India's International Trade of Four Specific Commodities in the Recent Past

Some Insights

Preface

The study uses trade indicators to analyse merchandise export and import data in a way that should be useful for the purpose of policy. The indicators provide a glimpse of the trade patterns of the world and the performance of India in comparison to various other countries. They have been used in the case of India's exports of **Conveyor Belts of Vulcanised Rubber & Nucleic Acid** and imports of **Silicon in Primary forms & Glycosides** to indicate the possible directions policy may take.

The data used in this study has been sourced from the Export Import Data Bank of the DGCI&S, Department of Commerce, and Government of India and from the United Nations Comtrade Database. Introduction notes of each commodities has been sourced from the various sights –viz Wikipedia, Britannica, The Economic Times etc.

Computations are based on data at ITC-HS four-digit level (ITC-HS Code-4010 & 2934 for export and 3910 & 2938 for import) and the latest finalized data available on the UN Comtrade Database up to year 2020 and on the DGCI&S Database up to September'2022. So, trends from 2018 to 2021 have been shown when we extract the data from UN Comtrade and from 2018 to 2021 have been shown when we extract the data from DGCIS Data base.

In this report, we will see various analysis and aspects of India's Precious as well as International export trade of Conveyor Belts of Vulcanised Rubber & Nucleic Acid and imports of Silicon in Primary forms & Glycosides**.** We will use both the 4 digit Commodity codes, for our analysis, as appropriate.

Trends in India's as well as International Trade i.e. Exports and Imports of above four Commodities are given below in different tables :

- **Table1: India's top 10 Export destination of Conveyor Belts of Vulcanised Rubber with their shares in percentage.**
- **Table 2 : World's top 10 Exporters of Conveyor Belts of Vulcanised Rubber with their shares in percentage.**
- **Table 3 : World's top 10 Importers of Conveyor Belts of Vulcanised Rubber with their shares in percentage.**
- **Annex- I : Top 3 sources of Conveyor Belts of Vulcanised Rubber of World's top 3 Importers.**
- **Table4: India's top 10 Export destination of Nucleic Acid with their shares in percentage.**
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- **Annex-II : Top 3 sources of Nucleic Acid of World's top 3 Importers.**
- **Table 7 : India's top10 Sources of Silicon in Primary forms with their shares in percentage.**
- **Table 8 :World's top 10 Importers of Silicon in Primary forms Oils with their shares in percentage.**
- **Table 9 : India's top 10 Sources of Glycosides with their shares in percentage.**
- **Table 10 : World's top 10 Importers of Glycosides with their shares in percentage.**

EXPORT

Conveyor Belts of Vulcanised Rubber

A **conveyor belt** is the carrying medium of a **belt conveyor system**. A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys, with a closed loop of carrying medium—the conveyor belt—that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport large volumes of resources and agricultural materials, such as grain, salt, coal, ore, sand, overburden and more.

Conveyors are durable and reliable components used in automated distribution and warehousing, as well as manufacturing and production facilities. In combination with computer-controlled pallet handling equipment this allows for more efficient retail, wholesale, and manufacturing distribution. It is considered a labour-saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with labour expense.

Belt conveyors are the most commonly used powered conveyors because they are the most versatile and the least expensive.[1] Products are conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. Belt conveyors are also manufactured with curved sections that use tapered rollers and curved belting to convey products around a corner. These conveyor systems are commonly used in postal sorting offices and airport baggage handling systems.

Rubber conveyor belts are commonly used to convey items with irregular bottom surfaces, small items that would fall in between rollers, or bags of product that would sag between rollers.

The belt consists of one or more layers of material. It is common for belts to have three layers: a top cover, a carcass and a bottom cover. The purpose of the carcass is to provide linear strength and shape. The carcass is often a woven or metal fabric having a warp & weft. The warp refers to longitudinal cords whose characteristics of resistance and elasticity define the running properties of the belt.

Today there are different types of conveyor belts that have been created for conveying different kinds of material available in PVC and rubber materials. Material flowing over the belt may be weighed in transit using a beltweigher. Belts with regularly spaced partitions, known as *elevator belts*, are used for transporting loose materials up steep inclines. Belt Conveyors are used in self-unloading bulk freighters and in live bottom trucks. Belt conveyor technology is also used in conveyor transport such as moving sidewalks or escalators, as well as on many manufacturing assembly lines. Stores often have conveyor belts at the check-out counter to move shopping items, and may use checkout dividers in this process. Ski areas also use conveyor belts to transport skiers up the hill. Industrial and manufacturing applications for belt conveyors include package handling, trough belt conveyors, trash handling, bag handling, coding conveyors, and more. Integration of Human-Machine Interface(HMI) to operate the conveyor system is in the developing stages and will prove to be an efficient innovation.

Conveyors used in industrial settings include tripping mechanisms such as trip cords along the length of the conveyor. This allows for workers to immediately shut down the conveyor when a problem arises. Warning alarms are included to notify employees that a conveyor is about to turn on. Some other systems used to safeguard the conveyor are belt sway switches, speed switches, belt rip switch, and emergency stops. The belt sway switch will stop the conveyor if the belt starts losing its alignment along the structure. The speed switch will stop the belt if the switch is not registering that the belt is running at the required speed. The belt rip switch will stop the belt when there is a cut, or a flap indicating that the belt is in danger of further damage. An emergency stop may be located on the conveyor control box in case of trip chord malfunctions.

These are broadly classified under **H.S. Code-4010.**

Table – 1

India's Top 10 destination of Conveyor Belts of Vulcanised Rubber (H.S Code-4010)

