



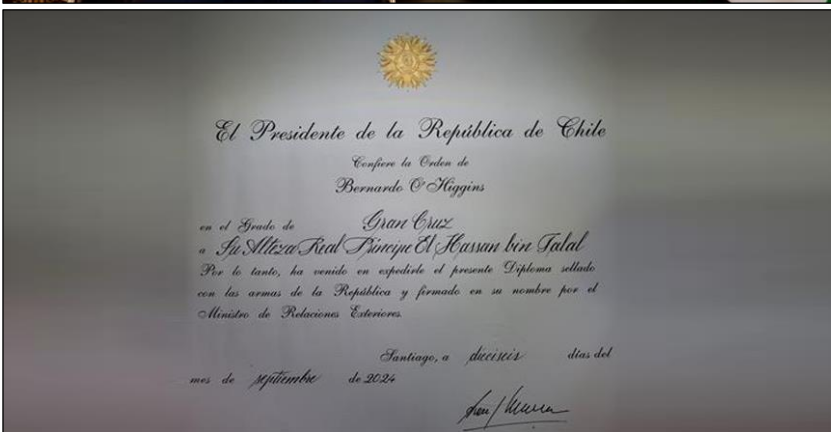
Newsletter

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PRINCE EL HASSAN BIN TALAL AWARDED BERNARDO O'HIGGINS MEDAL OF CHILE*



Amman - On Sunday, 8 December 2024, Chile honoured HRH Prince El Hassan Bin Talal with the "prestigious" Bernardo O'Higgins Medal, recognising his outstanding contributions to community development, human dignity advocacy, interfaith dialogue, and his efforts to raise awareness about water scarcity and clean energy.

The award was presented by Chile's Ambassador to Jordan Jorge Tagle during a ceremony attended by IAS President,

Prof. Adnan Badran and Spain's Ambassador to Jordan Miguel de Lucas, and Director of UNRWA Operations in Jordan Olaf Becker.

Prince El Hassan expressed his "deep" gratitude for the recognition, emphasising the importance of kindness, authenticity, and cultural understanding.

He also underscored the need for mutual respect, dialogue, and identifying common ground to bridge differences among nations and peoples.

He expressed pride in the "longstanding" relations between Jordan and Chile, which have flourished over the past 70 years.

Tagle highlighted that the Bernardo O'Higgins Medal is awarded to foreign nationals who have made exceptional contributions in areas such as arts, sciences, education, industry, trade and humanitarian efforts.

* Source: <https://jordantimes.com/news/local/prince-el-hassan-awarded-bernardo-obiggins-medal-chile>

ARTIFICIAL INTELLIGENCE (AI) FOR HUMANITY

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AI is transforming our world into digitalization. There is no doubt that AI will open new opportunities and release potentials of science and scientists combined for future life of humanity, particularly in meeting the challenge of cheap clean energy and meeting water shortages and ensuring food security for future generations under a changing ecosphere. This will undoubtedly contribute to better life of all citizens in the world.

Progress of scientific research blended with AI will offer to global solutions of addressing floods, wildfires, drought and food insecurity, poverty, climate change and drive progress of achieving fully the indicators of SDGs 2030.

Economic Opportunity of AI: (as cited in UN report of the AI advisory body, Sept. 2024)

- Since the Industrial Revolution, a handful of innovations have dramatically accelerated economic progress. These earlier “general-purpose technologies” have reshaped multiple sectors and industries. The last major change came with computers and the digital age. These technologies transformed economies and increased productivity worldwide, but their full impact took decades to be felt.

- Generative AI is breaking the trend of slow adoption. Experts believe its transformative effects will be seen within this decade. This quick integration means new developments in AI could rapidly reshape industries, change work processes and increase productivity. The rapid adoption of AI may thus transform our economies and societies in unprecedented ways.
- The economic benefits of AI may be considerable. Although it is difficult to predict all the ramifications of AI on our complex economies, projections indicate that AI could significantly increase (GDP), with relevant impacts across almost all sectors. For businesses, especially micro and small and medium-sized enterprises, AI can offer access to advanced analytics and automation tools, which were previously only available to larger corporations. The wide applicability of AI suggests that AI could be a general-purpose technology. As such, AI could enable productivity for individuals, small and large businesses, and other organizations in sectors as diverse as retail, manufacturing and operations, health care and the public sector, in developed and developing economies. They will require broad adoption within and across sectors; application in productivity-enhancing uses; and AI that makes workers more productive and ushers in new economic activities at scale. They will also require investment and capital deepening, co-innovations, process and organizational changes, workforce readiness and enabling policies.

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Opportunities:

- New products and business models - including leapfrogging solutions, solutions for bottom of pyramid individuals, and easier access to credit.
- Automation of core business processes - leading to lower product costs.
- Human capital development.
- Innovation in government services.

Risks:

- Obsolescence of traditional export-led path to economic growth.
- Increased digital and technological divide.
- Transformation of job requirements and disruption of traditional job functions.
- Privacy, security and public trust.

- Nevertheless, while AI can enhance productivity, boost international trade and increase income, it is also expected to impact work. Research suggests that AI could be assistive to workers in some cases, and job displacement in others cases. Research, including by the International Labour Organization (ILO), suggests that in the foreseeable future, AI is likely to be more worker-assistive than worker-displacing.
- Research has also shown that when it occurs, job displacement is expected to occur differently in economies at different stages of development. While advanced economies are more exposed, they are also better prepared to harness AI and complement their workforce. Low- and middle-income countries may have fewer capabilities to leverage this technology. Additionally, the integration of AI in the workforce may disproportionately affect certain demographics, with women potentially facing a higher risk of job displacement in some sectors.
- Without focused and coordinated efforts to close the digital divide, AI's potential ability to be harnessed in support of sustainable development and poverty alleviation will not be realized, causing large segments of the global population to remain disadvantaged in the swiftly changing technological environment, with exacerbation of existing inequalities.
- To successfully integrate AI into the global economy, we need effective governance

that manages risks and ensures fair outcomes. This means among other options creating regulatory sandboxes for testing AI systems, promoting international cooperation on standards and setting up mechanisms to continuously evaluate AI's impact on labor markets and society. Apart from sound national AI strategies and international support, it specifically requires:

- 1. Skills development:** Implementing education and training programs to develop AI skills across the workforce, from basic digital literacy to advanced technical expertise, to prepare workers for an AI-augmented future.
- 2. Digital infrastructure:** Significant investment in digital infrastructure, especially in developing countries, to bridge the AI divide and facilitate widespread AI adoption.
- 3. Workplace integration:** Leveraging social dialogue and public-private partnerships for managing AI integration in the workplace, ensuring worker participation in the process and protecting labour rights.

Value chain considerations: Ensuring decent work conditions along the entire AI value chain, including often overlooked areas, such as data annotation and content moderation, for equitable AI development.

A PHYTOCHEMICAL ANALYSIS AND THE PHARMACOLOGICAL IMPLICATIONS OF THE SEAGRASS *HALODULE UNINERVIS*: AN OVERVIEW[∇]

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Abstract:

Seagrasses are marine angiosperms that inhabit tropical and subtropical regions around the world. They play a vital role in marine biodiversity and the ecosystem by providing habitats and food for several marine organisms, stabilizing sediments, and improving water quality. *Halodule uninervis* from the family *Cymodoceaceae* has been used in traditional folk medicine for the treatment of many ailments. Additionally, several identified bioactive metabolites have been shown to contribute to its pharmacological activities, including anticancer, anti-inflammatory, and antioxidant. As such, *H. uninervis* could contribute to the development of novel drugs for various diseases. This review aims to compile the phytochemical composition and pharmacological activities of *H. uninervis*. Furthermore, details about its botanical characteristics and ecological significance are also discussed.

By providing valuable insights into the role of *H. uninervis* in both the marine ecosystem and biomedicine, this review helps to highlight its potential as a therapeutic agent for future drug discovery and development.

Keywords: *Halodule uninervis*; seagrass; marine ecosystem; herbal medicine; bioactive metabolites; antioxidant; antimicrobial; anticancer; antidiabetic; green nanotechnology

Citation: Wehbe, N., Bechelany, M., Badran, A., Al-Sawalmih, A., Mesmar, J. E., & Baydoun, E. (2024). A Phytochemical Analysis and the Pharmacological Implications of the Seagrass *Halodule uninervis*: An Overview. *Pharmaceuticals*, *17*(8), 993. <https://doi.org/10.3390/ph17080993>

[∇] Link to the whole publication: <https://www.mdpi.com/1424-8247/17/8/993>

BIOCHAR DERIVED FROM CITRONELLA AND OREGANO WASTE RESIDUES FOR REMOVAL OF ORGANIC DYES AND SOIL AMENDMENT[∇]

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Abstract: The exponential growth and prominence of the essential oil industry was associated with the generation of large amounts of plant residues which, if not managed properly, present an environmental threat due to their ability to contaminate soil and water systems. This study focuses on the valorization of residues generated from oregano and citronella plants following essential oil extraction. To tackle this challenge, we investigated the potential of biochar of oregano and citronella residues for removing methyl orange dye, a common environmental pollutant, and assessed their phytotoxicity for potential applications as soil amendment. The biochar was produced at different pyrolysis temperatures (300 °C and 400 °C) to study the effect of temperature on the various physicochemical properties of the biochar. Several analytical techniques were used to characterize the generated biochar including Fourier Transform infrared (FTIR) spectroscopy, Scanning Electron Microscopy (SEM), X-ray energy dispersive (EDX) spectroscopy, and X-ray diffraction (XRD) spectroscopy. The efficiency of oregano and citronella biochars produced at different temperatures as soil amendment was evaluated by examining the germination and root development of *Lepidium sativum* seeds commonly known as garden cress. The control group displayed strong performance with 90–100 % germination and 3.54 cm root length. Oregano biochar obtained by pyrolysis at 300 °C (BOR-300) was toxic to seed growth, while the biochar fabricated at 400 °C (BOR-400) improved germination but fell short of the control. On the other hand, citronella biochar generated at 300 °C (BCR-300) and 400 °C (BCR-400) resulted in better germination compared to BOR, but still lagged behind the control group. Furthermore, our results demonstrated that citronella biochar (BCR) at 400 °C effectively removed 88.8 % of the methyl orange dye. Conversely, the combination of oregano biochar (BOR) and citronella biochar (BCR) at 300 °C did not substantially affect the dye removal efficiency. In summary, applying BOR and BCR produced at 400 °C to soil appears environmentally safe but does not significantly enhance plant growth. These results highlight the critical roles played by biochar type and pyrolysis temperature in shaping the application process.

