

# Quranic scientific miracles in Metals A Comparative study with the Bible

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**ABSTRACT**--*This paper is entitled: Quranic scientific miracles in Metals: A Comparative study with the Bible. The study included minerals: gold, silver and iron in terms of their presence in the texts of the Koran and the Torah with a study of all the miraculous aspects concerning these minerals and compared with their counterparts in the Old Testament. The results of this study showed the high accuracy of the use of these minerals in the Holy Quran with the compatibility of scientific aspects with the findings of modern science and the absence of these concepts of what is found in these minerals in the Old Testament. This indicates that there is no doubt that the Koran is the word of God Almighty revealed to the Prophet Muhammad.*

**Keywords**-- *Miracles, The Holy Qur'an, The Bible, Gold, Silver, Iron, Minerals, Metals.*

## I. INTRODUCTION

There have been many studies on the scientific miracle in the Holy Quran as a proof of the miracle of the Prophet Muhammad and the answer to the skeptics in the question of denying the various scientific aspects that exist in the Holy Qur'an, which were discovered thousands of years ago.

In addition to knowing the scientific facts behind the mention of some things and not others, this research came to add to the findings of scientists and researchers of scientific facts confirm the miracle of the Holy Qur'an.

The research dealt with the minerals mentioned in the Holy Qur'an, and the importance of mentioning them - without other minerals of the same category – and their biological and biochemical perspective according to the scientific findings of modern science in this regard, and was compared with the same minerals mentioned in the Old Testament of the Bible.

The research came in three outlines:

- **Gold metal:** A comparative scientific study between the Holy Qur'an and the Old Testament.
- **Silver metal:** A comparative scientific study between the Holy Qur'an and the Old Testament.
- **Iron metal:** A comparative scientific study between the Holy Qur'an and the Old Testament.

**Copper** was excluded, because it is contained in one verse of the Holy Qur'an, which in its interpretation is out of orbit.

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## II. GOLD METAL: A COMPARATIVE SCIENTIFIC STUDY BETWEEN THE HOLY QURAN AND THE OLD TESTAMENT

Gold has long been seen as a source of wealth, even centuries ago, a noble metal in chemical terms (Holleman *et al*, 1985), with a density of 19.3 g / cm<sup>3</sup> and a melting point of 1064 C and atomic mass of 196.96 units; compared to silver metal, which is also a noble metal, Silver is 10.49 g / cm<sup>3</sup> and its melting point is 961.78 percent and its atomic mass is 107.86 units; therefore all the above values are higher in gold than in silver (which is basic information for each element) (Meija, 2016). So, this is probably the scientific reason for mentioning gold before silver in the Qur'an.

People adorned themselves with jewelry and gold ornaments to signify their power and status. God mentioned gold in eight places in the Qur'an:

1- "Beautified for people is the love of that which they desire - of women and sons, heaped-up sums of gold and silver, fine branded horses, and cattle and tilled land. That is the enjoyment of worldly life, but Allah has with Him the best return." (Holy Qur'an: Surat Al Imran: 14).

2- "Indeed, those who disbelieve and die while they are disbelievers - never would the [whole] capacity of the earth in gold be accepted from one of them if he would [seek to] ransom himself with it. For those there will be a painful punishment, and they will have no helpers." (Holy Qur'an: Surat Al Imran: 91).

3- "And those who hoard gold and silver and spend it not in the way of Allah - give them tidings of a painful punishment." (Holy Qur'an: Surat Attawbah: 34).

4- "Those will have gardens of perpetual residence; beneath them rivers will flow. They will be adorned therein with bracelets of gold and will wear green garments of fine silk and brocade, reclining therein on adorned couches. Excellent is the reward, and good is the resting place." (Holy Qur'an: Surat AlKahf: 31).

5- "Indeed, Allah will admit those who believe and do righteous deeds to gardens beneath which rivers flow. They will be adorned therein with bracelets of gold and pearl, and their garments therein will be silk." (Holy Qur'an: Surat AlHaj:23).