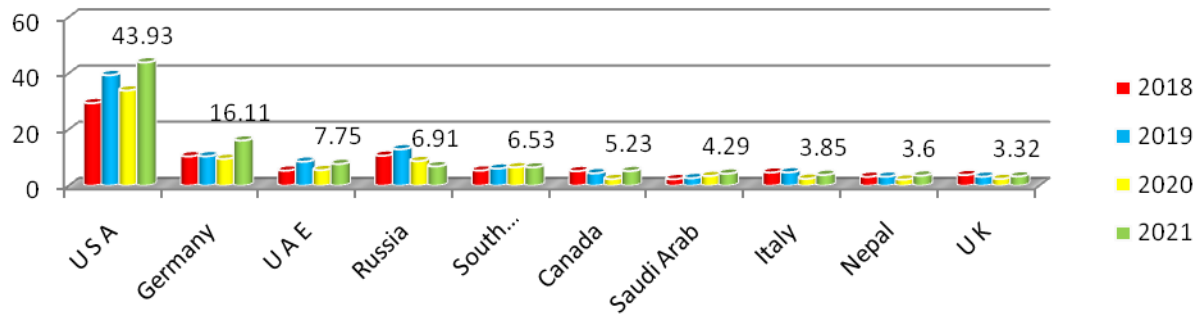
Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	U S A	29.41	21.00	39.38	27.41	33.92	27.77	43.93	27.67
2.	Germany	10.45	7.46	10.49	7.30	9.55	7.81	16.11	10.14
3.	U A E	5.38	3.84	8.57	5.96	5.55	4.55	7.75	4.88
4.	Russia	10.68	7.63	13.00	9.05	8.78	7.18	6.91	4.35
5.	South Africa	5.39	3.85	6.10	4.25	6.56	5.37	6.53	4.11
6.	Canada	5.18	3.70	4.45	3.10	2.38	1.95	5.23	3.29
7.	Saudi Arab	2.33	1.67	2.70	1.88	3.46	2.83	4.29	2.70
8.	Italy	4.69	3.35	4.75	3.30	2.49	2.03	3.85	2.43
9.	Nepal	3.18	2.27	3.22	2.24	2.19	1.79	3.60	2.27
10.	U K	3.79	2.71	3.21	2.24	2.42	1.98	3.32	2.09
	Others	59.55	42.52	47.80	33.27	44.88	36.73	57.27	36.07
	Total	140.04	100	143.67	100	122.18	100	158.80	100

Source: DGCI&S.

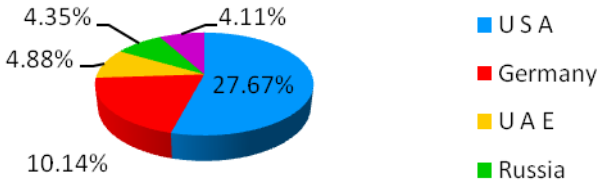
Note : India's Export including re-export

Major destinations of Conveyor Belts of Vulcanised Rubber from India from 2018-2021**(in Million $)**

Data label given on the basis of 2021



India's top 5 destinations of Conveyor Belts of Vulcanised Rubber by percentage India in 2021:



Conveyor Belt of Vulcanised Rubber export from India has shown significant growth. In the year 2018 the total value of Conveyor Belt of Vulcanised Rubber export was US $ 140.04 million. Whereas the data of 2021 states the export value of US $ 158.80 million, which shows a considerable 13.39% greater from the 2018. During the year 2021, India's Conveyor Belt of Vulcanised Rubber export value to USA was around US $ 44 million, which holds the top position with the share of 27.67% of the total export value. With the value of US $ 16.11 million, Germany takes runner up position in the global importers of Conveyor Belt of Vulcanised Rubber from India. It was followed by the UAE with the share of 4.88% of India's total export.

Table-2

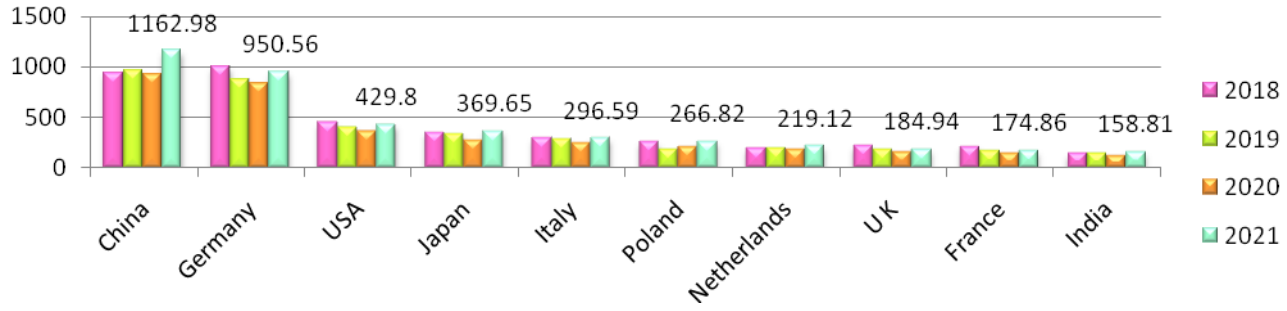
World's Top 10 exporter of Conveyor Belts of Vulcanised Rubber (H.S Code-4010)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	936.03	15.72	957.46	17.22	919.93	17.86	1162.98	19.14
2.	Germany	1000.33	16.79	874.58	15.73	830.72	16.13	950.56	15.65
3.	USA	447.44	7.51	397.86	7.15	358.71	6.96	429.80	7.07
4.	Japan	355.71	5.97	336.47	6.05	278.15	5.40	369.65	6.08
5.	Italy	293.84	4.93	284.02	5.11	246.14	4.78	296.59	4.88
6.	Poland	259.65	4.36	190.45	3.42	213.88	4.15	266.82	4.39
7.	Netherlands	198.14	3.33	199.03	3.58	185.92	3.61	219.12	3.61
8.	U K	218.91	3.68	179.04	3.22	164.69	3.20	184.94	3.04
9.	France	215.82	3.62	171.37	3.08	148.26	2.88	174.86	2.88
10.	**India**	**140.02**	**2.35**	**143.52**	**2.58**	**122.07**	**2.37**	**158.81**	**2.61**
	Others	1890.21	31.74	1827.03	32.86	1682.14	32.66	1861.26	30.64
	Total	5956.12	100	5560.83	100	5150.59	100	6075.39	100

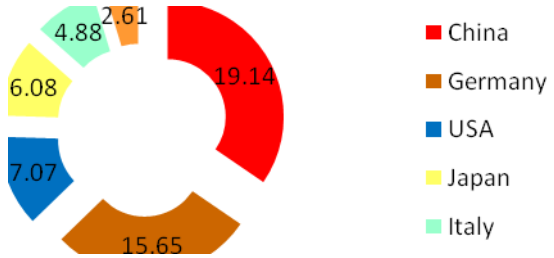
Source: UN Comtrade

Leading exporters of Conveyor Belts of Vulcanised Rubber of world from 2018 to 2021 **(in million $)**

Data label given on the basis of 2021



Country wise leading exporter of Conveyor Belts of Vulcanised Rubber by percentage in 2021 :



In 2021, the amount of conveyor belt exported worldwide amounted to US $ 6.07 Billion. Over the period under review, global conveyor belt exports reached its maximum level of US $ 6.07 Billion in 2021. China (US $ 1.16 B), Germany (US $ 950.56 M) and USA (US $ 429.80M) were the countries with the highest levels of exports in 2021, with a combined 41.86% share of global exports. In the same year with the value of US $ 158.81 million or 2.61% share of world export, **India** takes 10th position in the global exporters of Conveyor Belt of Vulcanised Rubber.