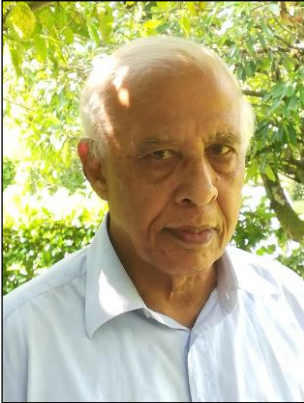
Keywords: Citronella, Oregano, Biochar, Pyrolysis, Water treatment, Methyl orange removal, Adsorption

Citation: Rammal, M. et al. (2024). 'Biochar derived from Citronella and oregano waste residues for removal of organic dyes and Soil Amendment', *Current Research in Green and Sustainable Chemistry*, 9, p. 100433. <https://doi.org/10.1016/j.crgsc.2024.100433>

[∇] Link to the whole publication: <https://www.sciencedirect.com/science/article/pii/S2666086524000389>

PHENOMENON OF SUPERFLUIDITY

Mohammed Asghar[^] FLAS



Abstract: This document treats the conditions for superfluidity of Helium-4 and Helium-3 fluids, and their salient properties.

1. Introduction.

Superfluidity is the characteristic property of a fluid with zero viscosity which therefore flows without any loss of kinetic energy. When stirred, a superfluid forms vortex that continue to rotate indefinitely.

Helium-4 and He-3 gases as fluids have been investigated extensively for their superfluidity. However, the quantum mechanical effects on these two gases are significantly different, because Helium-4 with two protons, two neutrons and two electrons with a total spin $S=0$, is a boson, but Helium-3 with two protons, one neutron and two electrons with a total spin $S=1/2$, is a fermion. The boson He-4 and the fermion He-3 due to these different quantum mechanical properties, have very different superfluidity temperatures.

2. Helium-4.

a. Thermodynamics of He-4.

Fig. 1, displays the (P-T) phase diagram for Helium-4. The λ -line separates the normal He-4 region He-I from the superfluid He-4 region represented by He-II. Moreover, the slope of the λ -line shows that the He-4 temperature T_s of transition to superfluid depends on the pressure P, and for a P of one atmosphere, the $T_s = 2.17^\circ\text{K}$. The superfluid He-4 acts like a non-viscous fluid with a density of 125 g/ liter, and a critical velocity about 20 cm /s. Landau's quasi-

particle- based theory analyses the underlying physics of Helium-4 fluid and superfluid (1).

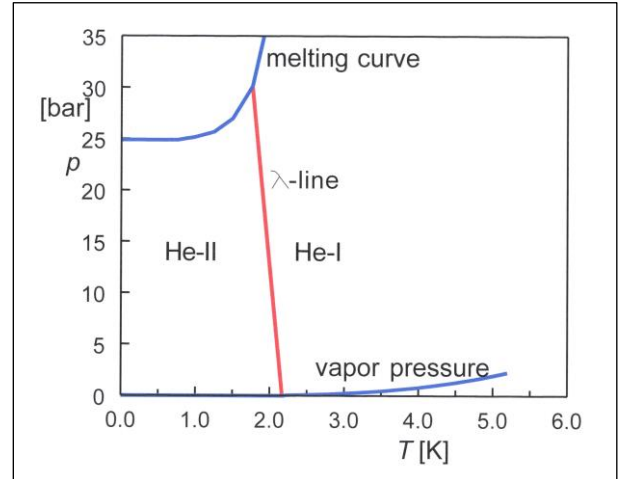


Figure 1. (P-T) Phase diagram of He-4 with the λ -line, (1).

Normally, He-4 gas is a mixture of normal component and superfluid component. Fig.2, gives the temperature dependence of the relative superfluid and the normal density components ρ_s / ρ and ρ_n / ρ as a function of temperature T. At $T = 2.2^\circ\text{K}$ most of He-4 consists of the normal component, but at $T = 1.0^\circ\text{K}$ most of it is superfluid.

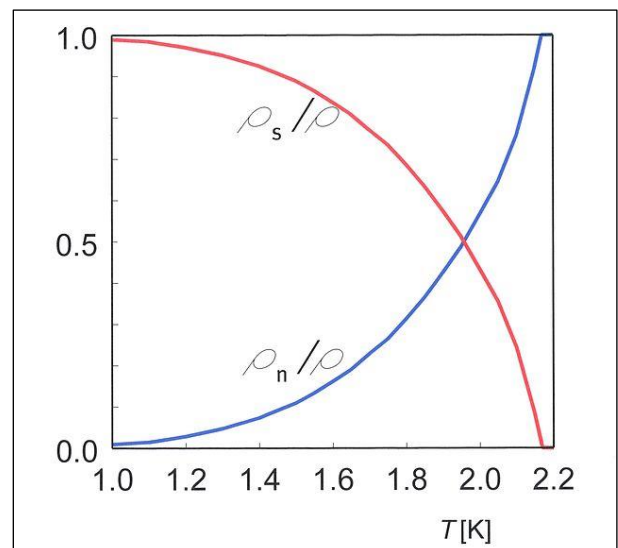


Figure 2. Temperature dependence of the relative superfluid and normal density components ρ_n / ρ and ρ_s / ρ of He-4 as a function of temperature T, (1).

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The dispersion curve of superfluid helium, Fig. 3, is non-monotonic and consists of three monotonic parts. Because of this, the superfluid helium has three quite distinct components of phonons R^- rotons and R^+ rotons, each component corresponds to a monotonic region of the curve.

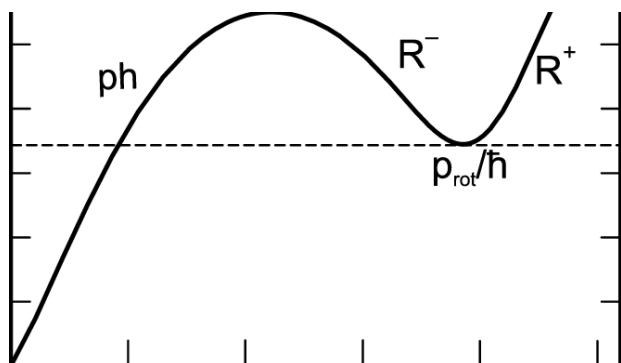


Figure 3. Dispersion curve of superfluid Helium-4 including the still little understood roton regions, (1).

b. Salient properties of superfluid He-4.

- * The He-4 fluid below the λ -point is composed of superfluid and normal Helium-4 components whose relative amount depends on its temperature (Fig.1). The superfluid component has zero viscosity and zero entropy.
- * The Superfluid Helium-4 without viscosity and with a critical velocity of about 20 cm/s, flows relatively up easily up the wall of containers, over the top, and down to the same level as the surface of the liquid in the container, in a siphon effect. However, the flow through a nanoporous membrane becomes restricted, if the pore diameter is less than 0.7 nm suggesting the unusual hydrodynamic properties of superfluid He-4 arise at a larger scale than the classical liquid Helium-4.
- * When a container with superfluid He-4 is rotated at speeds below the first critical angular velocity, the fluid remains stationary. Once the first critical angular is reached, the superfluid forms a vortex. The vortex strength is quantized, that is, a superfluid can only spin at certain “allowed” values. If the rotation speed is increased more and more vortices are formed which arrange themselves in patterns like the Abrikosov lattice in a superconductor.

3. Helium-3.

a. Cooper pairing of two Helium atoms.

In the case of Helium-4, which is a boson, the superfluidity akin to the Bose-Einstein condensation, appears at $T_s = 2.17^\circ \text{K}$. However, Helium-3 atom is a fermion, and there is a need to bosonize the system through Cooper pairing of two Helium-3 atoms like the Cooper pairing of two electrons for the BCS theory-based superconductivity, through the coupling of an electron with the phonons of a deformed metal positive-ions based lattice, where a positive charge surrounding the interacting electron transforms it into a positively charged particle that interacts and pairs with a normal electron. However, two Helium-3 atoms cannot pair up in the s-wave state with zero angular momentum since the hard-core repulsion (Fig.4) ensures that this wavefunction vanishes for small interatomic distances. However, with an angular momentum $l = 2$, the corresponding wavefunction extends to a much larger interatomic distance covering the attractive part of the curve due to the Van der Waals attractive interaction and the two Helium-3 atoms can undergo the Cooper pairing. Since this pairing strength is relatively small and to avoid thermal agitation problem, Helium-3 must be cooled to very low temperature of $T_s = 0.0025^\circ \text{K}$ to be superfluid at normal pressure.

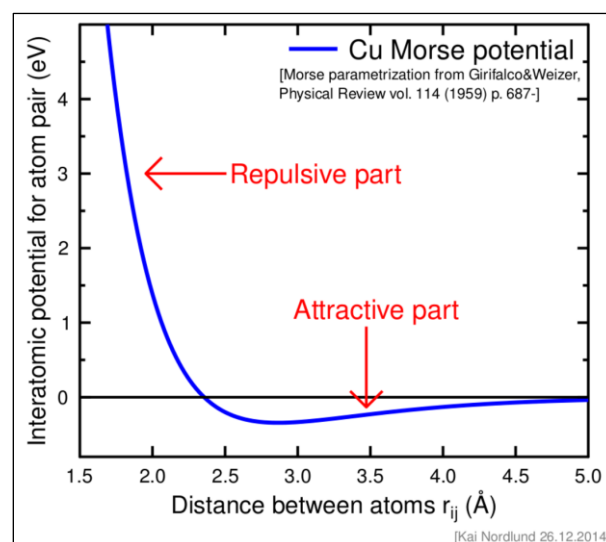


Fig. 4, Interatomic potential of Helium-3 atoms, (1).