6- "[For them are] gardens of perpetual residence which they will enter. They will be adorned therein with bracelets of gold and pearls, and their garments therein will be silk." (Holy Qur'an: Surat Fater: 33)

7- "Then why have there not been placed upon him bracelets of gold or come with him the angels in conjunction?" (Holy Qur'an: Surat AlZukhruf: 53).

8- "Circulated among them will be plates and vessels of gold. And therein is whatever the souls desire and [what] delights the eyes, and you will abide therein eternally" (Holy Qur'an: Surat AlZukhruf: 71).

But the question here is: Why God preferred gold metal over other metals more expensive than used in the manufacture of jewelry as well as to be the jewelry of the people of Paradise? Here we are talking about Platinum, for example. To answer this question, we have compared here the biological characteristics of both minerals due to long-term dealing with them and their effects on the human body and to reveal the scientific miraculous face in this regard.

Recent scientific research indicates that gold metal has therapeutic properties for a variety of diseases; it is a non-toxic metal and does not lead to side effects, even after long-term exposure; Gold has valuable therapeutic properties, according to Provident Metals, a well-known trade in precious metals, to relieve arthritis symptoms. It

also helps in healing the wound, allowing blood to flow more freely, and this increase in blood circulation regulates oxygen inside the body, which helps to heal; Gold has been converted into an ointment, and is used to treat many skin diseases and infections; pure gold can be found in a variety of beauty products and skin treatments, all of which maintain a bright and beautiful skin (Scobczak *et al*, 2011).

At the level of gold nanoparticles, because of its physical properties and corrosion resistance, one of its greatest properties, materials manufactured in the nanoscale have unique and useful properties for the medical sector in the field of dental implants, tissue engineering and organs due to its characteristics, as gold nanoparticles are subject to great interest in the applied fields such as physics, chemistry and biology, especially in the medical sector (Kleps *et al*, 2007).

Apart from the apparent use of gold bullion in dental restorations, gold minutes are currently used in many technological applications and there are a large number of uses of gold metal, especially in medical devices, due to the excellent biological compatibility of this metal, these include: pacemaker wires, gold-plated stents used in the treatment of heart disease, etc. (Parida and Nayak, 2012), Gold is also highly resistant to bacterial colonies, this is because the preferred material for planters at risk of infection, such as the inner ear, gold has a long history of use in this application and is a valuable mineral in microsurgery of the ear, and its compounds have also historically been used in medicines to treat a range of diseases (Giasuddin *et al*, 2012).

The molecular structure of gold has proven to be a versatile platform for a wide range of biomedical applications, with potential use in many areas including: diagnosis and sensing, in vitro and in vivo, and therapeutic techniques. These applications are possible due to the highly favorable properties of golden structures (Cobley *et al*, 2011).

As we see above, gold is a health-safe mineral, and has great therapeutic and health characteristics of the human body, as well as the psychological comfort gained by wearing it.

Platinum is also a noble metal, has a higher density than gold, 21.45 g / cm<sup>3</sup> and its atomic mass is very close to the gold mass, 195.084 units, and its melting point is higher than the melting point of gold, 1768.3 c. It is also more expensive than gold and is used in jewelry as well, although the earliest discoveries of platinum by the ancient Egyptians were the famous coffin found in “*Tiba*” decorated with platinum along with gold and silver and the indigenous people of South America used platinum in ceremonial jewels such as nose rings and necklaces, God did not mention it in the Koran as a metal of paradise, and we investigated the possible scientific reasons due to not mentioned in the Holy Qur’an, we found that the salts of platinum It can cause many health effects, such as:

- 1- Changes in DNA.
- 2- Cancer.
- 3- Allergic reactions to the skin and mucous membranes lining the nose.
- 4- Organ damage, such as intestines, kidneys and bone marrow.
- 5- Hearing damage.

6- Finally, platinum can enhance the toxicity of other hazardous chemicals in the human body, such as selenium (Hunter *et al*, 1945).

