org/10.1016/j.tetlet.2007.07.136)

J. S. Yadav, **S. K. Biswas**, R. Srinivas. IBX mediated facile conversion of 1,3 diols to 1,2 diketones by oxidative cleavage of C-C bond. *Synthesis*, **2006**, 4237. DOI: [10.1055/s-2006-950372](https://doi.org/10.1055/s-2006-950372)

J. S. Yadav, B. V. S. Reddy, B. Eeshwaraiyah, M. K. Gupta, **S. K. Biswas**. Gallium (III) halide promoted synthesis of 1,3,5-triaryl-1,5-dihalo-1,4-pentadienes, *Tetrahedron Letters* **46**, **2005**, 1161. DOI: [10.1016/j.tetlet.2004.12.080](https://doi.org/10.1016/j.tetlet.2004.12.080)

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J. S. Yadav, B. V. S. Reddy, M. K. Gupta, **S. K. Biswas**. Rapid and Efficient Protocol for the Synthesis of 4-Chlorotetrahydropyrans using Niobium(V) chloride. *Synthesis*, **2004**, 2711. DOI: [10.1055/s-2004-831220](https://doi.org/10.1055/s-2004-831220).

Lecture / Presentations:

- "**National Science Day**" 2024 on 14th March 2024, Lecture by Dr.Swapan Kumar Biswas, Associate Professor, Department of Chemistry, Tripura University, at Government of Tripura, Rabindranath Thakur Mahavidyalaya, Bishalgarh, Sepahijala, Tripura – 799102.
- "**Science and Technology for Environmental Sustainability and Tribal Development**" on 14th & 15th March, 2024, Organized by Government Degree College, Dharmanagar, in collaboration with Indian Science Congress Association, Dharmanagar Chapter, Venue: Government Degree College, Dharmanagar, North Tripura

Presentations at symposium

- Poster presented on "Synthesis 1-Bromo-2-alkyl- or 2-arylpent-4-en-2-ols using Tin-Mediated Allylation/ Propargylation" One Day National Seminar on Dimensions in Chemical Sciences, held Dept. Of Chemistry And IQAC, RBC for Women, 16th May 2023.
- Poster presented on "One-pot Synthesis of Pyrano[2,3-c]pyrazole Derivatives via Multicomponent Reactions (MCRs) and their Applications in Medicinal Chemistry", Science for Society Environment and Sustainability-2022, CSIR-North East Institute of Science and Technology, Jorhat, 24th-26th Nov 2022.
- "Production and application of Bio-Based Surfactants-A Breeff overview", Trends in surface science and related Areas, 6th Oct, 2018, Sarojini Naidu College for women & ISSST, Jadavpur University,
- "Synthesis of Caspases Inhibitor to....." NATCOBER-2017, 10-12 Nov, 2017, Sambalpur University
- Production and Application of Bio-Based surfactants-A Brief Overview" Trends in surface science and related areas, 20th Aug 2016, Sree Chitanya Collge & ISSST, Jadavpur University.
- Poster presented on "Studies directed towards the synthesis of 2,3-dihydroxy- trinervitanes *via* intramolecular Diels-Alder cyclization" in **National Symposium**, March, 2009 held at the University of Kalyani, Kalyani, West Bengal.
- Poster presented on "IBX mediated facile conversion of 1,3 diols to 1,2 diketones by oxidative cleavage of C-C bond" in **National Symposium on Current Trends in Chemistry** 30-31st January, 2007 held at the University of Kalyani, Kalyani, West Bengal.
- Poster presented on "Rapid and Efficient Protocol for the Synthesis of 4-chlorotetra-hydropyrans using Niobium (V) chloride or Gallium chloride" in **OSPC-2005** held at the Indian Institute of Chemical Technology, Hyderabad.