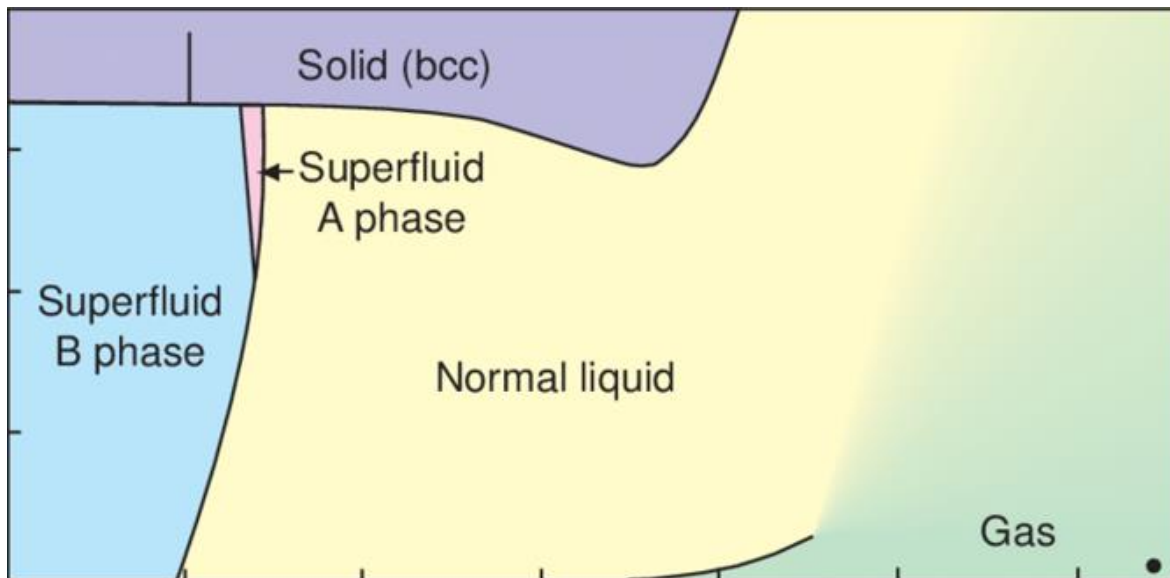


Figure 5. (P-T) phase diagram for Helium-3, (1).

b. Thermodynamics of Helium-3

Fig. 5, presents the (P-T) phase diagram of Helium-3, where a slightly curved vertical line separates the normal liquid region from the superfluid region. The superfluid region itself has two sub-regions of “A phase” and “B Phase”. The spin susceptibility of the A phase is temperature independent and is close to its value in the normal state. In the B phase, the susceptibility approaches a finite value as the temperature approaches zero. This finite value is nearly one third of the normal state value. Moreover, the profile of the separation line indicates that the Helium-3 superfluidity temperature T_s increases slightly with pressure.

c. Salient properties of Helium-3.

The superfluid Helium-3 has similar salient properties as the Superfluid Helium-4 presented above in the Helium-4 section.

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ROLE OF FUTURE TECHNOLOGIES, AGRICULTURAL TECHNOLOGY AND SCIENTIFIC INNOVATION

SCIENTIFIC STUDY: PREPARATION AND STORAGE OF PLANT EXTRACTS OF GROUND OIL SEED POWDER OF IRAQI DATE PALM

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Abstract: This study was conducted for the purpose of extracting date pit oil (*Phoenix dactylifera* L.) from the pits of three local Iraqi varieties, namely Al-Zahdi, Al-Halawi, and Al-Sair, using the saxolite method. The

effect of storage at 25°C for a period between 14 and 40 days on the physical and chemical properties of the extracted oils was studied. The results of storage tests for the extracted oil at a temperature of 25°C for 14 and 40 days showed an increase in the properties of (viscosity, acidity number, peroxide number, saponification number and insoluble substances). For saponification) and a decrease in characteristics (Refractive index, specific gravity, melting point, and iodine number).

Keywords: oil storage, ground date pit oil, varieties, *Phoenix dactylifera* L. pits, ground Iraqi date palm pits, study of physical and chemical characteristics after oil storage.

Introduction:

Date pits contain protein, fats, fibres, mineral salts, and carbohydrates in percentages ranging between 5-7.7-10.10-20 and 1-2.80-75%, respectively. Date pits are also called pits, stones, kernels, seeds, and they are the waste of the production of many industries based on the technical transformation of dates. Large quantities of pits can be collected from date factories or from production waste.

A little research has been conducted on date pits, especially on their chemical composition, as follows: Moisture: 5-10%, protein 5-7%, oils 7-10%, crude fibers 10-20%, carbohydrates 55-65%, and ash 1-2%. [1] pointed out the uses of date palm pits in many fields, including preparing

charcoal for use in crafting jewelry and using it as fuel in traditional copper bleaching furnaces. The pits are used as animal fodder after being crushed or soaked in water because they are a rich source of carbohydrates, fat, and protein, and some poor people use them as food. Cook them as you cook legumes to benefit from their high content of essential nutritional components, in addition to their fiber content, which protects the body from the symptoms of poor digestion, constipation, and colon problems.

The oil extracted from the pits, which amounts to 8%, was exploited for human consumption and in the soap industry. It was also used as a medical preparation in the treatment of some kidney and urinary tract diseases, after roasting them, then grinding them and boiling them with water. The oil extracted from them was also used as an ointment to treat rheumatism, gout, and joint pain. Ground seeds mixed with rose water to treat the eyes and used after softening as an alternative to kohl. Iraq is considered the original homeland of the date palm, especially the Shatt al-Arab and the head of the Arabian Gulf, from which it moved to all regions with suitable weather [2, 4, 7, 13, 14].

The dwelling. Palm trees occupy an important position in human life, especially in hot and dry regions, because their fruits represent a high-energy food source and an industrial, commercial and agricultural source. Dates are one of the most important fruit crops in Iraq and the Arabian Peninsula, and you rarely find a home without dates, as they are a fruit, medicine, drink and... It is a sweet for the rich and the poor alike [5,3,7,17,15] and it is an ideal food sufficient for humans. Dates occupy fifth place on the list of tropical and subtropical fruits, after citrus fruits, mango, bananas and pineapples. They also occupy the top spot on the list of dried fruits such as raisins and figs.



Picture 1 - Photo of Iraqi dates powder
(Powder of Hilawi date seeds)

The Theoretical Framework Of The Study: Objectives Of The Study :

This Study Seeks To Achieve The Following Objectives:

1- This study was conducted for the purpose of extracting date pit oil (*Phoenix dactylifera* L.) from the pits of three local Iraqi varieties, namely Al-Zahdi, Al-Halawi, and Al-Sair, using the Soxhlet method.

2- The effect of storage at 25°C for a period between 14 and 40 days on the physical and chemical properties of the extracted oils was studied. The results of storage tests for the extracted oil at a temperature of 25°C for 14 and 40 days showed an increase in the properties of (viscosity, acidity number, peroxide number, saponification number and substances). Unsaponifiable) and a decrease in properties (refractive index, specific gravity, melting point, and iodine number).

The Importance Of Studying :

The importance of this study lies in the scientific study of the preparation and storage of plant extracts of ground Iraqi date palm kernel oil.

Study structure:

The first topic:

First/Materials and work methods:

1- Storing oil:

The effect of storing the extracted oil at a temperature of 25°C for (40.14) days on its physical and chemical properties was studied.

2- Oil extraction:

The ground oil of the ground date pits of the three varieties of dates (Zahdi, Al-Halawi, and Al-Sayer) was extracted using a petroleum ether solvent with a boiling point (40-60 °C) and using a Soxhlet device. According to what was stated in (Pearson, 1971), 10 grams of ground dry date pits

were taken (and removed). Moisture from it before the extraction process so that the efficiency of the solvent in extraction remains high and does not mix with moisture) and I placed it in the thimble and placed a piece of fat-free cotton over the sample inside the thimble to the inside of the siphon. I filled the beaker with a sufficient amount of solvent (250 ml) so that this amount is sufficient to fill the siphon. The extraction began for 6 hours until the solvent in the siphon was colorless and free of any yellowing at the end of the extraction. He took the beaker and evaporated the solvent in it, then dried it in an oven until the weight was constant. After the process of evaporating the solvent, the oil was collected in dry glass containers and preserved by refrigeration. The oil produced in this way is known as crude oil. The extracted oil is transferred to the baker for the purpose of studying its properties.

Results And Recommendations:

The Effect Of Storage On The Physical Properties Of Date Pit Oil:

The table (Table 1) shows the effect of temperature and duration of storage on the values of the physical properties of date pit oil. It is noted that the specific gravity of date pit oil reached (0.9146), the refractive index (1.4403) and the melting point (15.4)°C decreased with increasing storage period, while it is noted that the value The viscosity of Al-Zahdi date pit oil increased (18.50) centipoise. It is also noted that the values of Al-Halawi date pit oil decreased for both the specific gravity (0.9208), the refractive index (01.451), and the melting point (17.2) C. It is noted that the value of the viscosity of Al-Halawi date pit oil increased (20.51) It is also observed that the values of Al-Sayer date pit oil decreased in terms of specific gravity (0.9208), refractive index (1.4574), and melting point (19.3) C, while it was noted that the viscosity value of Al-Sayer date pit oil increased (20.42) centipoise at a temperature of 25 degrees. C and storage period of 40 days. The results of the statistical analysis indicated that there were significant differences between the types of oils studied at the probability level ($p < 0.05$), and the results of the statistical analysis indicated that there were no significant differences at the probability level ($p < 0.05$) for the color degree values, as a result of the influence of the date varieties and the type of treatment on The degree of yellow color and the degree of red color for the studied date pit

oils, and the duration of storage does not affect the appearance of the color during storage, as we note that the value of the color degree for Al-Zahdi pit oil reached (yellow 20, red 0.1), for Al-Halawi pit oil (yellow 15, red 0.1), and for Al-Sayer pit oil. (yellow 20, red 0.2), as for the refractive index value, and in comparison with the types of date pit oil studied, it was found that the refractive index value of Al-Zahdi date pit oil at a temperature of 25 °C and a storage period of (14) days in a row was higher than the refractive index value, as it reached (1.4399) at a temperature of 25°C and a storage period of (40) days, and in comparison with the Halawi date pit oil variety, it was found that the refractive index value of the Halawi date pit oil at a temperature of 25°C and a storage period of (14) days was higher than the refractive index value, as it reached (01.450).) at a temperature of 25°C and a storage period of (40) days.