Table-3

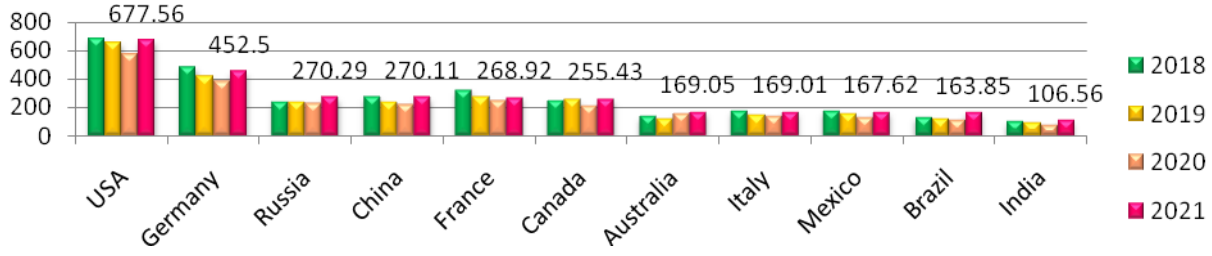
World's top 10 Importers of Conveyor Belts of Vulcanised Rubber (H.S Code-4010)

Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	686.41	11.02	658.74	11.46	570.73	10.85	677.56	11.27
2.	Germany	482.78	7.75	417.55	7.26	382.04	7.26	452.50	7.53
3.	Russia	240.06	3.85	242.43	4.22	228.71	4.35	270.29	4.50
4.	China	274.05	4.40	235.02	4.09	222.07	4.22	270.11	4.49
5.	France	321.85	5.17	275.10	4.78	242.96	4.62	268.92	4.47
6.	Canada	246.94	3.97	252.23	4.39	214.51	4.08	255.43	4.25
7.	Australia	133.74	2.15	124.60	2.17	151.95	2.89	169.05	2.81
8.	Italy	174.45	2.80	149.70	2.60	133.78	2.54	169.01	2.81
9.	Mexico	171.15	2.75	158.04	2.75	128.89	2.45	167.62	2.79
10.	Brazil	130.63	2.10	120.36	2.09	111.47	2.12	163.85	2.73
18.	**India**	**99.79**	**1.60**	**94.79**	**1.65**	**76.89**	**1.46**	**106.56**	**1.77**
	Others	3266.12	52.44	3022.05	52.55	2798.44	53.18	3039.75	50.57
	Total	**6227.98**	**100**	**5750.60**	**100**	**5262.44**	**100**	**6010.64**	100

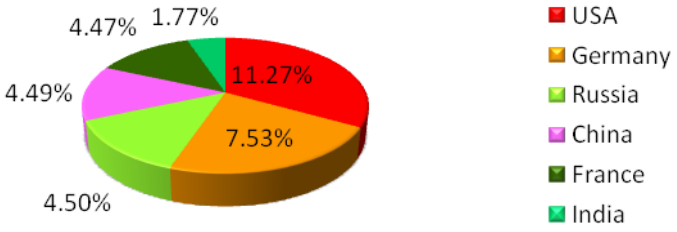
Source : UN Comtrade

Leading Conveyor Belts of Vulcanised Rubber importers of world from 2018 to 2021**(in million $)**

Data label given on the basis of 2021



Country wise leading importers of Conveyor Belts of Vulcanised Rubber by percentage in 2021

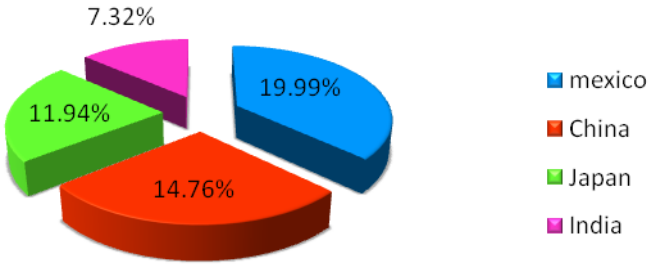


In 2021, the amount of conveyor belt imported worldwide amounted to US $ 6.01 Billion, rose by 14.22% against the previous year figure. In the year 2018, global conveyor belt imports reached its maximum value of US $ 6.22 Billion. During the year 2021, USA imported US $ 677.56 million, which holds the top position with the share of 11.27% of the total world import value. With the value of US $ 452.50 million and US $ 270.29 million, Germany and Russia took 1st runner up & 2nd runner position respectively in the global importers of Conveyor Belt of Vulcanised Rubber. It was followed by the China with the share of 4.49 of India's total export. In the same year **India** took 18th position with share of 1.77% of global import.

Annexure-1

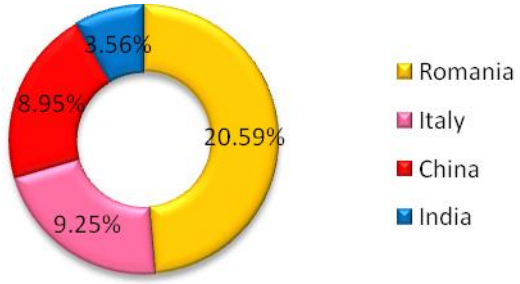
Major sources of world's top 3 importers of Conveyor Belts of Vulcanised Rubber (HS Code-4010)

i) Top 3 Sources of Conveyor Belt of Vulcanised Rubber to USA in 2021 by percentage:



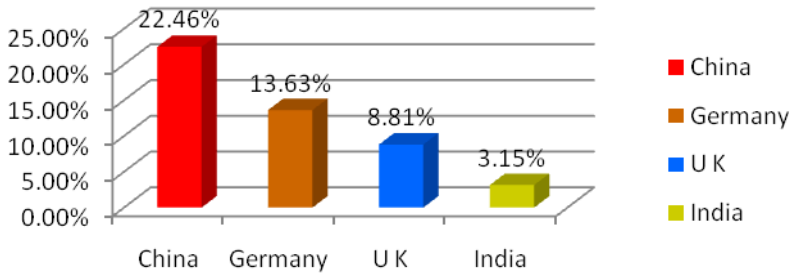
USA imports most of its requirements of Conveyor Belt of Vulcanised Rubber from Mexico with nearly 20 % share of USA's total import of Conveyor Belt of Vulcanised Rubber came from Mexico in 2021. China (14.76%) & Japan (11.94%) were the 2nd and 3rd major source of Conveyor Belt of Vulcanised Rubber to USA in the same year. India exported 7.32% share of USA's total import in 2021. **(Source: UN Comtrade)**

ii) Top 3 Sources of Conveyor Belt of Vulcanised Rubber to Germany in 2021 by percentage*:*