Gold has been mentioned in most of the books of the Old Testament because of its high value, has been used to encapsulate everything that can be wrapped tools, walls, trees and wood for the kings, and here are some of the biblical verses that mentioned gold, note that silver has been presented on gold in the majority of biblical texts.

Exodus says:

“And thou shalt overlay it with pure gold, within and without shalt thou overlay it, and shalt make upon it a crown of gold round about.”

“... and thou shalt cast four rings of gold for it, and put them in the four corners thereof; and two rings shall be in the one side of it, and two rings in the other side of it. And thou shalt make staves of shittim wood, and overlay them with gold. And thou shalt put the staves into the rings by the sides of the ark, that the ark may be borne with them. The staves shall be in the rings of the ark: they shall not be taken from it. And thou shalt put into the ark the testimony which I shall give thee. And thou shalt make a mercy seat of pure gold: two cubits and a half shall be the length thereof, and a cubit and a half the breadth thereof. And thou shalt make two cherubim of gold, of beaten work shalt thou make them, in the two ends of the mercy seat” (Exodus, 25: 10-18).

Some biblical commentators have stated that there is a specific principle to mention gold in the Bible, that the closer to God the more valuable metals are used, so gold has been used for everything related to the presence of God.

After the Golden Calf formation, the Israelis males were abstained from wearing gold earrings and jewelry, where jewelry and gold were for men and women before this (Cole, 1989).

Pastor Antony Fekry points out that there is a general rule that wood refers to the human body of Christ, Gold refers to Christ's theology in his glory, and copper refers to Christ's theology in his justice and condemnation of sin. The wood is covered with gold, so this wood, which is covered with gold, refers to the monotheistic deity of one nature which is of two natures.

It is clear that this picture explains as far as we understand that the two natures have been unmixed and unchanged. The same is true of the altar of burnt wood, which is a wood covered with copper; If gold is mentioned alone, it does not refer to the incarnate Christ, but refers to God with his divinity. This applies here to the cover of the coffin is pure gold and refers to the lighthouse is also pure gold without wood; the lighthouse refers to the Holy Spirit and his work in the body of Christ, i.e. the church, the cover refers to God in his glory and on his throne (Fikri, <https://st-takla.org>).

### **III. SILVER METAL: A COMPARATIVE SCIENTIFIC STUDY BETWEEN THE HOLY QUR'AN AND THE OLD TESTAMENT**

The Holy Qur'an said:

“And there will be circulated among them vessels of silver and cups having been [created] clear [as glass], Clear glasses [made] from silver of which they have determined the measure. Upon the inhabitants will be green

garments of fine silk and brocade. And they will be adorned with bracelets of silver, and their Lord will give them a purifying drink” (Holy Qur’an: Surat AlInsan: 15, 16 and 21).

God has mentioned the use of silver pots and bottles for drinking, and the use of silver bracelets to be worn by the people of Paradise, God has preferred the silver to other precious metals (such as gold and platinum), and here God sets us a wonderful example in the scientific miracle of the Holy Qur’an by standing on the scientific reasons for this choice are as follows:

#### **1- Use silver flasks for drinking:**

In terms of water purification applications, silver is commonly used in domestic water filters, as it lowers the growth of biofilms within the filter or as an additional level of treatment; it is used in both granular activated carbon and powder filters as well as local ceramic water filters. It is also commonly used as a preventive measure against the growth of a variety of bacterial colonies (especially Legionella) in hot water systems. In 2007 Silvestre-Rodriguez and his group studied the inhibition of pathogenic bacteria *Pseudomonas aeruginosa* and *Aeromonas hydrophila* with silver in tap water, with the aim of assessing the possibility of using silver as a secondary disinfectant to replace or reduce chlorine level. It was chlorinated water filtration (obtained from the groundwater source) with 106 bacteria cfu / mL were added silver nitrate concentration of 100 ug / l. Experiments were conducted at pH 7 and 9 at 24 ° C for each bacterial species and at 4 ° C for *P. aeruginosa*. In addition, 3 mg / L of humic acid was added to chlorinated tap water (to simulate the surface water source), and there was a significant reduction in the number of bacterial colonies (Silvestry-Rodriguez *et al*, 2007). Cunningham *et al*. (2008) also studied flow cytometry to examine the minimum inhibitor concentration (MIC) of silver nitrate on bacteria *E. coli*, with a view to considering the methodology used for water screening and sanitation, and they reported an inhibition of these bacteria at concentration ranging between 60 and 80 micrograms / liter (Snyder *et al*, 2008). Both of Pathak and Gopal (2012) assessed the effectiveness of silver ions against bacteria *E. coli*, a significant decrease was observed in the number of these bacteria at a concentration of 20 µg/ L. Nawaz *et al*. (2012) considered the effectiveness of silver (silver nitrate) in inhibiting *P. aeruginosa* and *E. coli* bacteria in rainwater supply, Samples were analyzed for microbial analysis every two hours for 14 hours after the application of silver therapy and then daily for a week to examine the regrowth. The results showed that *E. coli* did not regrow after 168 hours. Silver nanoparticles have been tested in a number of experimental treatment systems (POU), ionic silver has been examined for possible use as a secondary disinfectant in drinking water supply, and the effectiveness of silver ions (along with copper and chlorine) has also been investigated for use. In disinfection of swimming pools (Franci *et al*, 2015).

#### **2- Use silver bracelets only:**

Silver has a long and intriguing history of its use as an antibiotic in human health care; silver has been developed for use in wound care, orthopedic prostheses, reconstructive orthopedics, cardiac devices, catheters and surgical devices, and advances in biotechnology have allowed the integration of ionizing silver in fabrics for clinical use to reduce the risk of hospital-acquired infections and personal hygiene (Lansdown, 2006).

Silver has a clear scientific basis for its health benefits derived from electrical and thermal conductivity. The silver ions charged with positive charge create a conductive field that reflects electromagnetic radiation away

from the body, stimulating the body's natural conductivity, improving blood circulation, balancing body temperature, and giving general psychological comfort. The positively charged silver ions are also associated with negatively charged oxygen receptors in bacteria, which is why silver can resist harmful infection and disease, and researchers at the University of Southampton have demonstrated that wearing a specific type of silver ring can help relieve some of the symptoms of arthritis in Hands; benefits include not only helping to reduce pain, but also preventing excessive stretching of the joints of the fingers, which is common in those with rheumatoid arthritis (Adams *et al*, 2008).

Silver has been mentioned in many parts of the Old Testament, and has often been used as money for buying and selling, it was mentioned in the book of Genesis in the sale of the prophet Joseph in silver dirhams to the Egyptians:

“Then there passed by Midianites merchantmen; and they drew and lifted up Joseph out of the pit, and sold Joseph to the Ishmaelites for twenty pieces of silver: and they brought Joseph into Egypt” (Genesis, 37: 28).

But among the biblical verses in which silver is mentioned, there are two verses in the book of kings and the second in the book of the first Maccabees, where gold vessels were used for drinking instead of silver:

“And all king Solomon’s drinking vessels were of gold, and all the vessels of the house of the forest of Lebanon were of pure gold; none were of silver: it was nothing accounted of in the days of Solomon” (1Kings, 10: 28).

“Upon this he sent him golden vessels to be served in, and gave him leave to drink in gold, and to be clothed in purple, and to wear a golden buckle” (1Maccabees, 11: 58).

This is contrary to the aforementioned scientific fact which stated the importance of silver and not gold in the purification of drinking water and the disposal of bacterial contaminants in the water, which coincided with what Allah Almighty stated in the Holy Quran:

“And there will be circulated among them vessels of silver and cups having been [created] clear [as glass], Clear glasses [made] from silver of which they have determined the measure. Upon the inhabitants will be green garments of fine silk and brocade. And they will be adorned with bracelets of silver, and their Lord will give them a purifying drink”. (Holy Qur’an, Surat AlInsan: 15-18).and that the use of silver utensils and bottles for drinking, confirming that the Holy Qur’an is the miracle of our Holy Prophet.