In comparison between the types of date pit oil studied, it was found that the value of the specific gravity of Al-Zahdi date pit oil at a temperature of 25°C and a storage period of (14) days was higher than the value of the specific gravity, as it reached (0.9144) at a temperature of 25°C and a storage period of (40) days. In comparison, With the Halawi seed oil variety, it was found that the value of the specific gravity of the Halawi date pit oil at a temperature of 25°C and a storage period of (14) days was higher than the value of the specific gravity, as it reached (0.9201) at a temperature of 25°C and a storage period of (40) days. To compare with Al-Sayer date pit oil, it was found that the value of the specific gravity of Al-Sayer date pit oil at a temperature of 25°C and a storage period of (14) days was higher than the value of the specific gravity, which reached (0.9202) at a temperature of 25°C and a storage period of (40) days. As for a comparison with Al-Sayer date pit oil, it was found that the refractive index value of Al-Sayer date pit oil at a temperature of 25°C and a storage period of (14) days was higher than the refractive index value, as it reached (1.4573) at a temperature of 25°C and a storage period of (40). day. As for the melting point value, and in comparison with the studied varieties of date pit oil, it was found that the melting point value of Al-Zahdi date pit oil at a temperature of 25°C and a storage period of (14) days was higher than the melting point value at a temperature of 25°C and a storage period of (40).) day, as it reached (15.3) C. In comparison

with the Halawi date pit oil variety, it was found that the melting point value of Halawi date pit oil at a temperature of 25 C and a storage period of (14) days was higher than the melting point value at a temperature of 25 C and a storage period of (40).) day, as it reached (17.1) C. As for a comparison with Al-Sayer date pit oil, it was found that the melting point value of Al-Sayer date pit oil at a temperature of 25 C and a storage period of (14) days was higher than the melting point value at a temperature of 25 C and a storage period. (40) days, when it reached (19.2) C. The decrease in specific gravity, refractive index, and melting point is attributed to the fact that the temperature of storage led to the oxidation of the double bonds of fatty acids [2,9,12,13,14]. As for the value of viscosity, in comparison with Varieties of date pit oil studied. It was found that the viscosity value of Al-Zahdi date pit oil at a temperature of 25°C and a storage period of (14) days was less than the value of the viscosity at a temperature of 25°C and a storage period of (40) days, as it reached (18.51) centipoise, compared to the variety Halawi pit oil, as it was found that the viscosity value of Halawi date pit oil at a temperature of 25°C and a storage period of (14) days was less than the viscosity value at a temperature of 25°C and a storage period of (40) days, as it amounted to (20.55) centipoise either in comparison with... Al-Sayer date pit oil was classified as it was found that the viscosity value of Al-Sayer date pit oil at a temperature of 25°C and a storage period of (14) days was less than the viscosity value at a temperature of 25°C and a storage period of (40) days, as it reached (20.52) centipoise. The reason for this is that the temperature of storage led to the oxidation of the double bonds of fatty acids [2,9,12,13,14].



Picture 2 - Date seed oil.

The Effect Of Storage On The Chemical Properties Of Date Pit Oil:

Table (2) shows the effect of temperature and storage duration on the chemical properties of stored date pit oil, as we observe them for ascetic (acidity number, free fatty acids FFA%, peroxide number, iodine number, saponification number) (41.2 mg KOH/g oil, 0.142%, 1.70 mEq/kg oil, 47.30 mg/100 g oil, 221.65 mg/g oil) respectively, while for Halawi date pit oil (0.94 mg KOH/g oil, 0.133%, 1.71 mEq/kg oil, 49.41 mg/100 g oil, 218.21 mg/g oil) respectively, and for Al-Sayer date pit oil (0.60 mg KOH/g oil, 0.126%, 1.72 mEq/kg oil, 52.30 mg/100 g oil, 0208.3 mg/g oil) respectively, at a temperature of 25°C. And a storage period of (14) days. By comparing the types of date pit oil studied with different storage periods, it was found that the pH value of Al-Zahdi date pit oil at a temperature of 25°C and a storage period of (14) days was less than the value of the pH value at a temperature of 25°C and a storage period of (40).) on a day when it reached (1.25) mg KOH/g of oil, and the Al-Halawi date pit oil was less than the value of the acidity number value, as it reached (0.95) mg KOH/g of oil. As for Al-Sayer core oil, the pH value was higher, reaching (0.70) mg KOH/g of oil. We notice an increase in the value of the acidity number as the storage period increases. The increase in the value of the acidity number occurred due to the increase in temperature and as a result of the activity of the lipase enzyme and the presence of traces of moisture [1,7,17,16,12]. The statistical analysis results indicated significant differences between the studied oil varieties at the probability level ($p < 0.05$) when the extent of storage and the percentage of free fatty acids differed. In comparison between the studied date pit oil varieties, it was found that the percentage of free fatty acids (FFA%) for the pit oil Al-Zahdi dates at a temperature of 25°C and a storage period of (14) days were less than the percentage of free fatty acids (FFA%) when stored for a period of (40) days, as it reached (0.146%), and compared to Al-Halawi seed oil, which amounted to (0.137%). As for Al-Sayer core oil, it reached (0.129%). The reason for the increase in the percentage of free fatty acids with increasing storage period is due to the action of enzymes that work to decompose triglycerides into free fatty acids and glycerol [3,7,5, 8,11]. The results of the statistical analysis indicated that there were significant differences between the types of oils studied at the probability level

($p < 0.05$) when the storage period for the peroxide number value differed.



Picture 3 - Photo of the seeds preparation for grinding

In comparison with the types of date pit oil studied, it was found that the value of the peroxide number for Al-Zahdi date pit oil at a temperature of 25°C and a storage period of (14) days was less than the value of the peroxide number when stored for a period of (40) days, as it amounted to (1.71) mEq/kg oil. Compared to Al-Halawi pit oil, it was lower, reaching (1.72) mEq/kg oil, while for Al-Sayer pit oil, it was lower, reaching (1.73) mEq/kg. The increase in the peroxide number may be the result of self-oxidation, which is represented by the combination of dissolved oxygen in the oil with other oil compounds to form peroxides, which are the primary products of starting the oxidation process [2,9,12,13,14,8]. The stability of any oil also depends on the composition of its fatty acids and its content of compounds such as tocopherols, sterols, and phosphorylated fats [1,7,2,9,12,13,14]. Also, the values of the acidity number, the percentage of free fatty acids, and the peroxide number were close to the values. Which was reached by [8,5,16,11,8] for palm oil during the storage period at room temperature, in the presence of light and air, for (40) days, as the acidity number increased from 0.50 to 0.66 mg/g and the percentage of free fatty acids from 0.254% to 0.317% and the peroxide number ranges from 6.2 to 13.2 mEq/kg oil [8,5,16,11,8]. The results of the statistical analysis indicated that there were significant differences between the types of oils studied at the probability level ($p < 0.05$) when the duration of storage for the iodine number was different. By comparison between the types of date pit oil studied, it was

found that the value of the iodine number for Al-Zahdi date pit oil at a temperature of 25°C and storage duration (14) days was higher than the value of the iodine number when stored for (40) days, as it reached (46.2) mg/100 gm oil, and in comparison with Al-Halawi pit oil, which amounted to (49.26) mg/100 gm oil. As for Al-Sayer pit oil, it reached (52.1). mg/100g oil. We notice a decrease in the value of the iodine number at a temperature of 25°C and a storage period of (40) days. The reason is attributed to the temperature of storage leading to the oxidation of the double bonds of unsaturated fatty acids in the oil, so the iodine number decreased [7,5,14,13,9]. The results of the statistical analysis indicated that there were significant differences between the types of oils studied at the probability level ($p < 0.05$) when the storage period for the saponification number differed. By comparison between the types of date pit oil studied, it was found that the value of the saponification number for the al-Zahdi date pit oil at a temperature of 25°C and the duration of storage. (14) days was less than the value of the saponification number when stored for (40) days, as it amounted to (221.70) mg/g. In comparison with Al-Halawi pit oil, it was less than it reached (218.23) mg/g. As for pit oil, it amounted to (208.4) mg. /Gloom. We notice an increase in the value of the saponification number at a temperature of 25°C and a storage period of (40) days. The reason is firstly due to the difference in the oils' content of fatty acids that differ in their chain lengths and which are linked to glycerides [8,5,16,11,8], and secondly to the different sources of the oils. . It is noted from the detailed results in Table (4-10) the effect of temperature and storage duration on the percentage of unsaponifiable substances in the stored date pit oil. The results of the statistical analysis indicated that there are significant differences between the types of oils studied for those substances at a probability level of $p < 0.05$) By comparing the types of date pit oil studied, it was found that the percentage of unsaponifiables in Al-Zahdi date pit oil at a temperature of 25°C and a storage period of (14) days was less than the value of the percentage of unsaponifiables when stored for (40) days. It reached (0.98%), and compared to Al-Halawi pit oil, it was lower, reaching (0.82%). As for Al-Sayer pit oil, it was lower, reaching (0.88%). The high percentage of unsaponified substances in some oils is due to their varying content of sterols and tocopherols, and the high

percentage of unsaponified substances will reduce the exposure of oils to oxidation because they provide protection as natural antioxidants (Swern, 1979). It was pointed out by [8,5, 16,11,8] that the main component of the unsaponifiables in all vegetable oils is tocopherols and sterols. Tocopherols are natural antioxidants, and their presence rates are related to the amount of unsaturation of the fatty acids in order to give natural protection to the oil.