20.49 % of Conveyor Belt of Vulcanised Rubber imports of Germany came from Romania in 2021, followed by Italy (9.25%) and China (8.95%). In the same year Germany imported 3.56% of its total import of Conveyor Belt of Vulcanised Rubber from India. .**(Source: UN Comtrade)**

iii) Top 3 Sources of Conveyor Belt of Vulcanised Rubber to Russia in 2021 by percentage*:*



China was the largest source of Conveyor Belt of Vulcanised Rubber to Russia in 2021, 22.46% of total Conveyor Belt of Vulcanised Rubber import by Rubber from China in 2021. Germany and UK were other important sources of Conveyor Belt of Vulcanised Rubber to Russia in that year. In the same year **India** exported 3.15% of the commodity to Russia. **(Source : UN Comtrade)**

Nucleic Acids

Nucleic acids are biopolymers, macromolecules, essential to all known forms of life. They are composed of nucleotides, which are the monomers made of three components: a 5-carbon sugar, a phosphate group and a nitrogenous base. The two main classes of nucleic acids are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). If the sugar is ribose, the polymer is RNA; if the sugar is the ribose derivative deoxyribose, the polymer is DNA.

Nucleic acids are naturally occurring chemical compounds that serve as the primary information-carrying molecules in cells and make up the genetic material. Nucleic acids are found in abundance in all living things, where they create, encode, and then store information of every living cell of every life-form on Earth. In turn, they function to transmit and express that information inside and outside the cell nucleus to the interior operations of the cell and ultimately to the next generation of each living organism. The encoded information is contained and conveyed via the nucleic acid sequence, which provides the 'ladder-step' ordering of nucleotides within the molecules of RNA and DNA. They play an especially important role in directing protein synthesis.

Nucleic acid was first discovered by Friedrich Miescher in 1869 at the University of Tübingen, Germany. He gave its first name as **nuclein**. In the early 1880s Albrecht Kossel further purified the substance and discovered its highly acidic properties. He later also identified the nucleobases. In 1889 Richard Altmann created the term nucleic acid – at that time DNA and RNA were not differentiated. In 1938 Astbury and Bell published the first X-ray diffraction pattern of DNA.

The term nucleic acid is the overall name for DNA and RNA, members of a family of biopolymers, and is synonymous with polynucleotide. Nucleic acids were named for their initial discovery within the nucleus, and for the presence of phosphate groups (related to phosphoric acid). Although first discovered within the nucleus of eukaryotic cells, nucleic acids are now known to be found in all life forms including within bacteria, archaea, mitochondria, chloroplasts, and viruses. All living cells contain both DNA and RNA (except some cells such as mature red blood cells), while viruses contain either DNA or RNA, but usually not both. The basic component of biological nucleic acids is the nucleotide, each of which contains a pentose sugar, a phosphate group, and a nucleobase. Nucleic acids are also generated within the laboratory, through the use of enzymes (DNA and RNA polymerases) and by solid-phase chemical synthesis. The chemical methods also enable the generation of altered nucleic acids that are not found in nature, for example peptide nucleic acids.

Nucleic acids are generally very large molecules. Indeed, DNA molecules are probably the largest individual molecules known. Well-studied biological nucleic acid molecules range in size from 21 nucleotides to large chromosomes (human chromosome 1) is a single molecule that contains 247 million base pairs.

In most cases, naturally occurring DNA molecules are double-stranded and RNA molecules are single-stranded. There are numerous exceptions, however—some viruses have genomes made of double-stranded RNA and other viruses have single-stranded DNA genomes, and, in some circumstances, nucleic acid structures with three or four strands can form.

Nucleic acid molecules are usually unbranched and may occur as linear and circular molecules. For example, bacterial chromosomes, plasmids, mitochondrial DNA, and chloroplast DNA are usually circular double-stranded DNA molecules, while chromosomes of the eukaryotic nucleus are usually linear double-stranded DNA molecules.

Artificial nucleic acid analogues have been designed and synthesized by chemists, and include peptide nucleic acid, morpholino- and locked nucleic acid, glycol nucleic acid, and threose nucleic acid. Each of these is distinguished from naturally occurring DNA or RNA by changes to the backbone of the molecules.

These are broadly classified under **H.S. Code-2934.**

Table – 4

India's Top 10 destination of Nucleic Acids (H.S Code-2934)

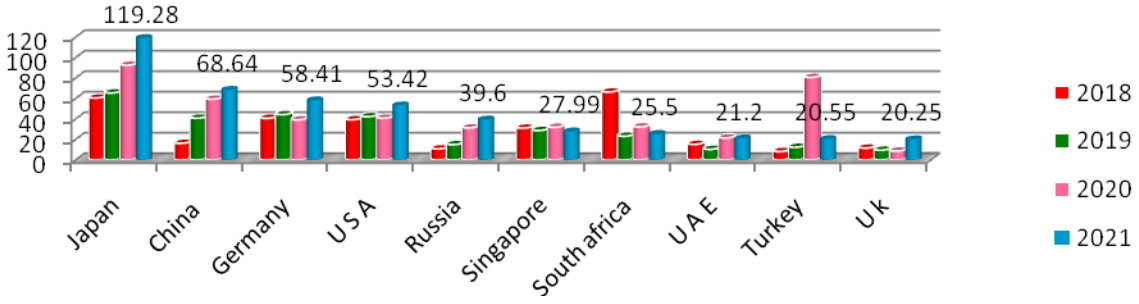
Rank	Countries	2018		2019		2020		2021	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Japan	60.71	11.03	65.62	11.94	92.70	13.75	119.28	15.85
2.	China	16.45	2.99	40.96	7.45	59.50	8.82	68.64	9.12
3.	Germany	40.82	7.41	44.44	8.08	39.30	5.83	58.41	7.76
4.	U S A	39.50	7.17	42.39	7.71	40.96	6.08	53.42	7.10
5.	Russia	10.95	1.99	15.11	2.75	31.52	4.68	39.60	5.26
6.	Singapore	31.29	5.68	28.94	5.26	32.04	4.75	27.99	3.72
7.	South africa	66.55	12.09	23.38	4.25	32.42	4.81	25.50	3.39
8.	U A E	15.36	2.79	10.51	1.91	21.57	3.20	21.20	2.82
9.	Turkey	8.37	1.52	12.55	2.28	80.84	11.99	20.55	2.73
10.	U k	11.70	2.13	9.72	1.77	8.83	1.31	20.25	2.69
	Others	248.95	45.21	256.11	46.59	234.55	34.79	297.73	39.56
	Total	550.65	100	549.72	100	674.23	100	752.57	100

