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Research Article

Synthesis And Antimitotic Activity of Benzotriazole Compound

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ABSTRACT

The present work to Synthesize benzotriazole Nucleus and study the biological activity of Antimitotic method through by seed germination assay by using the green gram seeds. It is preliminary screening method to identify this benzotriazole basic nucleus is having Anticancer property. By using this seed germination assay method be can studied that this nucleus is having inhibition of seed germination Activity.

INTRODUCTION

Benzotriazole is Bicyclic heterocyclic compound with three nitrogen atoms in the five membered ring i.e. triazole ring fused with benzene ring. This Pharmacophore molecule shows a wide Spectrum of pharmacological activities.

Table.1: Chemical Information of Benzotriazole [1-3]

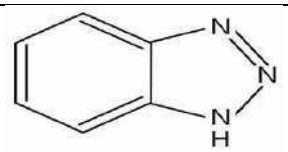
Synonyms	**1H-Benzotriazole, Benzotriazole,1,2,3-Benzotriazole**
Chemical formula	$C_6H_5N_3$
Molecular weight	119.12 g/mole
Chemical structure	
Density	1.36 g/ml
Melting point	100°c
Appearance	White solid
Chemical safety category	Environmental Hazard, Harmful

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Table.2: Materials used for the Reaction

Apparatus	Chemicals
Weighing balance	orthophenylene diamine
Glassine	Sodium Nitrite
Ice water bath	Glacial acetic acid
Thermometer	Distilled water
RFB	
Beaker	
Measuring cylinder	
Heating mantle	
Gravity filtration setup	
Desiccator	

Principle involved in the synthesis of Benzotriazole: [4-6]

The sodium nitrite reacts with glacial acetic acid and liberates nitrous acid.The o-phenylenediamine reacts with nitrous acid and produce diazonium ion. When the structure and stereochemistry of diazonium ion are stable, intramolecular nitrogen coupling occurs and forms benzotriazole.

$NaNO_2 + CH_3COOH \longrightarrow HNO_2 + CH_3COONa$

Table.3: Procedure for the Preparation of the Reaction mixture:

Reaction mixture-1	Reaction mixture-2
Dissolve1.3grams of O-phenylenediamine in a mixture of 1.5ml of glacial acetic acid and 5ml water in a beaker. Stir until the solid dissolves, warm gently if necessary. Cool the solution to 15°c.Stir well	Add a solution of 2grams of sodium nitrite in 2ml water.

Mixing RM-1 & RM-2 then this resultant reaction mixture will become warm within2-3minutes and reaches a temperature of about 85°c. and then begin to cool. Colour changes from deep red to pale brown. Continue stirring for 15minutes till the temperature fall about 35-40°c.Thoroughly chill in the ice bath for 30minutes.Filter the product and wash with cold water. Product is dried under Desiccator.

Evaluation of Antimitotic activity of Benzotriazole compound [7-12]

Table.4: Materials used for seed germination Assay method

Contents	Quantity
Green grams (Vigna radiata)	25grams
Sigma-Aldrich Polystyrene petri dishes	5 petri dishes
Benzotriazole drug solution (BZT)	50ml BZT
Vehicle used-Distilled water	50ml

Seed germination Assay Method:

Green gram seeds were purchased from the market and stored in a moisture free place in self-sealing cover. Then accurately weighed 5grams of seeds and incorporated in each and every sigma-Aldrich polystyrene petri dishes to study the antimitotic activity of Benzotriazole compound. In Control only vehicle is used that vehicle is distilled water and incubate all the petridishes at room temperature for 24hrs. After getting the results of antimitotic activity of Benzotriazole compound. we randomly selected 3 seeds from each and every petriplate and calculate the germination length in

cms of the seeds and after that we done average length calculation.

Preparation of Benzotriazole drug solution:

Accurately weight about 1gm of Benzotriazole drug from the synthesized product and dissolved in the distilled water then make up to 50ml with the distilled water in the Volumetric flask.

Figure.1
BZT Drug solution

Figure.2
Green Gram seeds

Figure.1: BZT Drug Solution **Figure.2: Green Gram Seeds**

Table.5: Preparation of Antimitotic activity of Benzotriazole (BZT) compound.

S.no	Concentration of Benzotriazole compound (ml)	Contents in the petriplate
1	Control (0ml BZT)	10ml vehicle only
2	0.5ml (BZT)	10ml vehicle + 0.5ml BZT
3	1ml (BZT)	10mlvehicle +1ml BZT
4	1.5ml (BZT)	10mlvehicle + 1.5ml BZT
5	2ml (BZT)	10mlvehicle + 2ml BZT

Figure.3: Results of Antimitotic Assay method for Benzotriazole Drug solution

Table.6: Result of Antimitotic Activity of Benzotriazole compound.