Recommendations:

- 1- The importance of this study lies in the scientific study of the preparation and storage of plant extracts of ground Iraqi date palm kernel oil.
- 2- Conducting studies on the effect of the storage period negatively on the physical and chemical characteristics and positively on the physical and chemical characteristics, as the negative and positive characteristics are directly proportional to the storage period.

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NEW ISSUE OF IAS MEDICAL JOURNAL

The Medical Journal of the Islamic World Academy of Sciences (**Volume 31 Issue 1, 2024**), is now published online. The current issue and archives can be accessed through the website: <https://medicaljournal-ias.org/>



The topics covered in this latest issue are:

1. **Sports Nutrition Knowledge and Dietary Habits of Students at Faculty of Sports Sciences:** This study examines the nutritional knowledge and dietary habits of students in a sports science program.
2. **Socioeconomic Factors Associated with Attitudes Toward Consanguineous Marriage in Iran:** This article explores the socioeconomic factors influencing attitudes toward consanguineous marriage in Iran.
3. **Urine Sediments as a Diagnostic Tool in Unani System of Medicine:** A review of how urine sediments are used as a diagnostic tool in the Unani system of medicine.
4. **Biodiversity and Medicinal Properties of Plants in The Holy Qur'an and The Ahadith:** This article discusses the biodiversity and medicinal properties of plants mentioned in Islamic texts.
5. **A Rare Cause of Coccydynia: Sacrococcygeal Chondrosarcoma:** A case report detailing a rare cause of coccydynia (tailbone pain) due to sacrococcygeal chondrosarcoma.

PROF. OMAR YAGHI FIAS WINNER OF THE GREAT ARAB MINDS AWARD IN NATURAL SCIENCE 2024



The Arab Genius Minds Award, launched by Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, honors extraordinary achievements by Arab scientists and innovators across six key categories essential for the region's developmental and cultural progress.

Professor Omar Yaghi has established himself as one of the most significant contributors to the advancement of modern chemistry. He contributed to the development of reticular chemistry, a groundbreaking field that creates open frameworks applicable in over 100 areas, from gas storage to innovative water collection methods. He received this prestigious award, which honors scientists and achievers of the seemingly impossible, in recognition of his impactful research, studies, and innovations that have left a tangible mark on humanity.

Prof. Yaghi is one of the leading pioneers in the field of reticular chemistry and holds the James and Neagle Tretter Chair in Chemistry at the University of California, USA.

Professor Yaghi has developed innovative methods for hydrogen storage and harvesting water from desert air. With dozens of patents and hundreds of research papers to his name, he has become a key reference for chemistry experts and specialists worldwide.

Source: <https://www.linkedin.com/posts/great-arab-minds>

ACADEMY OF SCIENCES OF IRAN ELECTED AS AASSA VICE-PRESIDENT



The Academy of Sciences of the Islamic Republic of Iran is proud to announce the election of Prof. Mohammad Reza Shams Ardekani, Secretary of the Academy, as Vice President of the Association of Academies and Societies of Sciences in Asia (AASSA) for the 2024–2027 term. This election took place during the 6th AASSA General Assembly on October 30, 2024, in Manila, where representatives from 32 countries gathered to discuss science-driven solutions to regional challenges.

This achievement underscores the commitment of the Academy of Sciences of the Islamic Republic of Iran to fostering scientific collaboration and highlights its significant contributions to AASSA's mission of advancing global scientific cooperation and innovation.



THE RIGHT TO PARTICIPATE IN AND BENEFIT FROM SCIENCE

The International Science Council believes that there is a universal human right to participate in and enjoy the benefits of science, and that it is a responsibility of governments to create and sustain the opportunities of citizens to use this right.

A right to participate in science

This right presumes a right to basic scientific literacy, and a right to scientific education, training and mentoring.

- I. A right to participate in generating diverse forms of knowledge through the study of natural and social phenomena using theoretical, observational, experimental, and analytical approaches to introduce and test existing and new models, conjectures, hypotheses and ideas unconstrained by political agendas or belief systems.
- II. A right to challenge established knowledge about natural and social phenomena when generating and communicating new models, conjectures, hypotheses and ideas, and the uses to which this knowledge has been or may be put.
- III. A right to collaborate and engage in scientific dialogue and research across national, political, regional and other boundaries.
- IV. A right to communicate both positive and negative findings.
- V. A right to form professional societies and associations.
- VI. A right to advocate for the responsible use of science.

A right to enjoy the benefits of science

- I. A right not to be excluded from the benefits of science on the basis of unjust discrimination based on race, nationality, ethnic origin, language, sex, gender identity, reproductive ability, sexual orientation, age, disability, political opinion, or religious belief.
- II. A right to equitably access information, data, and other resources necessary to enhance scientific knowledge, teaching and research.
- III. A right to apply scientific knowledge for technological developments for the good of humanity and the planet.



The International Science Council's interpretation of:

THE RIGHT TO PARTICIPATE IN AND BENEFIT FROM SCIENCE



The International Science Council believes that there should be a **universal human right to participate in and enjoy the benefits of science**, and that it should be a responsibility of governments to create and sustain the opportunities of citizens to exploit (use) these rights.

A RIGHT TO PARTICIPATE IN SCIENCE

this right presumes a right to **basic scientific literacy**, and a right to **scientific education**, training and mentoring.



1

A right to **participate in generating diverse forms of knowledge** through the study of natural and social phenomena using theoretical, observational, experimental, and analytical approaches to introduce and test existing and new models, conjectures, hypotheses and ideas **unconstrained by political agendas or belief systems**.

2

A right to **challenge established knowledge** about natural and social phenomena when generating and communicating new models, conjectures, hypotheses and ideas, and the uses to which this knowledge has been or may be put.

3

A right to **collaborate** and **engage in scientific dialogue** and research across national, political, regional and other boundaries.



4

A right to communicate both **positive** and **negative** findings.

5

A right to **form** professional societies and **associations**.

6

A right to **advocate** for the **responsible use of science**.



A RIGHT TO ENJOY THE BENEFITS OF SCIENCE

1

A right **not to be excluded** from the benefits of science on the basis of **unjust discrimination** based on race, nationality, ethnic origin, language, sex, gender identity, reproductive ability, sexual orientation, age, disability, political opinion, or religious belief.

2

A right to **equitably access information**, data, and other resources necessary to enhance scientific knowledge, teaching and research.

3

A right to **apply scientific knowledge** for technological developments for the **good of humanity and the planet**.

If you would like to learn more about the free and responsible practice of science, please visit:
council.science/the-right-to-science





CALL FOR APPLICATIONS

COMSTech AWARDS 2025

LIFE-TIME CONTRIBUTIONS IN 'BIOLOGY' AND 'CHEMISTRY'

The Organization of Islamic Cooperation Standing Committee on Scientific and Technological Cooperation (COMSTech) announces awards intended to encourage and support scientific contributions in basic sciences. COMSTech will offer awards in the fields of **Biology** and **Chemistry** during the forthcoming Session of COMSTech General Assembly. Each award consists of a certificate, shield of honour, and cash prize of US\$ 8000.

COMSTech AWARDS FOR EXCELLENCE IN SCIENCE & TECHNOLOGY

- **COMSTech Young Researcher Award**
 - › Under the age of 40 years by March 31, 2025.
 - **Best Scientific Book**
 - › Published by an International Publisher during 2023-2024
 - **Patent**
 - › The award recognizes individuals for their outstanding contributions to their respective field for discovery that has had lasting impact in furthering the theory and/or development of commercial systems
 - › Only those patents registered during the past five years would be considered
- Each of the above three awards carries a certificate, shield of honour, and cash prize of US\$ 4,000.

- **Best Research Paper**
 1. **Biology**
 2. **Chemistry**
 3. **Mathematics**
 4. **Physics**
 - › Based on original Research. Review paper is not acceptable.
 - › Published in Impact Factor International Journal during 2023-2024
- The above award in each discipline carries a certificate, shield of honour, and cash prize of US\$ 2,500.

COMSTech AWARD FOR EXCELLENCE IN SCIENCE COMMUNICATION

This award is being announced for the first time. It is awarded to individuals and institutions in OIC countries engaged in impactful science communication and outreach activities. Outstanding contributions to science communication in academia, journalism, outreach and film making will be recognized. The award carries a certificate, shield of honour, and cash prize of US\$ 2,500.

IMPORTANT:

Nominations for the COMSTech Awards 2025 are invited from science academies, national research councils, universities, research institutions, and internationally distinguished **scientists who are citizens of, and working in, OIC member states**. Nominations will be judged by the panels of distinguished scientists/experts in relevant field appointed by Coordinator General COMSTech.

A signed cover letter by the applicant along with softcopies of the relevant nomination papers be sent to COMSTech Secretariat (awards@comstech.org). Nominations should clearly state the contributions made in the field for which the prize would be given. The nominations must be submitted in the English language and English translation of the related documents must be accompanied along with the following documents.

- ❖ Complete application form with signatures
- ❖ CV (*no longer than 4000 words*)
- ❖ List of Publications
- ❖ Endorsement letter from the Head of Institution

Application forms can be downloaded from our website (www.comstech.org). The closing date of receipt of the applications is **Monday, March 31, 2025**. **Applications received after the closing date shall not be entertained**. For enquiries, please contact awards@comstech.org

OIC SECRETARY-GENERAL CALLS FOR COLLABORATION AMONG MEMBER STATES IN SCIENCE & TECHNOLOGY



The Secretary General of the Organization of Islamic Cooperation (OIC) Hissein Ibrahim Taha has emphasized the importance of collaboration among OIC member states in science and technology to overcome the key challenges faced by the Muslim Ummah.