Source: DGCI&S

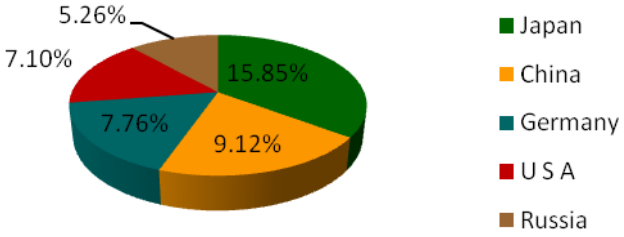
Note : India's Export including re-export

India's major destination Nucleic Acids from 2018-2021**(Values in million USD)**

Data label given on the basis of 2021



India's top 5 destinations of Nucleic Acids by percentage in 2021:



In 2021, India's export of Nucleic Acid amounted to US $ 752.57 Million, going up by almost 11.61% against the previous year figure. Over the period under review, Nucleic Acid export from India reached its maximum volume in 2021. Japan represented the major importer of Nucleic Acid from India in 2021, recording US $ 119.28 Million which was 15.85% of total export of India, followed by China and Germany with 9.12% and 7.76% share of India's total export value of Nucleic Acid in 2021.

Table - 5

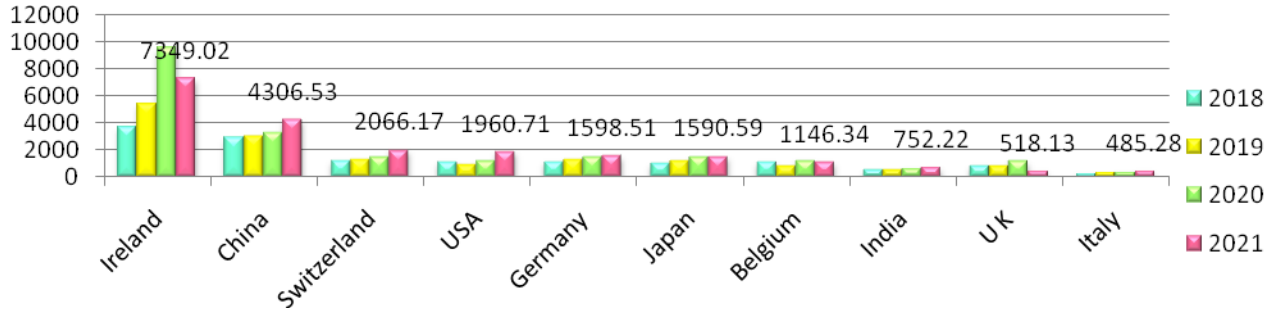
World's Top 10 exporter of Nucleic Acids (H.S Code-2934)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Ireland	3712.79	22.21	5446.32	29.64	9581.54	38.07	7349.02	29.70
2.	China	2929.81	17.53	3049.74	16.60	3333.95	13.25	4306.53	17.41
3.	Switzerland	1257.06	7.52	1366.08	7.44	1499.21	5.96	2066.17	8.35
4.	USA	1178.27	7.05	971.46	5.29	1217.44	4.84	1960.71	7.93
5.	Germany	1202.56	7.19	1340.11	7.29	1574.52	6.26	1598.51	6.46
6.	Japan	1029.83	6.16	1272.40	6.93	1513.05	6.01	1590.59	6.43
7.	Belgium	1159.61	6.94	843.03	4.59	1280.41	5.09	1146.34	4.63
8.	**India**	**549.18**	**3.29**	**550.06**	**2.99**	**675.32**	**2.68**	**752.22**	**3.04**
9.	U K	867.95	5.19	876.37	4.77	1237.76	4.92	518.13	2.09
10.	Italy	344.72	2.06	368.53	2.01	441.70	1.75	485.28	1.96
	Others	2485.11	14.87	2288.44	12.46	2815.26	11.18	2966.72	11.99
	Total	16716.88	100	18372.53	100	25170.13	100	24740.24	100

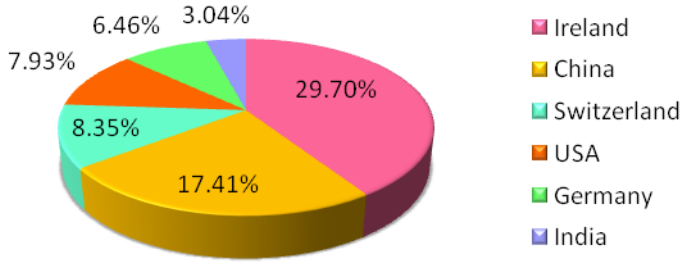
Source: UN Comtrade

Top world exporters of Nucleic Acids from 2018 to 2021 **(Values in million USD)**

Data label given on the basis of 2021



Export trends in world's leading Nucleic Acids exporters by percentage in 2020:



Global export of Nucleic Acid was totaled US $ 24.74 Billion in 2021. In that year the total export value decreased at an rate of -1.90% from 2020. The trend pattern indicated increasing trends up to the year 2020. Ireland represented the major exporter of Nucleic Acid in the world, exported 29.70% share of world export. China and Switzerland constitutes the 2nd and 3rd largest exporter of the Commodity in the same year with 17.41% and 8.35% share of world export respectively. In the same year India's contribution was 3.04% share of world export of Nucleic Acid and constitutes the 8th largest export in the world.