Swapan's Works Summary from next Page

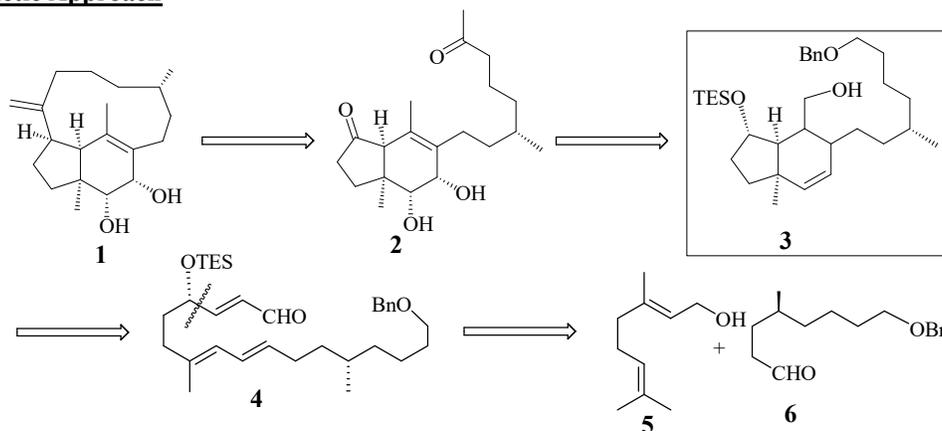
SWAPAN KUMAR BISWAS

BRIEF OUTLINE OF DOCTORAL RESEARCH WORK

Studies directed towards the synthesis of 2, 3-dihydroxytrinervitanes via intramolecular Diels-Alder cyclization. 2,3-dihydroxytrinervitanes a diterpenes has been isolated more than 30 years back, in spite of its unique structure and interesting biological activity; the total synthesis of the molecule is still remained unpublished.

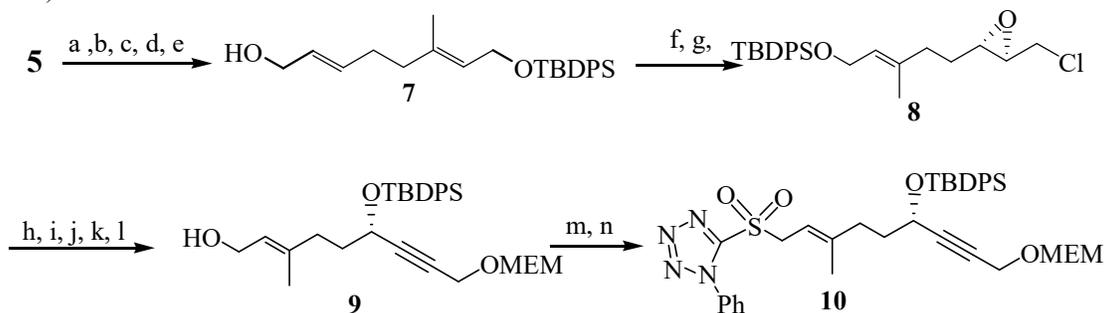
The compound has completely characterized 2, 3-dihydroxytrinervitanes that is inhibitory at 25 µg per mL, about 10 times less potent than a clinically practical antibiotic.

Retro-Synthetic Approach



Synthesis

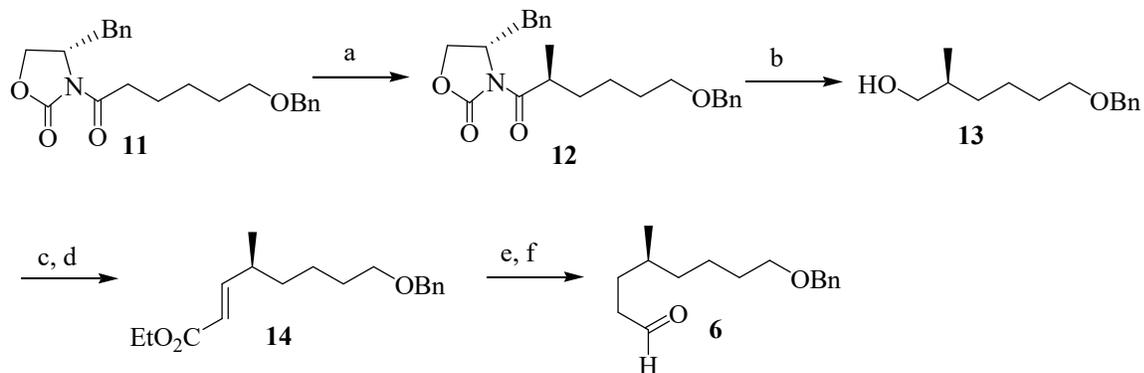
Fragment 1: Geraniol has been converted to sulfone using periodic acid, C-2 Wittig, DIBAL-H reduction followed by Sharpless epoxydation, Yadav's protocol, Mitsunobu reaction and ammonium molybdate/ H₂O₂ as the key steps (Scheme 1).