He was addressing a ceremony during his visit to the Secretariat of the OIC's Ministerial Standing Committee on Scientific and Technological Cooperation (COMSTECH) in Islamabad today.

The OIC Secretary General alongside the Federal Minister for Science and Technology and the Coordinator General of COMSTECH also launched COMSTECH Expert Service for Technological Cooperation.

The initiative is designed to enhance technological self-reliance, foster sustainable development, and mitigate brain drain within OIC member states.

It is also aimed at mobilizing expertise from across the Muslim world to address pressing challenges in healthcare, agriculture, energy, and education, embodying the spirit of collaboration and mutual progress among OIC countries.

The Secretary General OIC commended the COMSTECH Fellowships and Scholarships Program for Palestinian nationals, praising its profound impact on empowering Palestinian youth through education and skill development.

He highlighted the upcoming 16th COMSTECH General Assembly, scheduled to be held in Islamabad this year saying that it is a vital platform for discussing the future of science and technology in the OIC region. He also underscored the importance of the 2nd Ministerial Meeting of the OIC-15 Dialogue Platform, scheduled for this year, and the Emergency Conference on Education in Palestine,

declaring it critical efforts to foster scientific and educational progress.

Expressing gratitude to the government and people of Pakistan for their warm hospitality, the OIC Secretary General lauded COMSTECH's exceptional contributions to science, technology, and innovation.

Addressing the ceremony, Minister for Science, Technology, and Education, Khalid Maqbool Siddiqui, welcomed the Secretary General OIC and reaffirmed the importance of science and technology as fundamental pillars for sustainable development within the OIC.

He termed the launch of the COMSTECH Expert Service as a pivotal step in uniting expertise across the Muslim world to address shared challenges and build resilience.

In his address, Coordinator General OIC - COMSTECH, Professor Dr. Iqbal Choudhary, highlighted the organization's efforts in fostering collaboration, building capacities, and promoting scientific excellence among OIC member states.

Source:

<https://www.radio.gov.pk/10-01-2025/oic-secretary-general-emphasizes-collaboration-in-science-technology>

PROF. DR. MUHAMMAD IQBAL CHOUDHARY FIAS HONORED WITH SHEIKH ZAYED INTERNATIONAL AWARD 2024



Prof. Dr. Muhammad Iqbal Choudhary, Coordinator General COMSTech and distinguished Pakistani scientist, has been awarded the prestigious Sheikh Zayed International TCAM (Traditional Complementary and Alternative Medicine) Award 2024 in the discipline of Traditional Herbal Medicine under the Academic category, says press note. This recognition comes in light of his extraordinary and distinguished academic achievements in the field of traditional and complementary medicine. The Sheikh Zayed International Award for Traditional and Complementary Medicine is the first global award of its kind, recognizing excellence across all specialties in this field.

The award ceremony took place at the Hotel Beach Rotana, Abu Dhabi, United Arab Emirates. The honour was conferred by distinguished chief guests,

including Tariq Al Haidan, former Foreign Ministry Member; Dr. Afshar Alam, Vice Chancellor of Jamia Hamdard, and Prof. Wang Jingui, President of the First Teaching Hospital of Tianjin University of Traditional Chinese Medicine, China.

Prof. Choudhary's groundbreaking contributions to herbal medicine and academic excellence have brought global recognition to his work. This award not only acknowledges his individual accomplishments but also highlights the growing importance of traditional medicine in modern healthcare.

Based on his extraordinary distinguished academic achievements Professor Iqbal Choudhary has been selected for the Sheikh Zayed International TCAM Award 2024 in the discipline of Traditional Herbal Medicine in the Academic category. The Sheikh Zayed Award Ceremony was held on 12 December 2024 at Al-Thuraya hall, Hotel Beech Rotana, Abu Dhabi, UAE.



The 3rd edition of the Sheikh Zayed Global Award for Traditional, Complementary, and Alternative Medicine brought together innovation and science to honor the rich legacy of traditional medicine. This prestigious event not only celebrated the remarkable achievements of pioneers in the field but also underscored the importance of integrating traditional and modern approaches for a healthier, more compassionate future. By bridging the past with the future, the award continues to inspire advancements in global healthcare while preserving cultural and medical heritage.

Source:

<https://twa.com.pk/pakistani-scientist-prof-dr-iqbal-choudhary-honoured-with-sheikh-zayed-international-award-2024/>

SEVEN SCIENCE TECHNOLOGIES TO WATCH IN 2024 ACCORDING TO NATURE*

Advances in artificial intelligence are at the heart of many of this year's most exciting areas of technological innovation.

1. DEEP LEARNING FOR PROTEIN DESIGN

Scientists are making leaps in protein design, harnessing the power of deep learning to create custom-made proteins for a myriad of purposes, from crafting stable synthetic proteins for enzyme production to designing vehicles for drug delivery.

2. DEEPPAKE DETECTION

With multiple ongoing geopolitical conflicts and a US presidential election on the horizon, opportunities for weaponized media manipulation are rife. Researchers are innovating ways to identify manipulated media, from embedding hidden signals in AI-generated content to scrutinizing facial features for anomalies. Despite progress, the challenge lies in implementing these solutions effectively, and as reported in *Nature*, major social media sites are not routinely employing them.

3. LARGE-FRAGMENT DNA INSERTION

In late 2023, US and UK regulators approved the first-ever CRISPR-based gene-editing therapy for sickle-cell disease and transfusion-dependent β -thalassaemia — a major win for genome editing as a clinical tool. Groundbreaking techniques like prime editing and programmable addition through site-specific targeting elements (PASTE) offer hope for precise insertion of large DNA fragments into the genome, potentially revolutionizing treatments for genetic disorders and even endowing food crops with disease resistance.

4. BRAIN-COMPUTER INTERFACES (BCIs)

Pat Bennett has slower than average speech, and can sometimes use the wrong word. But given that motor neuron disease, also known as amyotrophic lateral sclerosis, had previously left her unable to express herself verbally, that is a remarkable achievement. Bennett's recovery

comes courtesy of a sophisticated BCI device developed by Stanford University neuroscientist Francis Willett and his colleagues at the US-based BrainGate consortium. BrainGate's trial is just one of several studies from the past few years demonstrating how BCI technology can help people with severe neurological damage to regain lost skills and achieve greater independence.

5. SUPER-DUPER RESOLUTION

Advancements in super-resolution microscopy, such as MINSTED and resolution enhancement by sequential imaging (RESI), are unlocking unprecedented insights into cellular structures and biomolecular interactions. These techniques offer researchers a window into the molecular world, fueling discoveries across science and medicine.

6. CELL ATLASES

If you're looking for a convenient cafe, Google Maps can find nearby options and tell you how to get there. There's no equivalent for navigating the much more complex landscape of the human body, but ongoing progress from various cell-atlas initiatives - powered by advances in single-cell analysis and 'spatial omics' methods - could soon deliver the tissue-wide cellular maps that biologists crave.

7. NANOMATERIALS PRINTED IN 3D

Weird and interesting things can happen at the nanometre scale. This can make materials-science predictions difficult, but it also means that nanoscale architects can manufacture lightweight materials with distinctive characteristics such as increased strength, tailored interactions with light or sound, and enhanced capacity for catalysis or energy storage. Several strategies exist for crafting such nanomaterials, most of which use lasers to induce 'photopolymerization' of light-sensitive materials, and over the past few years, scientists have made considerable headway in overcoming the limitations that have impeded broader adoption of these methods.

* Source: <https://partnerships.nature.com/blog/seven-science-technologies-to-watch-in-2024-according-to-nature/>

In a fast-changing world of transient ideas, which emerging technologies should be on the agenda of decision-makers, entrepreneurs and citizens in the years to come?

The World Economic Forum's latest Top 10 Emerging Technologies of 2024 report unveils a future teeming with possibilities. Here are the technologies that feature in the report:

1. CONNECTIVITY TECHNOLOGY

In a world that needs to use less energy, and with 6G on the horizon, how can we make this growing demand for, and delivery of, instant data access more sustainable?

Reconfigurable intelligent surfaces (RIS) optimize wireless communications links by changing shape dynamically, combining metamaterials, smart algorithms and advanced signal processing to control and manipulate electromagnetic waves.

Engineered for enhanced capacity and connectivity and with a strong focus on environmental sustainability, RIS can turn ordinary walls and surfaces into intelligent components in a wireless network.

How could the technology impact everyday processes? Telecoms is the major area of use. This could mean more reliable and efficient radio-wave communication in smart factories and vehicular networks, as well as improved coverage in agricultural settings, the report predicts.

Harnessing the latest in solar, battery, lightweight composite material and avionic technology, **high altitude platform station** (HAPS) systems potentially offer new levels of communications and observation capabilities. Operating at around 20km above the Earth – typically in balloon, airship or fixed-wing aircraft form – they can beat the connectivity, coverage and performance of terrestrial towers and satellites, particularly in remote parts of the world.

HAPS' innovative infrastructure is poised to bring internet access to over 2.6 billion people in

100 countries without connectivity, creating opportunities for education and economic growth.

In addition to improving digital inclusion, HAPS are quick to deploy so could be of vital use in emergency situations.

In a world awash with sensing and communications devices, there is inevitably some functional overlap. **Integrated sensing and communication** (ISAC) combines these capabilities in a single system that can collect and transmit data simultaneously, enabling cost and hardware efficiencies while opening up new application possibilities.

ISAC makes wireless networks environment-aware, enabling functions such as localization, environmental mapping and infrastructure monitoring. Sensors and data analytics can be used to monitor air and water quality, soil moisture and weather conditions, for example. Real-world applications include monitoring systems for smart agriculture, environmental conservation and urban planning, as well as smart grids that optimize energy generation and consumption.

2. AI-ENABLED DISCOVERIES

It's no surprise the speedy acceleration of artificial intelligence (AI) – and what it means for scientific research – tops this year's list of major tech developments. While scientists have long been experimenting with how AI can advance their knowledge and capabilities, recent breakthroughs in deep learning, generative AI and foundation models are changing the game when it comes to rates of discovery and prediction.