Table - 6

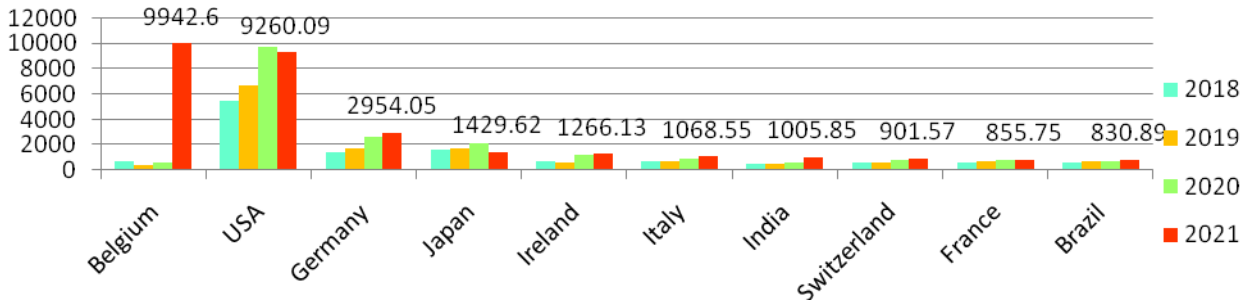
World's top 10 Importers of Nucleic Acids (H.S Code-2934)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Belgium	673.46	3.64	392.55	1.94	571.86	2.15	9942.60	27.09
2.	USA	5457.07	29.46	6693.64	33.02	9662.01	36.33	9260.09	25.23
3.	Germany	1435.49	7.75	1735.23	8.56	2605.14	9.79	2954.05	8.05
4.	Japan	1642.73	8.87	1743.09	8.60	2081.42	7.83	1429.62	3.90
5.	Ireland	693.18	3.74	559.10	2.76	1246.93	4.69	1266.13	3.45
6.	Italy	706.12	3.81	664.27	3.28	868.53	3.27	1068.55	2.91
7.	**India**	**498.31**	**2.69**	**500.76**	**2.47**	**644.02**	**2.42**	**1005.85**	**2.74**
8.	Switzerland	562.90	3.04	600.40	2.96	817.86	3.07	901.57	2.46
9.	France	612.66	3.31	685.19	3.38	802.50	3.02	855.75	2.33
10.	Brazil	594.60	3.21	692.86	3.42	685.79	2.58	830.89	2.26
	Others	5648.97	30.49	6002.61	29.61	6612.64	24.86	7183.05	19.57
	Total	18525.48	100	20269.69	100	26598.69	100	36698.15	100

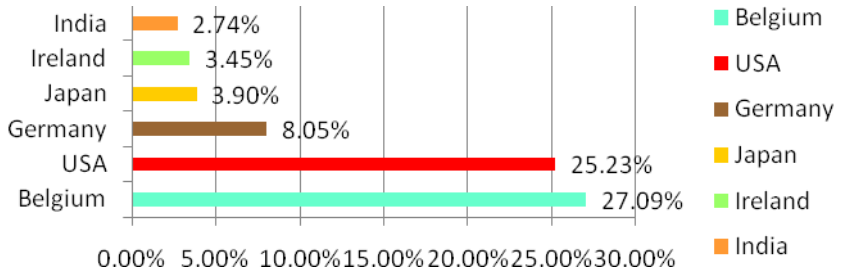
Source :UNComtrade

Top world importers of Nucleic Acids from 2018 to 2021 **(Values in million USD)**

Data label given on the basis of 2021



Country wise leading global Importer of Nucleic Acids by percentage in 2021

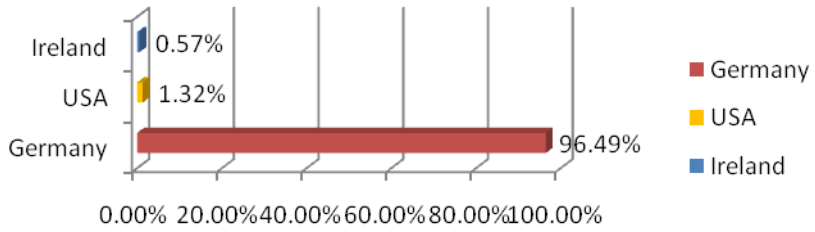


Belgium imported around US $ 10 Billion worth of Nucleic Acid in 2021, making it the leading importer of Nucleic Acid worldwide that year. USA followed in the second place, importing around US $ 9.26 Billion worth of the commodity. It was followed by Germany, imported around US $ 3 Billion of Nucleic Acid in the same year. **India's** share was 2.74% share of world import and making it the 7th largest importer world wide in that year. Over the period under review, Belgium, USA and Germany were the top three importer of Nucleic Acid up to the year 2020.

Annexure-II

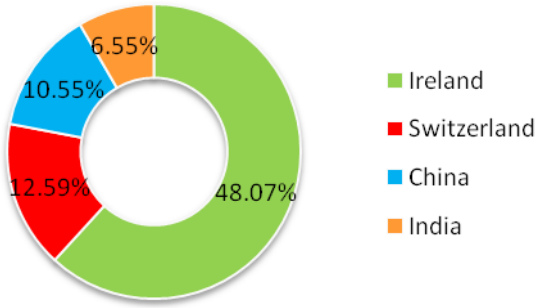
Sources of world's top three importers of Nucleic Acids (H.S Code-2934)

i) Top 3 Sources of Nucleic Acids to Belgium in 2021 by percentage:



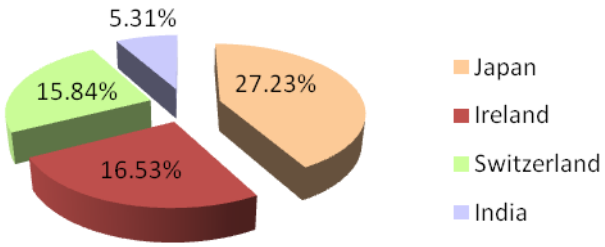
In the year 2021Belgium, imports largest worth value of Nucleic Acid, 96.49% share imported from Germany, which was very much distantly followed by USA (1.32 %) and Ireland (0.57%). **India** has exported only 0.11% share of Belgium's total import of Nucleic Acid in 2021.**(Source: UN Comtrade)**

ii) Top 3 Sources of Nucleic Acids to USA in 2021 by percentage**:**



Ireland was the number one source of Nucleic Acid to USA, imports 48.07% share from Ireland, 12.59% from Switzerland and 10.55% share from China in 2021. In the same year **India** has exported 6.55% of Nucleic Acid to USA. **(Source: UN Comtrade)**

iii) Top 3 Sources of Nucleic Acids to Germany in 2021 by percentage**:**



Japan was the largest source country of Nucleic Acid to Germany in 2021, Germany imports, 27.23% share of its total import of Nucleic Acid from Japan in that year. Germany imported 16.35% from Ireland and 15.84% Nucleic Acid from Switzerland. **India** exported 5.31% share of Germany's total import of Nucleic Acid in that year. **(Source : UN Comtrade)**

IMPORT

Silicon in Primary forms

Silicon is a chemical element with the symbol **Si** and atomic number 14. It is a hard, brittle crystalline solid with a blue-grey metallic luster, and is a tetravalent metalloid and semiconductor. It is a member of group 14 in the periodic table: carbon is above it; and germanium, tin, lead, and flerovium are below it. It is relatively unreactive.

Because of its high chemical affinity for oxygen, it was not until 1823 that Jöns Jakob Berzelius was first able to prepare it and characterize it in pure form. Its oxides form a family of anions known as silicates. Its melting and boiling points of 1414 °C and 3265 °C, respectively, are the second highest among all the metalloids and nonmetals, being surpassed only by boron.