Scheme 1: a) TBDPS-Cl, Imd, CH₂Cl₂, b) m-CPBA, CH₃Cl, c) H₅IO₆, Ether, THF, d) Ph₃PCHCO₂Et, CH₂Cl₂, e) DIBAL-H, Ether, -78 °C, f) Sharpless epoxydation, -20°C, 4h, g) CCl₄, reflux at 110°C, cat. NaHCO₃, h) Li, Liq. NH₃, cat Fe(NO₃)₃, i) TBDPS-Cl, DMF, Imd, j) n-BuLi, THF, (CH₂O)_n, -78 °C; k) MEM-Cl, DIEPA, CH₂Cl₂, 0 °C to rt; l) CSA, MeOH: CH₂Cl₂ (1:1), 12h; m) DEAD, TPP, Tetrazol, THF; n) (NH₄)₂MoO₄, H₂O₂, EtOH, 0 °C to r.t ;

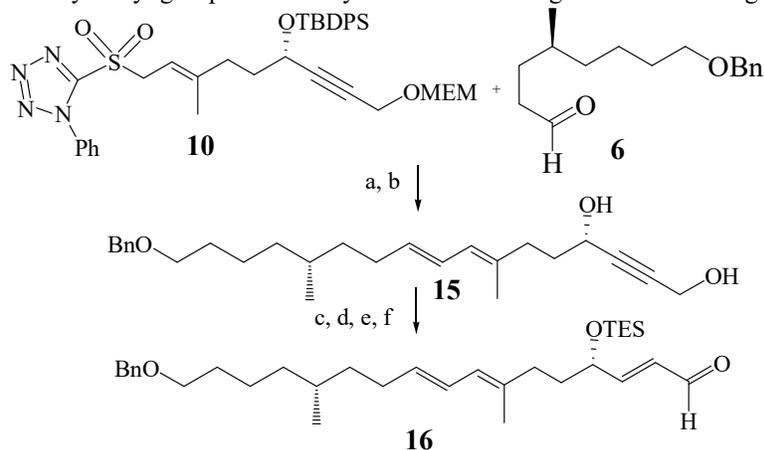
Fragment 2: Hexane diol was mono protected with benzyl group and converted to acid which was then coupled with Evan's auxiliary. After methylation with methyl iodide, removal of the auxiliary followed by C-2 Wittig, LiBH₄ reduction and IBX oxidation resulted aldehyde 6 (**Scheme 2**).

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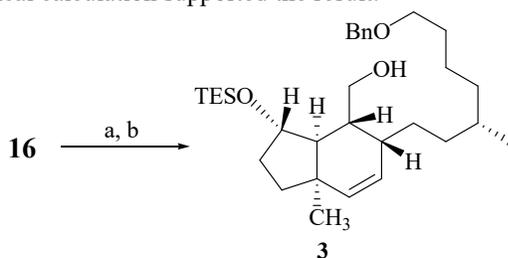
Scheme 2: a) MeI, NaHMDS, THF, $-78\text{ }^{\circ}\text{C}$, b) LiBH_4 , MeOH (1 drop H_2O), c) $(\text{COCl})_2$, DMSO, Et_3N , CH_2Cl_2 , d) $\text{Ph}_3\text{PCHCO}_2\text{Et}$, CH_2Cl_2 , e) LiBH_4 , THF, $0\text{ }^{\circ}\text{C}$ to r.t., f) IBX, DMSO, THF.

Coupling and IMDA: Diels- Alder precursor **16** was prepared as following, coupling of **10** and **6** using Julia-Kocienski olefination to get and followed by deprotection of TBDPS and MEM to get **15**, Red-Al reaction and protection deprotection of hydroxyl group followed by IBX oxidation to give IMDA starting material (Scheme 3).