With AI expanding the world of data like never before, finding ways of leveraging it without ethical or security concerns is key. Enter synthetic data, an exciting **privacy-enhancing technology** re-emerging in the age of AI. It replicates the patterns and trends in sensitive datasets but does not contain specific information that could be linked to individuals or compromise organizations or governments. Building on advances in AI, synthetic data makes

* Source: <https://www.weforum.org/stories/2024/06/top-10-emerging-technologies-of-2024-impact-world/>

it possible for scientists and others to share data globally and work collaboratively on research related to biology and health by removing identifying information.

AI for Scientific Discovery is transforming how new knowledge is discovered and used. AI systems such as Deep Mind's AlphaFold can accurately predict the 3D models of protein structures. AI has also been applied in research that discovered a new family of antibiotics and created materials for more efficient batteries. According to a recent report from the United States President's Council of Advisors on Science and Technology, "AI has the potential to transform every scientific discipline and many aspects of the way we conduct science."

The building and construction sector is responsible for almost 40% of carbon emissions, according to the United Nations. **Immersive technology for the built world** and AI-driven blended reality tools could have critical parts to play in its cleaner future, helping anticipate challenges and optimize projects for delivery in the real world. Digital twins, for example, can be used to simulate complex outcomes, increasing efficiency, while virtual prototyping and experimentation can help improve accuracy.

Business may be booming, but global labour shortages persist. In the metaverse, this could be mitigated, the Top 10 Emerging Technologies report says, through immersive learning and training environments that bring together architecture, engineering and construction professionals from around the world.

3. TECH TO TACKLE CLIMATE CHANGE

Technologies that address, and provide solutions for, the climate crisis feature heavily in this year's top 10.

Elastocalorics is a rapidly advancing field, described as "powering heat systems to work like muscles", which could offer more sustainable ways to keep cool. With a warming climate and growing data demands, this has never been more important. Heat pumps using elastocaloric materials such as nickel and titanium – which

emit heat when mechanical stress is applied and cool down when the stress is relaxed – are proving more energy-efficient than traditional heating and cooling systems.

Another benefit is they do not require the use of environmentally harmful refrigerant gases, and can be used for cooling in areas with limited or no electricity grid infrastructure, according to the report. A study by the US Department of Energy ranks these heat pumps as the most promising alternative to current systems.

In the midst of a climate crisis, microorganisms are proving a valuable resource. Able to capture greenhouse gases from air or exhaust gases, they are converting emissions into valuable products like biofuels, which have the potential to reduce global warming.

There are two main types of **microbial carbon capture**. The first uses organisms like cyanobacteria and microalgae that "eat" carbon through photosynthesis, the second employs microorganisms that use renewable energy sources – like hydrogen or organic waste streams – to capture CO₂, which is then converted into new products, including biodiesel and protein-rich animal feed.

Animal agriculture relies on the production of proteins like soy, which can lead to deforestation, biodiversity loss, over-fertilization and greenhouse gas emissions from land-use changes. **Alternative livestock feeds**, or protein feeds for livestock sourced from single-cell proteins, algae and food waste – could be viable, sustainable substitutes for such products, especially as demand increases, says the report.

4. ADVANCES IN TRANSPLANTATION

While transplants save lives, there are not nearly enough available organs to meet demand. But recent advances in genetic manipulation, like CRISPR-Cas9, could change that.

Genomics for transplants: The successful implantation of genetically engineered organs into a human marks a significant advancement in healthcare, offering hope to millions awaiting transplants.

CARE BEYOND WALLS: SIX DIGITAL TRENDS SHAPING HEALTH CARE IN 2024*

In the rapidly evolving healthcare landscape, a convergence of factors, including payer reform, technological advancements, scientific breakthroughs and enhancing patient-centricity, are driving unprecedented industry transformation. Stakeholders across the value chain must recalibrate their strategies by integrating advanced medical sciences amid changing utilization patterns. To add to this, the symbiosis of technology, consumerism and data are amplifying care complexities, while regulatory pressures further compel adherence to global compliance policies to address disparities and foster member engagement.

To proactively adapt, organizations seek innovative technologies and models to improve the quality of care. Now, more than ever, artificial intelligence (AI) and cloud technologies are poised to reshape the healthcare ecosystem, reimagining care beyond the four walls of healthcare facilities. Personalization and digital transformation will be pivotal in determining the path ahead for independent software vendors (ISVs), medical device manufacturers, specialty providers, provider service plans (PSPs) and more. The focus is now on trends that can bolster secure high-quality care while reducing costs and dependencies in the care realm.

1. TRENDS SHAPING HEALTH CARE OF TOMORROW

With the care continuum undergoing metamorphosis, businesses face a critical juncture where emerging technologies, integrated vendor ecosystems and enhanced regulatory compliance will redefine care delivery and shape the needs of healthcare stakeholders.

Here are six healthcare technology trends to watch out for in 2024.

Cloud-first approach for value-based care.

Many organizations are embracing cloud-native platforms to disburse value-based care. More organizations are leveraging SaaS solutions to optimize scalability and cost-effectiveness, streamline communication and improve patient care.

By seamlessly integrating data, electronic health records and video conferencing systems into a centralized repository, healthcare leaders can now achieve faster speed-to-value. Real-time data analysis can empower healthcare providers to

provide enhanced patient care through informed decision-making and timely interventions. SaaS platforms can also simplify technology onboarding, minimize development resources and improve financial and operational outcomes. For example, health IT CRM systems can help healthcare leaders elevate their value chain and enhance data cycle management while maintaining compliance.

AI-powered clinical decision support.

AI (and, lately, GenAI) has been a game-changer in the health industry, with enterprises eager to tap into its unexplored potential. Healthcare organizations can leverage GenAI and analytics to automate the verification of patients' eligibility and benefits for claims submission or cost optimization workflows, leading to augmented revenue cycle management. Enterprises can also harness GenAI to simplify and automate code or data migration based on data volume, sensitivity and network bandwidth.

Specialists can utilize GenAI to assimilate and review health reports and generate patient hand-offs before forwarding them to Electronic Health Records (EHR). Many hospitals are opening up to virtual medical documentation and live clinical support applications to elevate care consistency, patient safety and clinical quality while saving time.

Personalized patient care and engagement.

In the year ahead, healthcare leaders will prioritize next-gen patient care for superior experiences, care quality and reduced costs. The demand spike for telemedicine is fueling the launch of smart wearables, digital health apps, closed-loop devices and clinical decision support systems (CDSS).

Smart wearables such as heart monitors and fitness watches help assimilate and transmit patient records, aiding research centers and pharmacies with faster diagnosis. Digital health apps enable remote monitoring, reducing hospital readmissions and costs while making healthcare accessible to those who need it the most.

As the need for effective telemedicine surges, AI-powered CDSS can help clinicians and medical experts simplify and augment complex tasks, alleviating pressure on the already burdened and burnout care professionals.

Digital transformation and data democratization.

* Source: https://medtechintelligence.com/feature_article/care-beyond-walls-six-digital-trends-shaping-health-care-in-2024/

In 2024, the convergence of digital transformation and data democratization is poised to impact the healthcare landscape profoundly. The synergy of these two trends is expected to stimulate significant improvements in patient care, operational efficiency and overall healthcare outcomes.

The urgency surrounding care accessibility has led healthcare firms to lean towards data standardization, on-prem to cloud migrations, automation and legacy tech stack consolidations. Automation can help health personnel streamline operations, cut costs and boost patient outcomes by automating repetitive tasks, but it requires careful planning. Health firms can also leverage automation for legacy tech stack consolidations to eliminate complexity, efficiency and data security, which requires careful planning.

Integrated vendor partnerships.

Many healthcare organizations are leaning toward vendor consolidations and Mergers and Acquisitions as they view cost-effectiveness and sustainability as strategic imperatives. Vendor consolidation facilitates better integration of technologies, innovation and collaboration, leading to the development of solutions that better meet the healthcare industry's unique needs. It also empowers procurement leads to enjoy greater purchasing power through bundled pricing. Health leaders can significantly save significant time managing relationships and administrative tasks and cut down on input costs through comprehensive solution suites.

Enhanced regulatory compliance.

Emergent digital health models, the rising adoption of cloud and SaaS, and changing policy mandates require heightened regulation and compliance adherence for flexible and transparent care management. Furthermore, growing apprehensions around advanced cyberattacks and hefty fines due to noncompliance are urging healthcare providers to seriously consider AI-powered security solutions. This necessitates innovations in areas including but not limited to patient data, intellectual property rights (IPR) and incident management.

2. FOSTERING INNOVATION AND FASTER CARE

Enterprises are recognizing that accelerated technology and process adoption can help enhance capabilities, optimize investments, ensure better compliance, reduce time-to-market and achieve substantial cost savings. Implementing these advancements for prompt delivery of high-quality care only makes sense.

Tangible advantages the trends mentioned above confer upon patients and various stakeholders within the expansive healthcare ecosystem:

- **Desired scalability and adaptability:** Procurement leads can partner with hyperscalers to introduce plug-and-play components with built-in security features that need little to no integrations. Such comprehensive solutions enable enterprises to cater to evolving trends, attain faster time-to-market rates and bring down maintenance costs.
- **Timely and accurate interventions:** AI integration enables health organizations to build patient trust through upgraded prognoses and treatments. For example, AI-based radiology allows experts to identify complex patterns and provide quantitative assessments, facilitating better disease monitoring.
- **Improved care outcomes and population health:** Advanced technologies, such as AI, ML and NLP, enable pharmaceutical and biotech firms to swiftly analyze diverse data sources, yielding valuable real-world evidence (RWE). Enhanced RWE supports accelerated drug development, quicker care interventions and strengthened patient safety. A well-defined RWE strategy elevates post-market surveillance and opens new business opportunities for strategy leads and care experts.
- **Overall cost optimization:** Enterprises are increasingly recognizing the benefits of industry-first best practices to deliver swift, cost-effective care. Innovations including remote patient monitoring (RPM), population health management (PHM) and clinical decision support (CDS) offer a single source of truth, enabling health experts to consolidate data and streamline their operations.