Silicon is the eighth most common element in the universe by mass, but very rarely occurs as the pure element in the Earth's crust. It is widely distributed in space in cosmic dusts, planetoids, and planets as various forms of silicon dioxide (silica) or silicates. More than 90% of the Earth's crust is composed of silicate minerals, making silicon the second most abundant element in the Earth's crust (about 28% by mass), after oxygen.

Most silicon is used commercially without being separated, often with very little processing of the natural minerals. Such use includes industrial construction with clays, silica sand, and stone. Silicates are used in Portland cement for mortar and stucco, and mixed with silica sand and gravel to make concrete for walkways, foundations, and roads. They are also used in whiteware ceramics such as porcelain, and in traditional silicate-based soda-lime glass and many other specialty glasses. Silicon compounds such as silicon carbide are used as abrasives and components of high-strength ceramics. Silicon is the basis of the widely used synthetic polymers called silicones.

The late 20th century to early 21st century has been described as the Silicon Age (also known as the Digital Age or Information Age) because of the large impact that elemental silicon has on the modern world economy. The small portion of very highly purified elemental silicon used in semiconductor electronics is essential to the transistors and integrated circuit chips used in most modern technology such as smartphones and other computers. In 2019, 32.4% of the semiconductor market segment was for networks and communications devices, and the semiconductors industry is projected to reach $726.73 billion by 2027.

Silicon is an essential element in biology. Only traces are required by most animals, but some sea sponges and microorganisms, such as diatoms and radiolaria, secrete skeletal structures made of silica. Silica is deposited in many plant tissues.

Owing to the abundance of silicon in the Earth's crust, natural silicon-based materials have been used for thousands of years. Silicon rock crystals were familiar to various ancient civilizations, such as the predynastic Egyptians who used it for beads and small vases, as well as the ancient Chinese. Glass containing silica was manufactured by the Egyptians since at least 1500 BC, as well as by the ancient Phoenicians. Natural silicate compounds were also used in various types of mortar for construction of early human dwellings.

Silicon is widely used in following sector:

- The element is a major constituent in ceramics and bricks.
- Being a semiconductor, the element is put into use for making transistors.
- Silicon is widely used in computer chips and solar cells.
- It is a vital component of Portland cement.
- Silicon is used in the production of fire bricks.

These are broadly classified under **H. S. Code 3910**.

Table - 7

India's Top 10 Sources of Chocolates and other preparations of Cocoa (HS Code :1806)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	85.28	31.01	75.10	30.66	35.05	29.96	103.99	36.32
2.	Germany	80.08	29.12	70.39	28.74	34.56	29.55	77.32	27.01
3.	U S A	26.76	9.73	25.63	10.46	13.45	11.50	27.98	9.77
4.	Belgium	15.36	5.59	16.25	6.64	7.23	6.18	13.63	4.76
5.	Japan	14.96	5.44	11.58	4.73	5.15	4.40	12.83	4.48
6.	Korea RP	14.89	5.41	11.21	4.58	5.08	4.34	12.48	4.36
7.	Thailand	13.68	4.98	16.76	6.84	7.28	6.22	12.48	4.36
8.	Netherland	1.58	0.57	3.17	1.29	2.15	1.84	4.32	1.51
9.	Vietnam	0.01	0.01	0.03	0.01	0.12	0.10	3.81	1.33
10.	U K	6.11	2.22	2.35	0.96	0.72	0.62	2.63	0.92
	Others	16.31	5.93	12.48	5.09	6.19	5.29	14.87	5.19
	Total	275.02	100	244.95	100	116.97	100	286.33	100

Source: DGCI&S

Note : India's Import including re-import

Imports of Silicon in primary form in India increased to US $ 286.33 Million in 2021 from US $ 116.97 Million in 2020. Over the period under review, global Silicon in primary form imports attained its maximum worth value of US $ 286.33 Million in 2021. In 2021 India imported the highest dollar worth of Silicon in primary form from China with valued at US $ 104 Million. In Second and Third source countries were Germany and USA , from where India imported around US $ 77.32 Million and US $ 28 Million worth of Silicon in primary form respectively. In the same year. The top 10 countries shared 94.81% of the Silicon in primary form import to India.

Table - 8

World Top 10 Importer of Silicon in Primary forms (HS Code 3910)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	China	827.07	9.84	841.07	11.10	817.57	12.25	927.80	10.84
2.	USA	707.95	8.43	619.31	8.17	559.14	8.38	735.86	8.60
3.	Rep of Korea	590.50	7.03	505.71	6.67	433.07	6.49	617.14	7.21
4.	Germany	560.90	6.68	488.00	6.44	434.71	6.51	559.18	6.53
5.	Italy	418.13	4.98	361.65	4.77	312.64	4.68	420.02	4.91
6.	Netherlands	308.71	3.67	281.76	3.72	248.37	3.72	350.79	4.10
7.	U K	326.92	3.89	305.57	4.03	277.48	4.16	339.16	3.96
8.	France	303.91	3.62	304.83	4.02	243.44	3.65	307.17	3.59
9.	**India**	**274.85**	**3.27**	**244.87**	**3.23**	**188.86**	**2.83**	**286.58**	**3.35**
10.	Mexico	228.58	2.72	220.12	2.91	196.83	2.95	251.96	2.94
	Others	3854.76	45.88	3403.71	44.92	2962.86	44.39	3762.75	43.97
	Total	8402.29	100	7576.60	100	6674.97	100	8558.42	100

Source :UNComtrade

In 2021 Global import of Silicon in primary form totaled were US $ 8.55 Billion, which was increased by 28.22% from the year of 2020. Global import of the Commodity peaked of US $ 8.55 Billion in 2021. In value terms, China constitutes the largest market for imported Silicon in primary form worldwide with worth value of US $ 927.80 Million, making up 10.84% of global imports. The second position in the ranking was occupied by USA (US $ 735.86 M), with the share of 8.60% of global imports. It was followed by the Rep. of Korea with the share of 7.21%. In the same year **India** constitutes the 9th position in ranking with 3.35% share of world import.

Glycosides

A **Glycosides** is a molecule in which a sugar is bound to another functional group via a glycosidic bond. Glycosides play numerous important roles in living organisms. Many plants store chemicals in the form of inactive glycosides. These can be activated by enzyme hydrolysis, which causes the sugar part to be broken off, making the chemical available for use. Many such plant glycosides are used as medications. Several species of *Heliconius* butterfly are capable of incorporating these plant compounds as a form of chemical defense against predators. In animals and humans, poisons are often bound to sugar molecules as part of their elimination from the body.