S. No	Concentration of Benzotriazole compound (ML)	Length of seeds (cm)	Average length of the seeds(cm)
1	Control	First Seed- 4cm Second seed -4.5cm Third seed -4.5cm	4+4.5+4.5= 13/3 =4.3cms
2	0.5ml	First Seed- 2.5cm Second seed-3cm Third seed -3.7cm	2.5+3+3.7 = 9.2/3 = 3.06cms
3	1ml	First seed -1.5cm Second seed-2cm Third seed-2.5cm	1.5+2+2.5= 6/3 =2cms
4	1.5ml	First seed -0.9cm Second seed -0.5cm Third seed -0cm	0.9+0.5+0 = 1.4/3 = 0.46cms
5	2ml	First seed -0cm Second seed -0cm Third seed -0cm	**No germination of seeds**

From the Figure.3 We obtained the results of antimitotic activity from this we calculated the average length of seeds germination from each and every individual concentrations of Benzotriazole

(BZT) drug solution.Then after we plot a graph for taking the Average length of seeds in Y-xis and concentration of Benzotriazole drug solution in X-Axis.

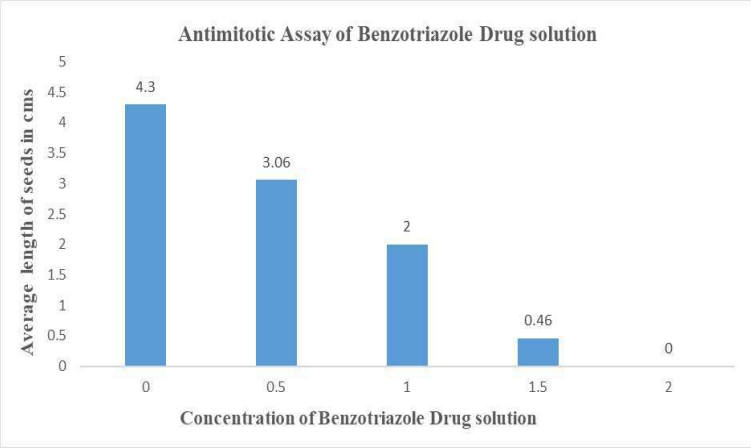

Figure.4: Graphical Representation of Antimitotic Assay of Benzotriazole Drug Solution

CONCLUSION:

From the Above results of Antimitotic activity of Benzotriazole (BZT) Drug solution we observe that there is a gradually reduction in Average length of the seeds.so we conclude that highest strength of the BZT drug solution is hot having any seed germination from this it is conformed that the Benzotriazole Compound is having Antimitotic activity.

REFERENCES

1. Navneet Singh, Vanika Priya, Ridhima Bhasin, Kunika Verma. An exploration of sundry nature of benzotriazole derivatives: A Review. International research journal of pharmacy. 2019; 10 (3)
2. Suma B.V., Natesh N.N., Madhavan V. Benzotriazole in medicinal chemistry: an overview. J. Chem. Pharm. Res. 2011;3:375–381
3. John H.B., John M.B.J. eleventh ed. 2004. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry; pp. 217–281.
4. Christopher John Perry, Keith Holding and Elizabeth Tyrrell. (2008). “Simple, Novel Synthesis for 1CarbamoyllH-benzotriazole and Some of Its derivatives ” Synthetic Communications: An International Journal for Rapid Communication of Synthetic Organic Chemistry.
5. Henderson S.A., Yang B. Applications of benzotriazole methodology in heterocycle ring synthesis and substituent introduction and modification. J. Heterocyclic. Chem. 1998;35:1123–1159.
6. Zhang S.S., Wan J., Li C.L., Li M., Qu B. Syntheses and biological activities of novel triazole compounds. J. Heterocyclic. Chem. 2007;44:75–78.
7. V K Singh, Poonam Rish Ishwar, Peeyush Bhardwaj and Shashi Alok. (2017). Kale R., Prasad V., Mohapatra P., Tiwari V. Recent developments in benzotriazole methodology for construction of pharmacologically important heterocyclic skeletons. Monstah fur Chem. - Chem. Mon. 2010;141:1159–1182.
8. Gitanjali KP, Harshada CP, Indira MP, Prof. SL Borse and Dr. SP Pawar. (2015). “Benzotriazole – The Molecule Of Diverse Biological Activities” WJPPS, 4(5).
9. V K Singh, Poonam Rish Ishwar, Peeyush Bhardwaj and Shashi Alok. (2017).

Benzotriazole: A Heterocyclic Molecule with Diversified Pharmacological Activities, IJPSR, 8(2), 446-456

10. Perkovic I, Butala I, Kralj M, Martin Kleiner I and Balzarini J.(2012). Novel NSAID 1-acyl 4cycloalkyl/aryl semi carbazides and 1-acyl-5-benzyloxy/hydroxyl carbamoyl carbazides as potential anticancer agents and antioxidants. Eur J Med Chem, 51, 227-238.
11. Al-Soud Y.A., Al-Masoudi N.A., Ferwana Ael R. Synthesis and properties of new substituted 1,2,4-triazoles: potential antitumor agents. Bioorganic. Med. Chem. 2003;11:1701–1708
12. Walck JL, Baskin JM, Baskin CC, Hid Ayati SN. Defining transient and persistent seed banks in species with pronounced seasonal dormancy and germination patterns. Seed Sci Res. 2005;15(3):189–196.

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