3. CHARTING THE FUTURE OF HEALTH CARE

Healthcare leaders must rapidly adapt to evolving landscapes, regulations and patient requirements. Only by leveraging the potential of new technology and data-driven approaches can healthcare organizations redefine and strengthen their value chains. It goes beyond process and cost optimization. Ultimately, patient-centric innovations will pave the way for an inclusive, equitable and dynamic health ecosystem where everyone thrives.

PROF. JACKIE YING FIAS AWARDED THE KING FAISAL PRIZE



Professor Jackie Yi-Ru Ying (left) and Professor Sarah Gilbert received the King Faisal Prize for their contributions to science and medicine

Two female scientists – a Singapore-based nanotechnology scientist and a Covid-19 vaccine developer – have received one of the most prestigious international awards for their contributions to medicine and science.

One of them is Professor Jackie Yi-Ru Ying, senior fellow and director of the Agency for Science, Technology and Research’s (A*Star) NanoBio Lab.

The King Faisal Prize recognizes outstanding achievements in service to Islam, Islamic studies, Arabic language and literature, medicine and science. The awards were first given out in 1979, and since then, 282 recipients from 44 countries have been honoured, with more than 20 going on to win a Nobel Prize. Saudi Arabia-based King Faisal Foundation said Prof Ying was selected for her work on the synthesis of various advanced nanomaterials and systems, and their applications in energy conversion and biomedicine.

Her inventions have been used to solve challenges in medicine, chemistry and energy. She has more than 200 primary patents and patent applications under her belt. Forty-two of them have been licensed to multinational and start-up companies for applications such as nanomedicine, drug delivery, and cell and tissue engineering.

Her 386 publications have received more than 46,690 citations. In 2005, Prof Ying was inducted into the German National Academy of Sciences Leopoldina as its youngest member.

She was also the inaugural winner of the Mustafa Prize’s top scientific achievement award for her research in bio-nanotechnology in 2015. The

prize is granted to research that has improved human life and made tangible and cutting-edge innovations on the boundaries of science or has presented new scientific methodology.

In 2021, Prof Ying also became the first scientist to be elected as a member of the prestigious United States National Academy of Engineering for research based in Singapore.

“This is really unexpected, and I am really grateful to receive this award knowing how selective the prize is. This is a recognition of the research conducted by my lab, and it would not have been possible without the hard work and creativity of my staff and students at NanoBio Lab, the former Institute of Bioengineering and Nanotechnology, and Massachusetts Institute of Technology,” said Prof Ying.

The other female King Faisal Prize winner is Professor Sarah Gilbert, one of the creators of the Oxford-AstraZeneca Covid-19 vaccine.

The chair of vaccinology at Oxford University’s Nuffield Department of Medicine succeeded in making the vaccine after 10 months using a novel method.

Instead of the traditional method, which uses a weakened form of the original infection and requires a long time to develop in the human body, Prof Gilbert genetically modified a weakened version of a chimpanzee cold virus to be injected into humans without causing an infection.

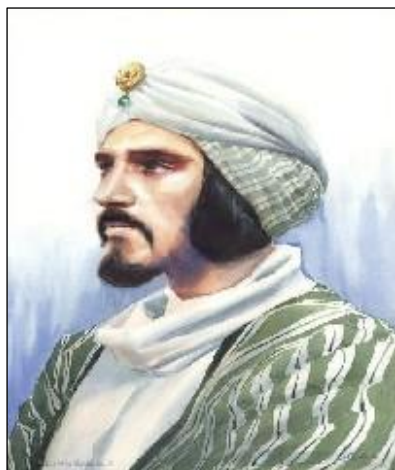
This modified virus became the essence of the vaccine, carrying the genetic instructions for the coronavirus spike protein.

When the modified virus enters a human cell, it uses a genetic code or instructions to produce the specific surface spike protein. This triggers an immune response, preparing the body’s immune system to attack the coronavirus if it infects the body. The Oxford-AstraZeneca vaccine has been in use in more than 180 countries due to its efficiency, low cost and accessibility.

Each winner will receive US\$200,000 (S\$267,000), a 24-carat gold medal and a certificate.

Source: <https://www.straitstimes.com/singapore/astar-researcher-one-of-two-women-scientists-to-win-prestigious-international-award>

YAQUB IBN ISHAQ AL-KINDI* (800 - 873 AD)



Abu Yousuf Yaqub Ibn Ishaq al-Kindi was born at Kufa around 800 AD. His father was an official of Haroon al-Rashid. Al-Kindi was a contemporary of al-Mamun, al-Mu'tasim and al-Mutawakkil and flourished largely at Baghdad. He was formally employed by Mutawakkil as a calligrapher. On account of his philosophical views, Mutawakkil was annoyed with him and confiscated all his books. These were, however, returned later on. He died in 873 AD during the reign of alMu'tamid.

Al-Kindi was a philosopher, mathematician, physicist, astronomer, physician, geographer and even an expert in music. It is surprising that he made original contributions to all of these fields. Because of his work he became known as the philosopher of the Arabs.

In mathematics, he wrote four books on the number system and laid the foundation of a large part of modern arithmetic. There is no doubt that the Arabic system of numerals was largely developed by alKhawarizmi, but al-Kindi also made rich contributions to it. He also contributed to spherical geometry to assist him in astronomical studies.

In chemistry, he opposed the idea that base metals can be converted to precious metals. In contrast to prevailing alchemical views, he was emphatic that chemical reactions cannot bring about the transformation of elements. In physics, he made rich contribution to geometrical optics and wrote a book on it. This book later on

provided guidance and inspiration to such eminent scientists as Roger Bacon.

In medicine, his chief contribution comprises the fact that he was the first to systematically determine the doses to be administered of all the drugs known at his time. This resolved the conflicting views prevailing among physicians on the dosage that caused difficulties in writing recipes.

Very little was known on the scientific aspects of music in his time. He pointed out that the various notes that combine to produce harmony have a specific pitch each. Thus, notes with too low or too high a pitch are non-pleasant. The degree of harmony depends on the frequency of notes, etc. He also pointed out the fact that when a sound is produced, it generates waves in the air which strike the ear-drum. His work contains a notation on the determination of pitch.

He was a prolific writer: the total number of books written by him was 241, the prominent among which were divided as follows: Astronomy 16, Arithmetic 11, Geometry 32, Medicine 22, Physics 12, Philosophy 22, Logic 9, Psychology 5, and Music 780.

In addition, various monographs written by him concern tides, astronomical instruments, rocks, precious stones, etc. He was also an early translator of Greek works into Arabic, but this fact has largely been over-shadowed by his numerous original writings. It is unfortunate that most of his books are no longer extant, but those existing speak very highly of his standard of scholarship and contribution. He was known as Alkindus in Latin and a large number of his books were translated into Latin by Gherard of Cremona. His books that were translated into Latin during the Middle Ages comprise *Risalat dar Tanjim*, *Ikhtiyarat al-Ayyam*, *Ilahyate-e-Aristu*, *al-Mosiqqa*, *Mad-waJazr*, and *Adwiya Murakkaba*.

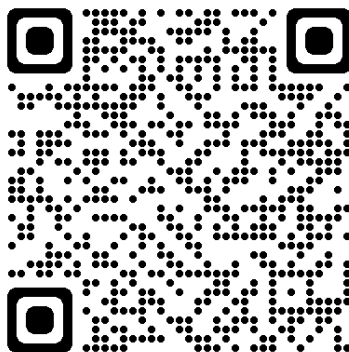
Al-Kindi's influence on the development of science and philosophy was significant in the revival of sciences in that period. In the Middle Ages, Cardano considered him as one of the twelve greatest minds. His works lead to further development of various subjects for centuries, notably physics, mathematics, medicine and music.

* Source: *Personalities Noble*, 2nd Edition, 2000, Edited by Hakim Mohammed Said, published by LAS with permission of Hamdard Foundation Pakistan.

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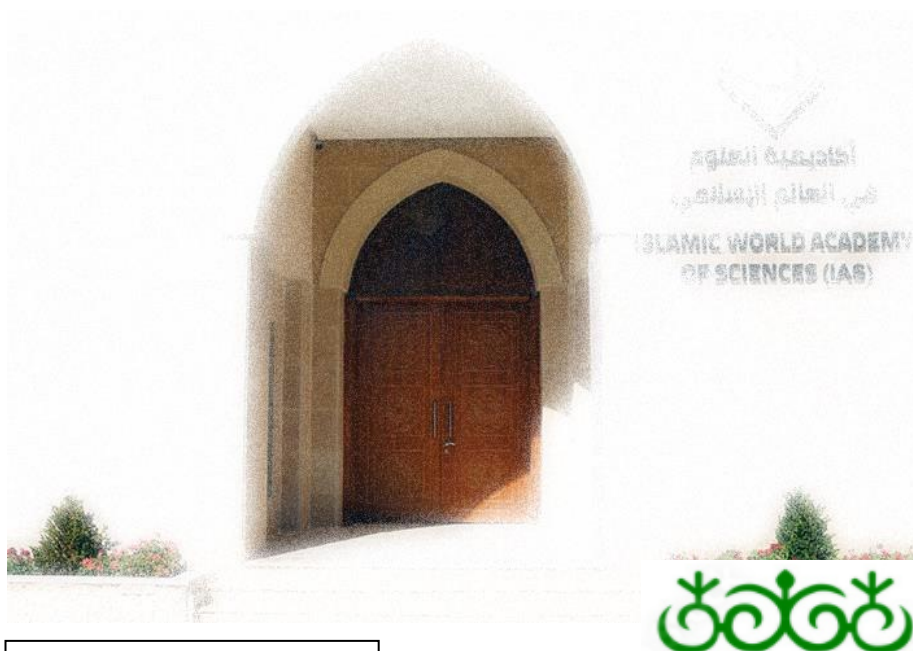
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