#### **IV. IRON METAL: A COMPARATIVE SCIENTIFIC STUDY BETWEEN THE HOLY QURAN AND THE OLD TESTAMENT**

It is a non-noble metal, mentioned in the Holy Qur’an six times, and there is a surah from the Holy Qur’an as "Surat Al-Hadid", as well as God Almighty mentioned in the Surah "Al-Kahf" to make a dam that prevents the exit of people "Ya'joj and Ma'joj" in the world when the Almighty said:

“Bring me sheets of iron" - until, when he had leveled [them] between the two mountain walls, he said, "Blow [with bellows]," until when he had made it [like] fire, he said, "Bring me, that I may pour over it molten copper." (Holy Qur’an, Surat AlKahf: 96).

The Almighty said in Surat al-Hajj to hit the people of fire in hell, the Almighty said:

“And for [striking] them are maces of iron.” (Holy Qur’an, Surat AlHaj: 21).

As mentioned by God in the "Saba' and AlHadid" to show the benefits and use in the world life, to say:

“And We certainly gave David from Us bounty. [We said], "O mountains, repeat [Our] praises with him, and the birds [as well]." And We made pliable for him iron”. (Holy Qur’an, Surat Saba’: 10).

“We have already sent Our messengers with clear evidences and sent down with them the Scripture and the balance that the people may maintain [their affairs] in justice. And We sent down iron, wherein is great military might and benefits for the people, and so that Allah may make evident those who support Him and His messenger’s unseen. Indeed, Allah is Powerful and Exalted in Might.” (Holy Qur’an, Surat AlHadid: 25).

While the Almighty mentioned in Surat Qaf for the analogy because of the strength and rigidity of this metal, where the Almighty said:

“[It will be said], "You were certainly in unmindfulness of this, and We have removed from you your cover, so your sight, this Day, is “Iron”." (Holy Qur’an, Surat Qaf: 22).

In Surat AlIsra’, the mention of iron in it was a scientific fact representing a clear miracle, later known as the process of mineralization of fossils, which God summarized by saying:

“Say, Be you stones or iron” (Holy Qur’an, Surat AlIsra’: 50).

To learn the miracle of this verse, the following is the scientific truth behind this text as mentioned sober scientific research:

Fossils - that preserve soft organisms - provide crucial evidence of life history;

Usually only more corrosion-resistant substances are left of the organism, such as cellulose in plants, Chitin in insect, the compounds that contained silica in shellfish shells, and calcium compounds in animal bones. Mineralization may preserve remarkable details, especially from plants. Mining is based on acute geochemical gradients from decaying microbes. The incoming minerals, and the level of preserved detail (which may be subcellular), depend on a number of factors, including the nature of microbial activity, the amount of decay, and the availability of ions (Briggs, 2003).

Substitution occurs when water dissolves the original solid parts and replaces them with the mineral. This chemical action may occur slowly, resulting in the reproduction of the microscopic structures of the original organism; bones, snails and wood are usually well preserved in this manner, and the most common alternative minerals are calcite and silica, pyrite (iron) and hematite (iron oxides), (Arkell, 1957) snails are often replaced with silica, that is, they fossilize, and when the original hard parts are quickly replaced, they often lose all traces of their original structure, leaving the original shape, but Without details, mineralization occurs when groundwater that dissolves dissolved minerals seeps into microscopic pores and cavities in bones, wood, or veneers, producing absorbed minerals that contain rock or fossils that still contain a large amount of native solids, and the bones, teeth, and many other organisms are



preserved. Fossil wood in the Arizona Petrified Forest is a popular example of conservation, and fossil teeth and bones in South Dakota and Nebraska are a common example of this type of fossilization, as well as Jurassic dinosaur bone deposits in Utah (Petrovich, 2001).

One of the cephalopods, *Kosmoceras Ammonit*, mineralized with iron since the Jurassic period, was found in the Volga River region of Russia. (Courville and Crônier, 2005).

