INTRODUCTION: Nanotechnology research has gained momentum in the recent years by providing nanoparticles that exhibit antibacterial, antifungal and UV filtering properties. Innovative solutions in the field of biomedical, materials science, optics and electronics. ZnO is used in a host of creams and ointments that are used to treat skin diseases. The antimicrobial activity of nanoparticles has been studied with human pathogenic bacteria, mainly Escherichia coli. Several natural and engineered nanomaterial’s have demonstrated strong antimicrobial properties through diverse mechanisms including photo catalytic production of reactive oxygen species that damage the cell components of bacteria and viruses (e.g.: TiO2, ZnO), and also the bacterial cell envelope (e.g. ZnO and Ag Nanoparticles). ZnO nanoparticles exhibit strong antibacterial activities on a broad spectrum of bacteria and do not induce any cytotoxicity. Zinc oxide nanoparticles are used in the preparation of substances possessing medically as well as cosmetically useful properties (Jones et al).

Due to its antibacterial properties, zinc oxide is applied on the skin, in the form of powders, antiseptic creams, surgical tapes and shampoos to relieve skin irritation, diaper rash, dry skin and blisters. Zinc oxide Nanoparticles increase the antibacterial efficiency of Ciprofloxacin. These Nanoparticles are an important source of zinc, which is needed to carry out various essential biochemical reactions in the body in addition to helping in maintaining a healthy immune system. Zinc oxide Nanoparticles are used industrially as a protective coating against photo- destruction. Nano Scale particles have emerged as novel antimicrobial agents owing to the high surface area to volume ratio, which is coming up as the current...
interest among the researchers due to the growing microbial resistances against metal ions and antibiotics. The recent growth in the field of porous and Nano metric materials prepared by non-conventional processes has stimulated the search of new applications of ZnO nanoparticles.

The present study focuses on the effect of the different capping agents on the antibacterial activity of ZnO nanoparticles.

MATERIALS AND METHODS:
Preparation of Zinc Oxide Nano-particles:
Materials:
Zinc acetate, Potassium hydroxide, dimethyl sulphoxide (DMSO), ethanol, Acetone, methanol, Thioglycerol, Tri ethanol amine, Oleic acid.

(i) Synthesis of Zinc oxide Nanoparticles-I:
(Thioglycerol as capping agent) 5,6
Zinc oxide nanoparticles were prepared by suspending 0.2 M zinc acetate in 20 ml ofDimethyl sulfoxide. It was stirred for about 30minutes. 1.2 M of KOH prepared in 10 ml ofethanol was added drop wise to zinc acetatesuspended in DMSO. After stirring for 5 minutes 0.06ml/0.12 ml/0.24ml of thioglycerol was added and stirr

(ii) Synthesis of Zinc oxide nano-particles-II:

RESULTS AND DISCUSSION:

<table>
<thead>
<tr>
<th>Organism</th>
<th>Thioglycerol</th>
<th>Triethanol amine</th>
<th>Oleic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.06ml</td>
<td>0.12ml</td>
<td>0.24ml</td>
</tr>
<tr>
<td>Bacillus</td>
<td>15</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>42</td>
<td>44</td>
<td>24</td>
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<tr>
<td>E. coli</td>
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<td>24</td>
<td>20</td>
</tr>
<tr>
<td>Proteus</td>
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<td>20</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>24</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Klebsiella</td>
<td>28</td>
<td>32</td>
<td>26</td>
</tr>
</tbody>
</table>

The ZnO nanoparticles synthesized using different capping agents was very effective against all the cultures. From Table1 and Fig. 1, we can infer that among the different capping agents used, Thioglycerol capped ZnO nanoparticles were more effective than Triethanol amine and Oleic acid. Thioglycerol when added at a concentration of 0.12ml was more effective than 0.06 and 0.24ml concentration. Thioglycerol is used as a component of corrosion inhibitors and ore floatation agent. In biochemistry, studied in the activity of immune system or denatures the proteins due to its strong reducing properties. Low molecular weight thiols or their esters such as 2-mercaptoethanol, 1-
thioglycerol and dithiothreitol denatures the proteins by reducing disulphide linkages leading to tautomerization and breaking up quaternary protein structure. They have been studied as anti-cancer agents by acting as alkylating agents to damage the cancer cell DNA.

In his famous and often cited talk given to the American Physical Society in 1959, Richard Feynman challenged scientists across all disciplines to consider the possibilities that could be achieved by miniaturization and atomic level control. In the ensuing fifty years, significant progress has been made to this end, affording scientists the ability to reproducibly create nanometer-sized inorganic structures. As the chemical and physical properties of nanomaterials are intimately linked to its size and shape, significant effort has been placed toward the synthesis of novel nanomaterial’s. The ability to modify physical and chemical properties such as light scattering, absorption and emission, magnetic properties, electrical properties and others toward a specific application have made inorganic nanomaterials suitable for a wide variety of applications. Traditionally, these applications have included sensors, catalysis, electronics, surface enhanced Raman spectroscopy, biology and diagnostic imaging. Nanotechnology has attracted global attention because nanoparticles (NP) have properties unique from their bulk equivalents. Nanoparticles of Ag, CuO and ZnO are being used industrially for several purposes including amendments to textiles, cosmetics, sprays, plastics and paints. A common feature of these three Nanoparticles is their antimicrobial activity. The antimicrobial activity of NP largely has been studied with human pathogenic bacteria, mainly Escherichia coli and Staphylococcus aureus. Nano-Ag is inhibitory to E. coli and S. aureus. These microbes also are sensitive to nano-CuO and nano-ZnO.
Nanoparticles action may be due in part to their release of free ions. Heavy metal ions have diverse effects on bacterial cell function. Zn is an essential element for cells; levels of Zn above the essential threshold level inhibit bacterial enzymes including dehydrogenase and certain protective enzymes, such as thiolioperoxidase, and glutathione reductase. Zn inhibition of NADH oxidase is proposed to impede the respiratory chain of E. coli. Additionally, loss of membrane potential is associated with inhibition by Zn ions at cytochrome oxidase.

CONCLUSION: ZnO nanoparticles have been successfully synthesized using zinc acetate, DMSO and KOH in ethanol at room temperature using three capping agents, i.e. TEA, oleic acid and Thioglycerol at different concentrations. It has been found that thioglycerol is more effective capping agent as compared to oleic acid and TEA. Thioglycerol was very effective when its quantity was 0.12ml than at 0.06ml and 0.24ml (2 times). This could be due to the effect of Thioglycerol on the particle size of ZnO nanoparticles.

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REFERENCES:

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