In formal terms, a glycoside is any molecule in which a sugar group is bonded through its anomeric carbon to another group via a glycosidic bond. Glycosides can be linked by an O-, N-, S-, or C- glycosidic bond. According to the IUPAC, the name "*C*-glycoside" is a misnomer; the preferred term is "*C*-glycosyl compound". The given definition is the one used by IUPAC, which recommends the Haworth projection to correctly assign stereochemical configurations.

Many authors require in addition that the sugar be bonded to a *non-sugar* for the molecule to qualify as a glycoside, thus excluding polysaccharides. The sugar group is then known as the glycone and the non-sugar group as the aglycone or genin part of the glycoside. The glycone can consist of a single sugar group, two sugar groups, or several sugar groups.

The first glycoside ever identified was amygdalin, by the French chemists Pierre Robiquet and Antoine Boutron-Charlard, in 1830.

Various medicines, condiments, and dyes from plants occur as glycosides; of great value are the heart-stimulating glycosides of *Digitalis* and *Strophanthus*, members of a group known as cardiac glycosides. Several antibiotics are glycosides (*e.g.*, streptomycin). Saponins, widely distributed in plants, are glycosides that lower the surface tension of water; saponin solutions have been used as cleansing agents.

Glycosides derived from glucuronic acid (the uronic acid of glucose) and steroids are constituents of normal animal urine. Compounds (nucleosides) derived from the partial breakdown of nucleic acids are also glycosides.

Glycosides are of commercial interest for industry in general and specifically for the pharmaceutical and food industry. Currently chemical preparation of glycosides will not meet EC food regulations, and therefore chemical preparation of glycosides is not applicable in the food industry. Thus, enzyme-catalyzed reactions are a good alternative. However, until now the low yields obtained by enzymatic methods prevent the production of glycosides on a commercial scale. Therefore, high yields should be established by a combination of optimum reaction conditions and continuous removal of the product. Unfortunately, a bioreactor for the commercial scale production of glycosides is not available. The aim of this article is to discuss the literature with respect to enzymatic production of glycosides and the design of an industrially viable bioreactor system.

Glycosides are very important in various industrial applications. Glycosides derived from long chain alkanols possess good surfactant and emulsifying properties, and are therefore applied in detergents and cosmetics. Terpene and phenolic glycosides are found to have antifungal and antimicrobial activity and have attracted great attention in food industry. Terpene and phenolic glycosides are found to have antifungal and antimicrobial activity and have attracted great attention in food industry. Glycosides of peptides and steroids are used in antitumor formulations and cardiac-related drugs, respectively. Aroma glycosides are an important class of nonvolatile precursors that are currently gaining increased interest and attention for their role in imparting unique aroma to food.

These are broadly classified under **H. S. Code 2938**.

Table - 9

India's Top 10 Source Countries of Glycosides (HS Code : 2938)

Rank	Countries	2018		2019		2020		2021	
		Value (million $)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	Spain	23.81	35.86	24.14	34.62	16.00	34.12	25.05	41.10
2.	China	30.40	45.80	32.83	47.07	21.16	45.15	12.25	20.11
3.	Malaysia	1.62	2.43	2.58	3.70	4.60	9.81	10.50	17.23
4.	U S A	1.16	1.75	0.96	1.38	0.49	1.05	4.92	8.07
5.	France	2.08	3.14	3.09	4.43	1.96	4.17	2.96	4.85
6.	Germany	2.21	3.32	1.11	1.59	0.15	0.31	2.85	4.67
7.	Vietnam	0.51	0.77	0.77	1.10	0.34	0.72	0.70	1.14
8.	Bangladesh	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.46
9.	Singapore	0.22	0.34	0.21	0.30	0.16	0.35	0.25	0.41
10.	Hong Kong	0.10	0.15	0.13	0.19	0.00	0.00	0.23	0.38
	Others	4.27	6.44	3.91	5.61	2.02	4.32	0.95	1.56
	Total	66.39	100	69.73	100	46.87	100	60.93	100

Source: DGCI&S

Note : India's Import including Re-import

There are so many countries India imports Glycosides, from. The dollar value of Glycosides import in 2021 stood at US $ 60.93 Million and US $ 46.87 Million in 2020. Which shows a growth of almost 29.99% from 2020. In 2021 India imported the highest dollar worth of Glycosides from Spain with valued at US $ 25.05 Million. In Second and Third major sources were China and Malaysia, from which India imported around US $ 12.25 Million and US $ 10.50 Million worth of Glycosides respectively. In the same year The top 10 countries shared 98.44% of the import to India.

Table - 10

World Top 10 Importer of Glycosides (HS Code : 2938)

Rank	Countries	2017		2018		2019		2020	
		Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)	Value (million$)	Share (%)
1.	USA	206.88	15.89	227.92	17.66	321.22	23.70	438.49	27.66
2.	China	133.33	10.24	130.74	10.13	121.37	8.96	112.65	7.11
3.	France	77.02	5.92	93.08	7.21	107.92	7.96	103.93	6.55
4.	Russia	54.63	4.20	50.84	3.94	48.35	3.57	79.82	5.03
5.	Spain	42.12	3.24	50.02	3.88	58.04	4.28	62.74	3.96
6.	**India**	**66.74**	**5.13**	**69.73**	**5.40**	**70.66**	**5.21**	**60.87**	**3.84**
7.	Germany	70.35	5.40	37.08	2.87	48.03	3.54	60.74	3.83
8.	Malaysia	78.39	6.02	92.40	7.16	60.32	4.45	59.78	3.77
9.	Rep. of Korea	38.35	2.95	39.97	3.10	39.66	2.93	50.08	3.16
10.	Japan	54.27	4.17	49.86	3.86	45.84	3.38	48.63	3.07
	Others	479.72	36.85	448.63	34.77	433.80	32.01	507.80	32.03
	Total	1301.79	100	1290.28	100	1355.21	100	1585.54	100

Source :UNComtrade

Global Glycosides imports amounted to US $ 1.58 Billion in 2021, approximately increasing by 16.99% from the previous year level. Over the period under review, global Glycosides imports attained its maximum worth value of US $ 1.58 Billion in 2021. In 2021 USA (US $ 438.49 M) constitutes the largest market for imported Glycosides worldwide, making up 27.66 % of global imports. The second position in the ranking was occupied by China (US $ 112.65 M), with the share of 7.11% of global imports. It was followed by the France, with the share of 6.55%. In the same year **India** has imported US $ 60.87 Million of Glycosides from world and occupied 6th position in ranking in the world import of Glycosides with 3.84% share of world import.