Iron is contained in a good number of verses in the Old Testament, and often symbolizes strength in many places: “the son of a Danite woman, his father a Tyrian. He is skilled at working in gold, silver, bronze, iron, precious stones, and wood; in purple, blue, and crimson yarn and in fine linen; and at engraving and designing whatever will be required of him, alongside your craftsmen and the craftsmen of my lord, your father David.” (II Chronicles, 2: 13).

However, if we note the words of Joshua in the following two verses:

“They burned down the city and everything in it. But the silver and gold and the objects of copper and iron were deposited in the treasury of the House of the LORD.” (Joshua, 19: 6).

We found that the biblical text placed a precious place for iron metal like gold and silver, as evidence that they kept iron pots with gold, silver and copper in the “treasury of the house of the Lord”; The biblical text in the book of Isaiah contradicts the foregoing, placing iron slightly above the stones;

“Instead of copper I will bring gold, Instead of iron I will bring silver; Instead of wood, copper; And instead of stone, iron. And I will appoint Well-being as your government, Prosperity as your officials.” (Isaiah, 60: 16).



This is clear evidence that these verses are not from the Word of God, and by comparison, we find that the Holy Qur'an has spoken accurately about iron metal, as it contains the benefits for people in the world life, and a hammer suppress the people of fire in the "Hereafter", and God did not compare it with any metal of precious metals, It has been linked to an ongoing scientific phenomenon, the phenomenon of mineralization, all this unequivocally proves that the Koran is the word of God and the miracle of Prophet Muhammad.

## V. CONCLUSION

This study included the minerals mentioned in the Holy Qur'an, which has a scientific study with a comparison with what was mentioned in the Old Testament, and during our journey between the introduction of the research and its conclusion, we find the following:

1. The mentioning of gold metal first before the silver metal in the Holy Qur'an was in accordance with the basic properties of gold in the periodic table of chemical elements in which the statistics of gold prevailed over silver, while we see the Bible mentioned the gold before silver in parts of the Old Testament and other places in the same Books, which shows the accuracy of the Holy Qur'an in the mention of information and thus confirms that it is a divine miracle.

2. In Holy Qur'an, all drinking utensils and bottles in paradise were associated with silver metal, not gold, this is confirmed by modern science of silver possessing properties that inhibit the growth of microbes and its multiple uses to purify drinking water. It is also used to kill bacteria on the skin, as well as other therapeutic uses. This is a form of scientific miracle that has been confirmed for more than a thousand years, and as compared with the Old Testament, it is opposed to the scientific facts discovered in this regard as it focuses on the drinking in the bottles made from gold and not silver.

3. Iron has been mentioned in the Holy Qur'an, it was used in industry and in the arming of the "Dhul-Qarnain" dam which he built to prevent the exit of "Ya'joj and Ma'joj" people, as mentioned by God in suppressing the people of fire, which in both subjects symbolizes the intensity and hardness, the Holy Qur'an was accurate in mentioning this metal did not make it nor in any place of the Qur'an with silver and gold, because of the vast difference in value between them, and as compared to what was mentioned in the Old Testament, we find that iron has been associated in most of the verses of the Torah, which mentioned the minerals so that it progressed on gold and silver in many of the precious metals stored by the children of Israel in the treasury with gold and silver, and thus this study was reflected the greatness and accuracy of the Holy Qur'an in mentioning information, which indicates that it is the word of God and the miracle of his Prophet Muhammad.

4. The mention of iron metal in the Holy Qur'an has been associated with a biological scientific phenomenon that occurs in fossils over a period of millions of years, namely the phenomenon of mineralization: the replacement of soft tissue from bones or plant tissue with silica "as stone" or iron to become fossils of Iron, or other minerals to take the form of those tissues or organisms, as a result of the rapid burial of these organisms during the emergent climatic events that occur suddenly to a particular ecosystem, God has told about this phenomenon more than a thousand years before the discover this fact. This is another clear example of Scientific miracle of the Holy Qur'an.