Scheme 3: a) KHMDs , THF, $-78\text{ }^{\circ}\text{C}$; b) 2N HCL, MeOH; c) Red-Al, Ether; d) TES-Cl, Imd; e) TBAF, $0\text{ }^{\circ}\text{C}$ 2 min; f) IBX, DMSO, THF, 1eqv. NaHCO_3 .

16 was heated at $160\text{ }^{\circ}\text{C}$ for 20 hours to provide the five and six member ring of trinervitanes skeletons by **intramolecular Diels-Alder**, Which was converted to **3** using NaBH_4 (Scheme 4). The structure was confirmed by NOESY interaction, quantum mechanical calculation supported the result.



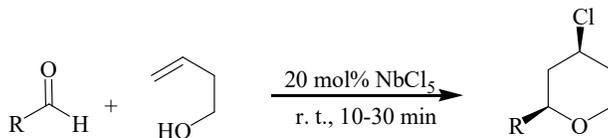
Scheme 4: a) Toluene, 0.1 eqv BHT, $160\text{ }^{\circ}\text{C}$ sealed tube 20h; b) NaBH_4 , MeOH, $0\text{ }^{\circ}\text{C}$.

Total energies and the relative energies (kJ/mol) at AM1, PM3, MNDO and B3LYP/6-31G (d) level of theory.

Structure	AM1	PM3	MNDO	B3LY/6-31G(d)
2a (α,α)	0.0	0.0	0.0	0.0
2b (β,β)	18.3	22.8	15.0	5.14

Yadav et al. *Synthesis* **2006**, 4237.

6). Rapid and Efficient Protocol for the Synthesis of 4-Chlorotetrahydropyrans using Niobium(V) chloride. Aldehydes undergo a rapid coupling with 3-buten-1-ol utilizing 20 mol% of niobium(V) chloride or gallium(III) halides to afford 4-chlorotetrahydropyran or 4-halo-tetrahydropyran derivatives under extremely mild conditions within short reaction times in excellent yields with high selectivity. The similar halogenated tetrahydropyrans are also obtained using.

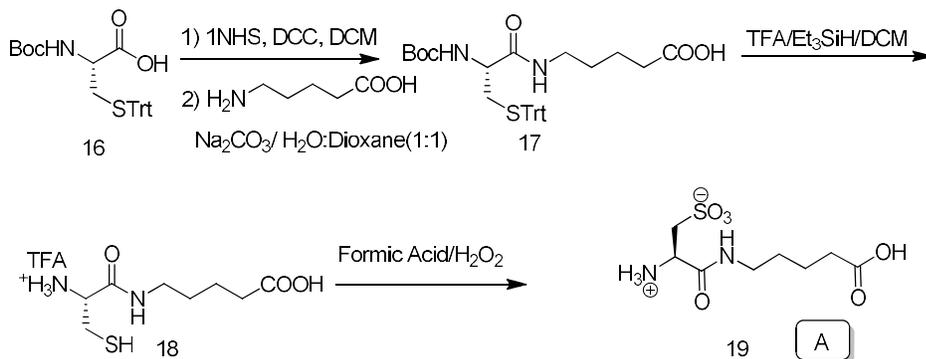


Yadav et al. *Synthesis* **2004**, 2711.

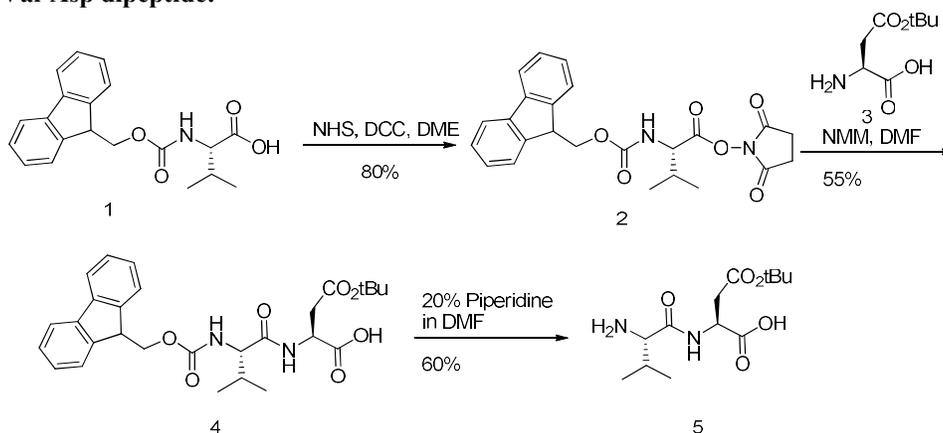
Project at Montana State University:

Synthesis of Caspases Inhibitor: Synthesis of highly water soluble zwitterionic fluorescent dyes (Zdye) for application in two-dimensional difference gel electrophoresis (2D-DIGE) to label the proteins from different biological treatments and thus overcome problems with experimental reproducibility of the separations of the myriad of proteins present in cells, organelles and in tissues. I have successfully completed Rhodamine Caspases inhibitor.

Synthesis of Caspases Inhibitor side chain:



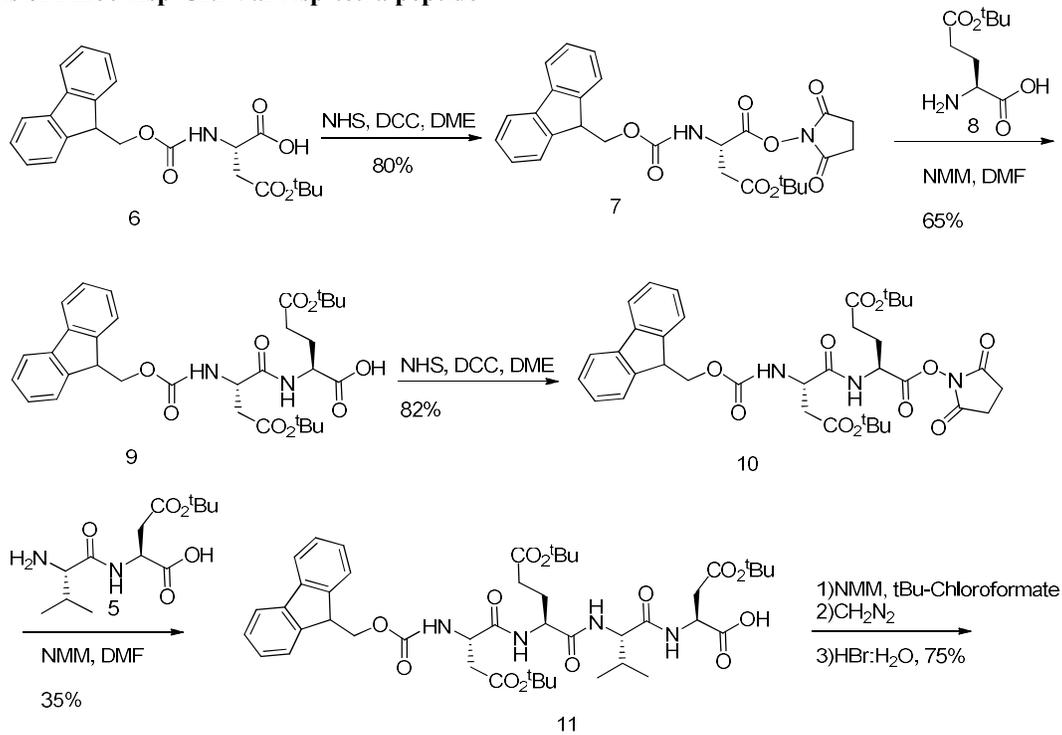
Synthesis of Val-Asp dipeptide:



Scheme 1

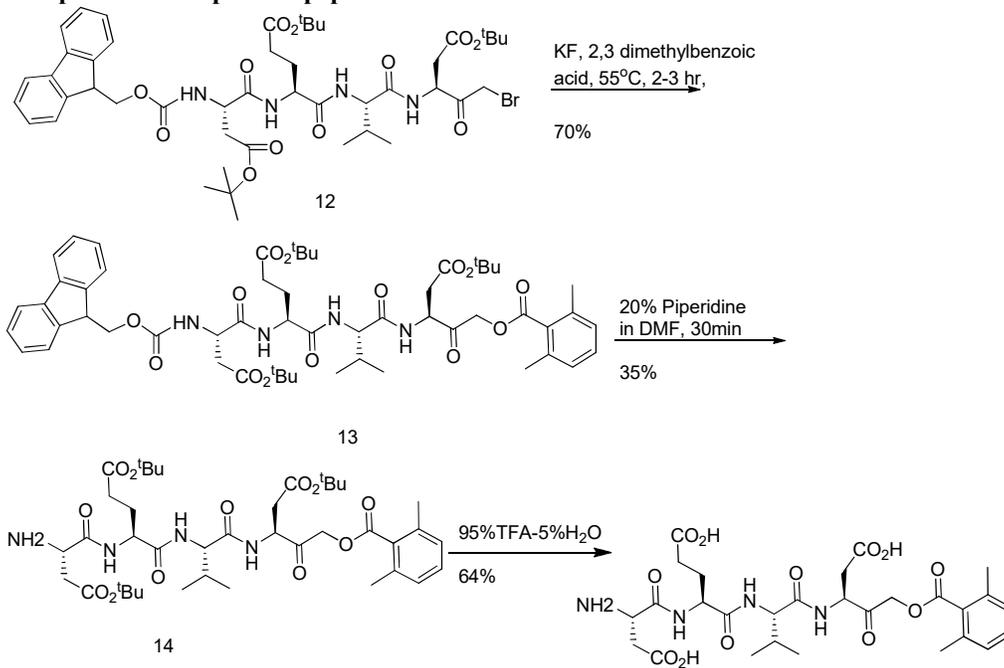
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Synthesis of Fmoc-Asp-Glu-Val-Asp-tetra peptide:



Scheme 2

Synthesis of Asp-Glu-Val-Asp-tetra peptide war head:

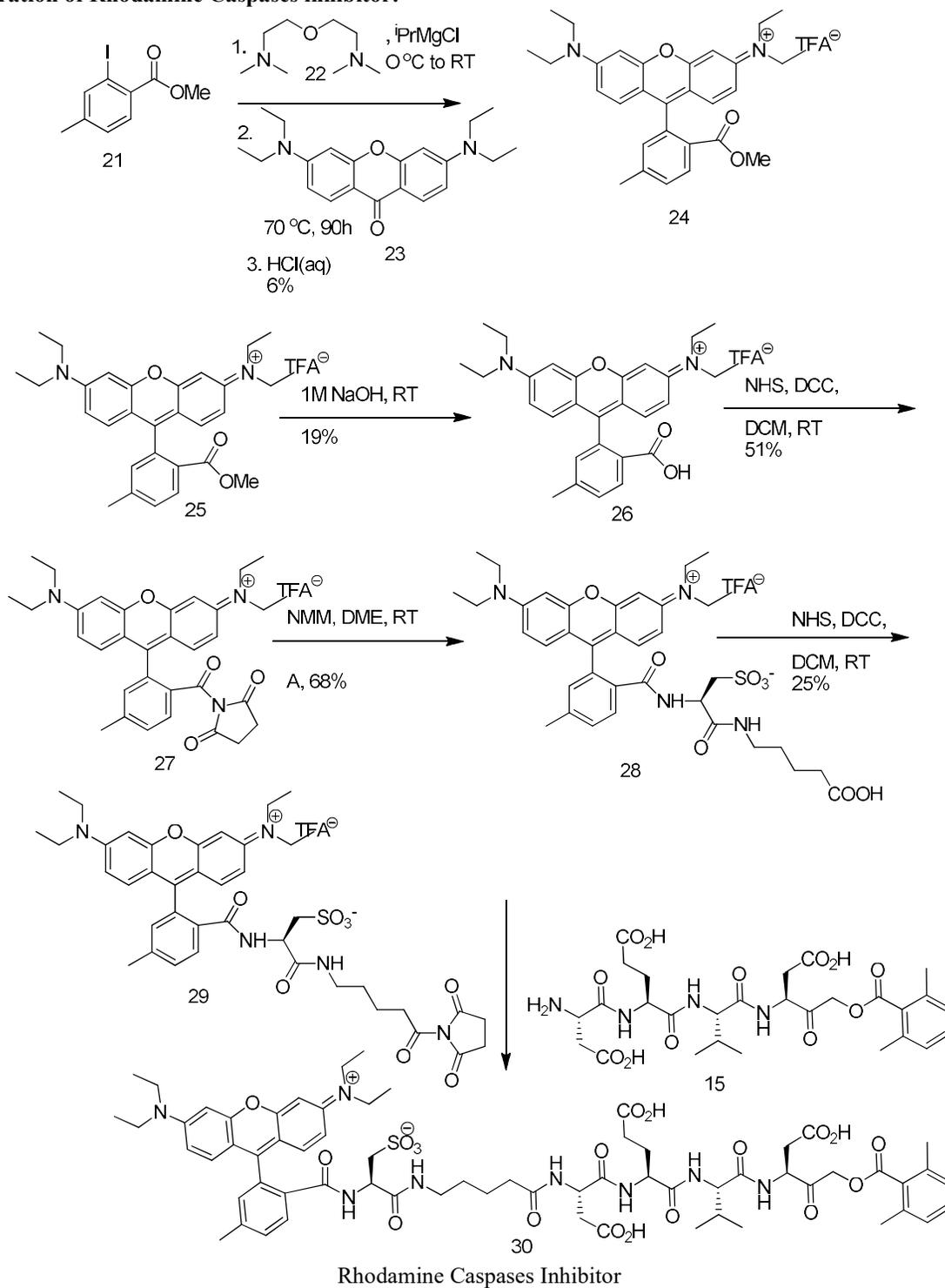


Scheme 3

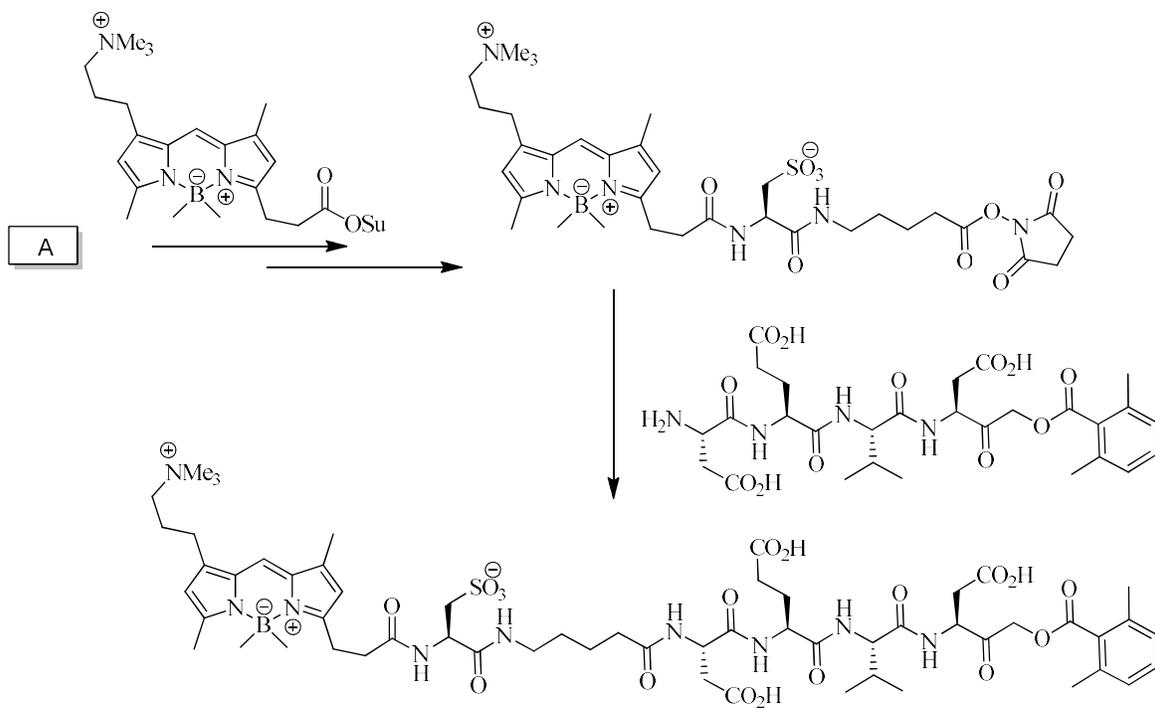
The tetrapeptide with the war head is ready for the coupling with three set of Z dye for the experiment with caspases.

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Preparation of Rhodamine Caspases inhibitor:



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Scheme 4