## REFERENCES

1. Adams, J.; Metcalf, Ch.; Macleod, C.; Caroline, S.; Burridge, J.; Cooper, C. and Cox, N. Three-Dimensional Functional Motion Analysis of Silver Ring Splints in Rheumatoid Arthritis, (2008). *Rheumatology*, Vol. 47, Issue: 2, P. ii151–ii157
2. Fikry A., Explanation of the Bible - The Old Testament, St. Takla Haymanot the Ethiopian Pastor: Coptic Orthodox Church - Alexandria - Egypt <https://st-takla.org>.
3. Arkell D., Mesozoic Ammonoidea. Treatise on Invertebrate Paleontology, (1957). Part L. Geological Soc. of America and Univ. Kansas Press.
4. Briggs, D., The role of decay and mineralization in the preservation of soft-bodied fossils, 2003. *Annual Review of Earth and Planetary Sciences*.
5. Cobley, C., Chen, J., Cho, E., Wang L., & Xia Y. Gold nanostructures: A class of multifunctional materials for biomedical applications, (2011). *Chem. Soc. Rev.*
6. Courville, Ph. and Crônier, C., Diversity or disparity in the jurassic (upper callovian) genus kosmoceras (ammonitina): a morphometric approach, (2005). *J. of Paleontology*.
7. Cunningham, M. A., Snyder, E., Yonkin, D., Ross, M., and Elsen, T. Accumulation of deicing salts in soils in an urban environment, (2008). *Urban Ecosystems*.
8. Franci, G., Falanga, A., Galdiero, S., Palomba, L. Rai, M., Morelli, G. and Galdiero, M., Silver Nanoparticles as Potential Antibacterial Agents, (2015). *Molecules*, 20.
9. Giasuddin, A., Jhuma, K. & Mujibul, A. Use of Gold Nanoparticles in Diagnostics, (2012). *Surgery and Medicine. Bangladesh: Med. Biochem.*
10. Holleman, A.; Wiberg, N. and de Gruyter, *Lehrbuch der Anorganischen Chemie*, (1985), 33. edition.
11. Hunter, D., Asthma caused by the complex salts of platinum, (1945) *British journal of industrial medicine*.
12. Kleps, I., Danila, M., Angelescu, A., Miu, M., Simion, M., Ignat, T., Bragaru, A., Dumitru, L., & Teodosiu, G., Gold and Silver/Si nanocomposite layers, (2007). *Materials Science and Engineering*.
13. Lansdown, A., Silver in health care: antimicrobial effects and safety in use, (2006). *Curr Probl Dermatol*.
14. Meija, J., Atomic weight of the elements (IUPAC Technical Report), (2016). *Pure and Applied Chemistry*, 88 (3).
15. Nawaz M, Han MY, Kim T, Manzoor U, Amin M., Silver disinfection of *Pseudomonas aeruginosa* and *E. coli* in rooftop harvested rainwater for potable purposes, (2012). *Sci Total Environ*.
16. Parida, U., & Nayak, P., Biomedical Applications of Gold Nanoparticles: Opportunity and Challenges, (2012). *World Journal of Nano Science & Technology*.
17. Pathak, S. and Gopal, K., Evaluation of bactericidal efficacy of silver ions on *Escherichia coli* for drinking-water disinfection, (2012). *Environ Sci Pollut Res*.
18. Petrovich, R., Mechanisms of fossilization of the soft-bodied and lightly armored faunas of the burgess shale and of some other classical localities, (2001). *American Journal of Science*.
19. Scobczak, A., Dagmara, M., Malgorzata, Z., & Zbigniew, W. Characterization of Gold Nanoparticles for various Medical Application, (2011), *Journal of Nanomaterials and Biostructures*.
20. Silvestry-Rodriguez N, Bright KR, Uhlmann DR, Slack DC, Gerba CP, Inactivation of *Pseudomonas aeruginosa* and *Aeromonas hydrophila* by silver in tap water, (2007). *J Environ Sci Health Part A*.